JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

COURSE: SOFTWARE TESTING

(Credit: 6)

Course Outcome: To develop the understanding of fundamentals of software testing, various techniques of testing like manual and automated testing.

Unit-I (Introduction)

(Credits: 2)

Introduction and concept learning: Basic definitions, Testing axioms, Purpose of Software Testing, Software Testing Principles, The Tester's Role in a Software Development Organization, Origins of Defects, Cost of defects, Defect Classes, Defect Prevention strategies, Defect Repository, Strategies for Software Testing, Testing Activities, Mistakes, Faults & Failures, Verification and Formal Methods, Planning for Verification and Validation.

Unit-II (Manual Testing Methods)

(Credits: 2.5)

White-Box Testing: Test Adequacy Criteria, Static Testing, Structural Testing, Code Complexity Testing, Mutation Testing, Data Flow Testing. Black-Box Testing: Test Case Design Criteria, Requirement Based Testing, Positive and Negative Testing, Boundary Value Analysis, Equivalence Partitioning State Based Testing, Domain Testing. Functional Testing: Test Plan, Test Management, Test Execution and Reporting, Test Specialist Skills, Tester's Workbench and Tool Categories, Debugging, Test Bed, Traceability and Testability, Attributes of Testable Requirements, Test Matrix, Types of Testing Documentation, Verification Testing, Validation Testing, Integration Testing, System and Acceptance Testing, GUI Testing, Regression Testing, Selection, Minimization and Prioritization of Test Cases for Regression Testing, Creating Test Cases from Requirements and Use cases, Test Design.

Unit-III (Test Automation)

(Credits: 1.5)

Test Automation: Software test automation – skill needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation – Test metrics and measurements – project, progress and productivity metrics.

Recommended Books & References:

1. W. E. Perry, *Effective Methods for Software Testing,* John Wiley and Sons, 2000.
2. R. Patton, *Software Testing*, Sams Publishing, 2005.
3. A. P. Mathur*, Foundations of Software Testing*, Pearson Education, 2013.
4. J. L. Mitchell, R. Black, *Advanced Software Testing—Vol. 3*, Rocky Nook, 2015.

COURSE: LINUX SYSTEM AND SHELL PROGRAMMING

(Credit: 6)

Course Outcomes: To develop the understanding of Linux operating system and its operations. The main objective is to develop the understanding of various operating systems and working on them as per requirements, practically.

Unit-I (Introduction to Linux)

(Credits: 2)

Fundamentals: Processes in Linux, I/O system calls, select and poll functions, Filters and redirection, Linux file system navigation, Directory access, File system implementation, Hard links and symbolic links. Asynchronous Events: Manipulating signal masks and signal sets, Catching and ignoring signals, waiting for signals.

Unit-II (Inter-Process Communication)

(Credits: 2)

Inter-Process Communication: Sockets, Remote procedure calls, Network file system. Concurrency: POSIX thread attributes, Synchronization functions, Mutex locks, Condition variables, Signal handling and threads. Character Device Driver Development: Driver concepts, Writing character drivers, Interrupt handling, Interfacing with hardware. Shell Scripting: Loops, Conditional statements, Command line arguments, test command, expr command.

Unit-III (Advanced Scripting Techniques)

(Credits: 2)

Advanced Scripting Techniques: Providing command line options to scripts, exporting variables, Arrays, Remote shell execution, connecting to MySQL using shell, Essential system administration.

Recommended Books & References:

1. W. R. Stevens, S. A. Rago, *Advanced Programming in the UNIX Environment*, (3e), Addison-Wesley, 2013.
2. R. Love, *Linux System Programming: Talking Directly to the Kernel and C Library,* O'Reilly, 2007.
3. S. Das, *Unix Concepts and Applications*, (4e), McGraw Hill, 2006.
4. W. R. Stevens, B. Fenner, *UNIX Network Programming, Volume 1: The Sockets Networking API,* (3e), Pearson, 2003.
5. K. A. Robbins, S. Robbins, *Unix Systems Programming: Communication, Concurrency, and Threads*, (2e), Prentice Hall, 2004.

COURSE: WIRELESS SENSOR & ADHOC NETWORK

(Credit: 6)

Course Outcome: To develop the understanding of adhoc networks, standards and benefits of using sensors for smart devices used in daily life.

Unit-I (Introduction to ad-hoc networks)

(Credits: 2)

Introduction to ad-hoc networks: Definition, characteristics features, applications. Characteristics of Wireless channel, Ad-hoc Mobility Models: Indoor and outdoor models. MAC Protocols: design issues, goals and classification. Contention based protocols with reservation, scheduling algorithms, protocols using directional antennas.

Unit-II (IEEE standards, protocols and security)

(Credits: 2)

IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN.Routing Protocols: Design issues, goals and classification.Proactive Vs reactive routing, Unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, Energy aware routing algorithm, Hierarchical Routing, QoS aware routing. Transport layer: Issues in designing- Transport layer classification, ad-hoc transport protocols. Security issues in ad-hoc networks: issues and challenges, network security attacks, secure routing protocols. Cross layer Design: Need for cross layer design, cross layer optimization, parameter optimization techniques, Cross layer cautionary perspective. Integration of ad-hoc with Mobile IP networks. Mesh Networks, Vehicular Area Networks, and Mobile Ad Hoc Networks (MANETs).

Unit-III (Introduction to sensor networks and its applications)

(Credits: 2)

Introduction to sensor networks and its applications: Architecture and factors influencing the sensor network design. Routing protocols- data centric routing protocols, hierarchical routing protocols, location based routing, energy efficient routing etc. Node Scheduling and coverage issues, topology control.Querying, data collection and processing.

Recommended Books & References:
1. S. K. Sarkar, T G Basavaraju, C Puttamadappa, *Ad Hoc Mobile Wireless Networks: Principles, Protocols, and Applications,* (2e), CRC Press,2016.
2. C. D. Morais Cordeiro, D. P. Agrawal, *Ad Hoc and Sensor Networks: Theory and Applications,* (2e), World Scientific Publishing, 2011.
3. H. Karl, A. Willing, *Protocols and Architectures for Wireless Sensor Networks,* John Wiley & Sons, 2007.
4. R. Jurdak, *Wireless Ad Hoc and Sensor Networks: A Cross-Layer Design Perspective*, Springer Publications, 2007.
5. S R Murthy, B. S. Manoj, *Ad Hoc Wireless Networks Architectures and Protocols,* Pearson   Education, 2008.

COURSE: MOBILE COMPUTING

(Credit: 6)

Course Outcome: To develop the understanding of wireless communications, telecommunication systems and the working of wireless networks using some security aspects.

Unit-I (Wireless Communication Fundamentals)

(Credits: 2)

Wireless Communication Fundamentals: Introduction wireless transmission, Frequencies for radio transmission, Signals, Antennas, Signal propagation, Multiplexing, Modulations spread spectrum, MAC, SDMA, FDMA, TDMA, CDMA, Cellular wireless networks.

Unit-II (Telecommunications Systems)

(Credits: 2)

Telecommunications Systems: GSM, System architecture protocols, Connection establishment, Frequency alocation, Routing, handover, Security, GPRS. Wireless Networks: Wireless LAN-IEEE 802.11 Standards, Architecture, Services HIPERLAN, AdHoc Network, Bluetooth mobile network layer: Mobile IP, Dynamic host configuration protocol.

Unit-III (Routing)

(Credits: 2)

Routing: DSDV, DSR, Alternative metrics, Wireless application protocol. Mobile Ad hoc Networks: Overview, Properties of a MANET, Spectrum of MANET applications, Routing and various routing algorithms, Security in MANET.

Recommended Books & References:
1. W. Stallings, *Wireless Communications and Networks,* (2e)Pearson Education, 2018.
2. J. Schiller, *Mobile Communications,* (2e), *Pearson Education*, 2009.
3. K. Garg, *Mobile Computing: Theory and Practice,* (1e) Pearson Education India, 2010.

COURSE: NATURAL LANGUAGE PROCESSING

(Credit: 6)

Course Outcome: To develop the understanding of various language formats used in computer systems and how these languages processed in the computer systems.

Unit-I (Introduction)

(Credits: 2)

Introduction: Ambiguity and uncertainty in language, processing paradigms, phases in natural language processing. Text representation in computers: encoding schemes. Linguistics resources: Introduction to corpus, elements in balanced corpus, WordNet, VerbNet. Part of Speech tagging: Stochastic POS tagging, HMM, Transformation based tagging (TBL), handling of unknown words, named entities, multi word expressions.

Unit-II (Natural language grammars)

(Credits: 2)

Natural language grammars: lexeme, phonemes, phrases and idioms, word order, agreement, tense, aspect and mood and agreement, context free grammar, spoken language syntax. Parsing- unification, probabilistic parsing, tree-bank. Semantics: meaning representation, semantic analysis, and lexical semantics.

Unit-III (Word Sense Disambiguation)

(Credits: 2)

Word Sense Disambiguation: selection restriction, machine learning approaches, dictionary based approaches. Discourse: Reference resolution, constraints on co-reference, algorithm for pronoun resolution, text coherence, discourse structure. Real time Applications of NLP: text to speech, text summarization, information retrieval, sentiment analysis, machine translation.

Recommended Books & References:
1.   D. Jurafsky, J. H. Martin, *Speech and Language Processing*, (2e), Pearson Education, 2009.
2.   T. Siddiqui, U. S. Tiwary, *Natural language processing and Information retrieval,* Oxford University Press, 2008.

COURSE: COMPUTER VISION

(Credit: 6)

Course Outcome: To develop the understanding of a computer system which uses various algorithms and methods to enhance images, graphics, and use of neural networks.

Unit-I (Introduction)

(Credits: 2)

Introduction to computer vision and its applications, Geometric Image Features: Differential Geometry, Contour Geometry, analytical image features: Euclidean geometry, Geometric Camera Parameters, Calibration methods, Image formation, Liner Filtering: Linear filters and convolution, shift invariant linear systems, spatial frequency and Fourier transforms,

Unit-II (Image Properties)

(Credits: 2)

Image transformations and Colour models, Edge Detection methods (Laplacian detectors and Canny edge detector), Points and patches, Harris corner detector, Histogram of Gradients, Difference of Gaussian detector, SIFT, Colour and Texture, Feature based alignment, least squares and RANSAC, Camera models, Camera calibration,

Unit-III (Methods and properties)

(Credits: 2)

Stereo vision, Stereo correspondence, Epipolar geometry Optical flow, Lucas Kanade method, KLT tracking method, Mean shift method, Dense motion estimation, Support Vector Machines, Face detection and recognition, Bag of words, Deep convolution neural network.

Recommended Books & References:
1. R. Szeliski, *Computer Vision: Algorithms and Applications*, Springer 2011.
2. D. A. Forsyth, J. Ponce, *Computer Vision: A Modern Approach*, (2e), PHI learning, 2012
3. J. E. Solem, *Programming Computer Vision with Python*, O'Reilly, 2012.

VIII SEMESTER

MAJOR PROJECT:

In this course student has to select a project work based on a topic of interest. Periodically the supervisor will evaluate the implementation. This work, started in eighth semester of which, the student will be evaluated internally and externally.

Outcome of the course:

Investigating professional topics, including ethical, legal and security issues, related to computing projects.

Design and develop the software with Software Engineering practices and standards

Apply prior knowledge to design and implement solutions for computational problems while considering numerous realistic restraints.

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JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

Faculty of Education and Methodology
Department of Science & Technology

BACHELOR OF COMPUTER APPLICATION (BCA)

SESSION – 2022-23

DURATION – 3 YEARS (6 SEMESTERS)

SYLLABUS FOR:
1-3 YEAR

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

PROGRAM DETAIL

Name of Program	Bachelor of Computer Application (BCA)
Program Code	BCA
Mode of Program	Semester
Duration of Program	3years/ 6 Semester
Total Credits of Program	202
Curriculum Type and Medium Choice	English

Program Outcomes:

- The curriculum is designed to bridge the gap between the IT industry and academia by incorporating the latest technologies into the curriculum along with practical training sessions and collaborative learning experiences led by a dedicated and qualified learning community.
- BCA is a three-year professional undergraduate program.

- This is the science that deals with the theory and methods of information processing in digital computers, the design of computer hardware and software, and the applications of computers.

- This program is designed with the intention of producing highly skilled, adaptable IT graduates in industries with the ability to design IT based solutions for the modern world.

- Practical sessions in computer laboratories using various programming languages and tools provide a deep conceptual understanding of the subjects to broaden the horizons of self-experience of the students.

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

SYLLABUS DETAIL
I SEMESTER

Nature of Course	Course Name	C	T	P
Mathematics	Mathematics- I	**6**	**6**	**0**
Core Computer Science	Computer Fundamentals	**6**	**6**	**0**
Core Computer Science	Fundamentals of Digital Systems	**6**	**5**	**1**
Core Computer Science	C Programming	**6**	**4.5**	**1.5**
Core Computer Science	Technical Communication	**6**	**6**	**0**
University Compulsory Course	English Communication	**1**	**1**	**0**
University Compulsory Course	Extra-Curricular Activities	**1***	**0**	**1**
University Compulsory Course	Community Development Activities	**1***	**0**	**1**
Portfolio Development Activity	Portfolio (Government/Corporate/ Entrepreneur)	**0.8**	**0.8**	**0**
Total Credits		**33.8**	**29.3**	**4.5**

For Theory 1 Credit equal to 10 Hours
For Practical 1 Credit equal to 20 Hours

II SEMESTER

Nature of Course	Course Name	C	T	P
Mathematics	Mathematics –II	**6**	**6**	**0**
Management	Financial and Accounting Management	**6**	**6**	**0**
Core Computer Science	Data Structures	**6**	**4**	**2**
Core Computer Science	Database Management System	**6**	**5**	**1**
Core Computer Science	Principles of Programming Languages	**6**	**6**	**0**
University Compulsory Course	Extra Curricular Activities	**1***	**0**	**1**
University Compulsory Course	Community Development Activities	**1***	**0**	**1**
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	**3.2**	**2.2**	**1**
University Optional Course	Professional Activity	**--**	**--**	**0**
Total Credits		**35.2**	**29.2**	**6.0**

Credits & Hours:
For Theory 1 Credit equal to 10 Hours
For Practical 1 Credit equal to 20 Hours

III SEMESTER

Nature of Course	Course Name	C	T	P
Mathematics	Basic Statistics and Probability	6	6	0
Core Computer Science	Computer Organization and Architecture	6	6	0
Core Computer Science	Web Programming	6	4.5	1.5
Core Computer Science	Object Oriented Programming using Java	6	5	1
Core Computer Science	Data Communication & Protocols	6	6	0
University Mission Course	Women's Rights And Law	1	1	0
University Compulsory Course	Extra Curricular Activities	1*	0	1
University Compulsory Course	Community Development Activities	1*	0	1
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	0.8	0.8	0
Total Credits		33.8	29.3	4.5

For Theory 1 Credit equal to 10 Hours
For Practical 1 Credit equal to 20 Hours

IV SEMESTER

Nature of Course	Course Name	C	T	P
Mathematics	Numerical Methods	6	**6**	**0**
Core Computer Science	Operating Systems	6	**5**	**1**
Core Computer Science	Open Elective-I	6	**6**	**0**
Core Computer Science	Python Programming	6	**45**	**1.5**
Core Computer Science	Software Engineering	6	**6**	**0**
University Compulsory Course	EVS & DM	1	**1**	**0**
University Compulsory Course	Extra Curricular Activities	1*	**0**	**1**
University Compulsory Course	Community Development Activities	1*	**0**	**1**
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	2.2	**2.2**	**0**
University Optional Course	Professional Activity	--	**--**	**--**
Total Credits		**35.2**	**31.2**	**4.0**

Credits & Hours:
    For Theory 1 Credit equal to 10 Hours
    For Practical 1 Credit equal to 20 Hours

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

V SEMESTER

Nature of Course	Course Name	C	T	P
Core Computer Science	Data Warehousing using OLAP	**6**	**5**	**1**
Core Computer Science	Mobile Application Development	**6**	**5**	**1**
Core Computer Science	OOAD Using UML	**6**	**6**	**0**
Core Computer Science	Program Elective-I	**6**	**6**	**0**
Core Computer Science	Introduction to Cloud Computing	**6**	**6**	**0**
Professional Development Activity	Industrial Visit	**1**	**1**	**0**
University Mission Course	Help Aid	**1**	**1**	**0**
University Compulsory Course	Extra-Curricular Activities	**1***	**0**	**1**
University Compulsory Course	Community Development Activities	**1***	**0**	**1**
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	**0.8**	**0.8**	**0**
University Optional Course	Professional Activity	**--**	**--**	**--**
Total Credits		**34.8**	**30.8**	**4.0**

For Theory 1 Credit equal to 10 Hours
For Practical 1 Credit equal to 20 Hours

VI SEMESTER

Nature of Course	Course Name	C	T	P
Core Computer Science	Cryptography Fundamentals	6	6	0
Core Computer Science	Fundamentals to Machine Learning	6	4.5	1.5
Core Computer Science	Fundamentals to Mobile Computing	6	4	2
Core Computer Science	Open Elective-II	6	5	1
Professional Development Activity	Project	60 Days		
University Mission Course	Gender Sensitization	1	1	0
University Compulsory Course	Extra-Curricular Activities	1*	0	1
University Compulsory Course	Community Development Activities	1*	0	1
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	2.2	2.2	0
University Optional Course	Professional Activity	--	--	--
Total Credits		**29.2 + 60 Days**	**22.7**	**6.5**

Credits & Hours:
For Theory 1 Credit equal to 10 Hours
For Practical 1 Credit equal to 20 Hours

BCA SYLLABUS
I SEMESTER

Course: MATHEMATICS- I   (Credits: 6)

Course Outcomes: The skill of selecting and applying appropriate numerical methods to obtain approximate solutions to difficult mathematical problems. Demonstrating the working of various numerical methods.

Unit-I (Overview of Functions and Continuity)   (Credits: 1.5)

Theory

Function: Definition, domain and range of function, types of functions (into, onto, one to one), composite function.

Limit: Definition, first principle, properties, and simple problems related to limit. Some standard limits.

Continuity: Definition, continuity of sum, product, difference and quotient of two continuous functions, simple problems.

Unit-II (Overview of Differentiation)   (Credits: 2)

Theory

Special Functions: Trigonometric functions and their properties, exponential functions, logarithmic functions, hyperbolic functions, inverse circular functions and related properties, simple problems. Rational functions, partial fraction and simple problems.

Differentiation: Definition, differentiation of simple functions using first principle, differentiation of trigonometric functions and inverse circular functions, method of substitution, differentiation of product and quotient of functions, maxima and minima of a function of single variable.

Unit-III (Overview of Integration)   (Credits: 1.5)

Theory

Integration: Definition, integration of simple functions using substitution, integration of trigonometric and inverse circular functions and related problems, integration by parts, integration of rational functions. Definite integral and their properties, simple problems. Reduction formula and simple problems.

Reference Books:

1. B.S. Grewal, "Elementary Engineering Mathematics", 34th Ed., 1998.
2. Shanti Narayan, "Integral Calculus", S. Chand & Company, 1999
3. H.K. Dass, "Advanced Engineering Mathematics", S. Chand & Comp
4. J.P. Chauhan "BCA Mathematics Volume -1", Krishna Publications.

Course: COMPUTER FUNDAMENTALS

Course Outcomes: To understand the working of basic input and output devices. Learn basic word processing skills with Microsoft Word, such as text input and formatting, editing, cut, copy and paste, spell check, margin and tab controls, keyboard shortcuts, printing, as well as how to incorporate some graphics such as pictures and charts.

Unit-I (Introduction to Computers)   **(Credits: 2)**
Theory
Introduction: Basic Definitions, Data, information, bits, byte, software, hardware, memory, Characteristics of a computer. Block diagram of a computer. Generation of Computers, Types of Computers, Memory and its types.

UNIT-II (I/O Devices)   **(Credits: 2)**
Theory
Input Devices, Output Devices, Monitors Characteristics, Digital and Analog singnals. Video Standard: VGA, SVGA, Types of printer, Storage Devices: Primary Vs Secondary memory, Storage Fundamentals, Data Storage and Retrieval Methods, Various Storage Devices.

UNIT-III (Software and Languages)   **(Credits: 2)**
Theory
Software: Types of software: System Software, Application Software. Operating Systems: types and functions. Programming Languages: Machine Language, Assembly language, High level language.Assembler, Compilers and Interpreter.Introduction to MS-Office.

Reference Books:
1. Fundamental of Computers – By V.Rajaraman B.P.B. Publications
2. Fundamental of Computers – By P.K. Sinha
3. Computer Today- By Suresh Basandra
4. MS-Office 2000(For Windows) – By Steve Sagman

Course: Fundamentals of Digital Systems

Course Outcomes: Digital system design and analysis. Computer arithmetic and data representation. Digital logic switch and gate design. Synchronous sequential logic design and analysis, finite-state machines.

UNIT I – (Introduction of Number System and Boolean algebra) **(Credits: 1.5)**

Theory

Introduction: Number system, Boolean algebra, De-Morgan's law, simplification of Boolean algebra, Logic Gates: basic and universal gates.

Practical: **(Credit: 0.5)**

S.No.	Name of Practical
1	Study of BASIC Gates
2	Study of Universal Gates

UNIT II- (Combination Circuit) **(Credits: 1.5)**

Theory

Simplification method: K-map and tabulation method. Combination circuit: introduction to combinational circuit, half adder circuit, full adder circuit, half subtracted, full subtracted, binary parallel adder, carry propagation, magnitude comparator, decoder, encoder, multiplexer, demultiplexer circuit, design of code converter, parity bit generator and checker

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Study of Haff Adder
2	Study of Full Adder and Sub Tractor using Gates
3	Study of Magnitude Comparator.
4	Study of Multiplexer.
5	Study of Demultiplexer.

UNIT III (Sequential Circuit Design) **(Credits: 1.5)**

Theory

Sequential Circuit Design: Introduction to flip flop. Types of flip flop: S-R, D, J-K, T, Clocked flip flop. S-R latch, Master-Slave flip flop, realization of one flip flop using other flip flop. Counter and shift registers: Synchronous counters, asynchronous counter, ring counter, serial-in-parallel out, parallel-in-serial out, parallel-in-parallel out, bidirectional shift registers.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Implementation of flip flops using NAND
2	Study of Shift Register
3	Design of Counter
4	Study of IC 7490
5	Vi Characteristic of TTL and CMOS

Reference Books:

1. M. Mano, Digital Logic and Computer Design, (1e), Pearson Education India, 2017.
2. R. P. Jain, Modern Digital Electronics, (3e), Tata McGraw-Hill Education, 2003.
3. R.L. Tokheim, Digital Electronics: Principles and Applications, (6e), Tata McGraw Hill, 2007.

Course: C PROGRAMMING

Course Outcomes: Developing C programming skills and learning advanced structured and procedural programming. being able to create computer program, analyze and explain pointer principles, initialization, declarations, operations, and their applications.

UNIT – I (Basics of C Programming)   **(Credits: 1.5)**

Theory
C Fundamentals: C program structure, Simple I/O operations, Operators and Expressions: Operator precedence and associatively, bitwise operators, arithmetic expressions, evaluation of expressions, Flow of Control: Statements and blocks, switch case statement, looping constructs.

Practical (0.5Credit)

S.No.	Name of Practical
1	Introduction to MS-Office, Excel & PowerPoint
2	Simple C Programs (expression oriented operations).
3	Programs to illustrate various operators in C.
4	Programs using branching constructs (if, if-else-if, switch case).

UNIT – II (Arrays and Strings)   **(Credits: 1)**
Theory
Arrays: Declaration and Initialization, sorting. Strings: String - operations on strings, built-in string handling functions, programs on strings.

Practical (0.5Credit)

S.No.	Name of Practical
1	Programs on 1D Arrays
2	Programs on 2D Arrays
3	Programs on strings.

UNIT – III (Functions and Loop)   **(Credits: 1.5)**
Theory
Functions: Modular programming, function declaration, definition and function call, Types of functions, function returning more values, function with operators, function and decision statements, function and loop operators, function with Arrays.

Practical (0.5Credit)

S.No.	Name of Practical
1	Programs using functions (with and without recursion).
2	Programs on passing parameters by value and reference.

Reference Books :
1. The C Programming Language (Ansi C Version), Brian W. Kernighan, PHI
2. Let Us C, YashwantKanetkar, BPB Publications.
3. Kumar R. et.al., "Programming in ANSI C", Tata McGraw Hill Publ.,
4.Johnsonbaugh, R and Jakin. M., "Application Programming in C", Prentice Hall of India.
5.Balagurusamy, E., "Programming in ANSI C", Tata McGraw Hill Pub.

Course: TECHNICAL COMMUNICATION

Course Outcomes: The purpose of technical communication is to make information clear and understandable to make business more productive and consumer goods more convenient. Technological communication helps our economy forward by ensuring sustainable research and development.

Unit –I -(Introduction to Communication) (Credits: 2)
Theory
Introduction to communication: Types of communication, Process of communication, Principles of communication, Channels of communication, Verbal and non-verbal communication, Formal and informal communication, Barriers to communication.

Unit –II–(Vocabulary and Grammar) (Credits: 2)
Theory
Vocabulary: Word formation, Affixes, Compound words, Synonyms, Antonyms, Homophones and Homonyms, Miss pelt words. Grammar: Punctuations, Parts of speech, Active and passive voice, Direct and indirect speech, Concord, Common errors. Techniques of effective sentence constructions.

Unit –III–(Writing and Speaking) (Credits: 2)
Theory
Structure and format of letter writing: Précis writing, Letter of Enquiry, Quotations, Orders, Tenders, Complaint/adjustment letters, Job application letter, Resume, Group discussion. Art of Public Speaking: Tips for effective presentations.

References Book:
1. A. Koneru, Professional Communication, (1e), Tata McGraw Hill, 2008.
2. L. C. Bovee, J. V. Thill, B. E. Schatzman, Business Communication Today, (7e), Pearson Education, 2004.
3. L. Sen, Communication Skills, (2e), Prentice Hall, 2007.
4. M. Raman, S. Sharma, Technical Communication: Principles and Practice, (2e), Oxford University Press, 2013.

II SEMESTER

COURSE: MATHEMATICS –II

(Credits: 6)

Course Outcomes: Making information plain and understandable is the goal of technical communication in order to increase company productivity and improve the convenience of consumer goods. The advancement of our economy is aided by technological communication, which promotes sustainable research and development.

Unit-I (Differential Calculus)   (Credits:2)

Theory

Differential Calculus: Successive differentiation, Leibnitz's theorem, polar curve, angle between radius vector and tangent, angle of intersection between two curves, derivative of arc (Cartesian and polar), curvature, radius of curvature, evolutes, related problems.

Rolle's Theorem, mean value theorem (Cauchy's and Lagrange's), in determinant form, partial derivatives, Euler's theorem, maxima and minima of functions of two variables.

Unit-II (Linear Algebra)   (Credits: 2)

Theory

Linear Algebra: Basic concepts, matrix addition, scalar multiplication, matrix multiplication, linear system of equations, Gauss elimination, rank of a matrix, Solution of Linear Systems: Existence, uniqueness, determinants, Cramer's rule, inverse of a matrix, Gauss-Jordan elimination.

Unit-III (Infinite Series)   (Credits:2)

Theory

Infinite Series: Convergence, divergence, comparison test, ratio test, Cauchy's root test, Cauchy's integral test, alternating series, Leibnitz's theorem, absolute and conditional convergence, expansion of functions into Taylor's and Maclaurin's series.

Reference Books:

1. S. Narayan, P.K. Mittal, *Differential calculus*, S. Chand & Co, Delhi, 2012.
2. S. Narayan, P.K. Mittal, *Integral calculus*, S. Chand & Co, Delhi, 2012.
3. M.D. Raisinghania, *Differential calculus*, S. Chand & Co, Delhi, 2010.
4. B. N. Mukherjee, *Integral Calculus*, U.N. Dhur, 1977.
Publications.

Course: FINANCIAL AND ACCOUNTING MANAGEMENT

(Credits: 6)

Course Outcomes: Financial statements and/or financial schedules also through the analysis and synthesis of information in accordance with generally accepted accounting principles.

Unit-I (Basic of Accounts) **(Credits: 2)**

Theory
General Purpose Cost Statement: Evolution of Cost Accounting, Cost Accounting Concepts, Generally Accepted Cost Accounting Principles and Cost Accounting Standards, Cost Accounting Standards, Business Process Analysis: Materials, Employee Costs, Direct Expenses, Overheads, Treatment of Special Items, Cost Sheet.

Unit-II (Financial Management) **(Credits: 2)**

Theory
Overview of Financial Management: Objective of Financial Management, Key Decisions of Financial Management, Planning Environment, Functions of Financial Management, Sources of Finance, International Sources, Emerging Role of Finance Manager, Securities and Exchange Board of India Act. 1992, Future Value, Present Value, Tools for Financial Analysis and Planning: Funds Flow Statement Cash Flow Statement, Ratio Analysis, Identification of Information Required to Assess Financial Performance.

Unit-III (Capital Management and Leverage Analysis) **(Credits:2)**

Theory
Working Capital Management and Leverage Analysis: Working Capital - Meaning and Definition, Kinds of Working Capital, Adequacies and Inadequacies of Working Capital, Danger of too high amount of Working Capital, Danger of inadequacies or low amount of Working Capital, Working Capital Cycle, Working Capital Financing, Inventory Management, Management of Receivable, Determinants of Credit Policy, Cash Management, Leverages, EBIT-EPS Indifference Point Level, Calculation of Indifference Point, Cost of Capital: Cost of Capital, Capital Structure, Dividend Decisions

Reference Books:
1. J. Pratt, *Financial Accounting in an Economic Context*, (5e), John Wiley & Sons, 2010.
2. Management Accounting & Financial Analysis by Kishore , R. M. Edit: 4th ed, Publisher: Taxmann Allied Services.
3. Management & Cost Accounting by Drury, Colin Edition: 6th Publisher: Thompson Books

Course: DATA STRUCTURES

Course Outcomes: To impart knowledge of basic data structures and their implementation. Understanding the importance of data structures in the context of writing efficient programs. Understanding basic algorithmic complexity.

UNIT I – (Introduction to Data Structures)   **(Credits: 1.5)**
Theory
Introduction: Definitions, Concept of Data Structures, Overview of Data Structures. Arrays: Definitions, terminologies, 1D Array: Memory allocation, Operations on array, Application of Arrays, 2D and 3D Array representation, Linked Lists: Definition, Single Linked List: Representation in memory, operations (insertion, deletion, modify etc.), Circular Linked List, Double Linked List.

Practical: **(Credit: 0.5)**

S.No.	Name of Practical
1	Programs based on Array and its operation insertion, deletion etc.
2	Programs based on Linked Lists Operations
3	Program 2D and Matrix Array
4	Program based on Circular Linked list.

UNIT II- (Stack and Queue)   **(Credits: 1.5)**
Theory
Stacks: Definition, Array and linked-list representation of stack, Operations on Stack: Push, Pop, application of stack: infix to postfix, evaluation of arithmetic expression, tower of Hanoi. Queues: Definition, Array and linked-list representation of Queue. Operations on Queue: Insertion, Deletion. Various Queue Structure: Circular Queue, Priority Queue. Insertion, Deletion operations on a Circular Queue and Priority Queue

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Program Based on Stack Operations (Push and pop)
2	Program Based on Queue Operations
3	Program on Stack using Array .
4	Program on Stack using Link List
5	Program on Queue using Array and Link List.

UNIT III (**Sorting, Searching and Tree**)   **(Credits: 1.5)**
Theory
Sorting and Searching: Insertion Sort, Selection Sort, Merge Sort, Linear Search, Binary Search. Tree: Definitions and Concepts, Representation of binary tree, Binary tree traversal (In order, post order, preorder), Threaded binary tree, insertion and deletion, Binary search trees, Applications of Trees- Some balanced tree mechanism, eg. AVL trees, 2-3 trees, Height Balanced, Weight Balance, B Tree, B+ Tree, Graph-Matrix Representation of Graphs, Elementary Graph operations.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Programs based on Sorting and Searching algorithms: Bubble Sort and Insertion Sort
2	Selection Sort
3	Merge Sort
4	Binary Search Tree Operations
5	Implementation of Graph: Directed and Weighted Directed Graph.

Reference Books:
1. A. M. Tenenbaum, Data Structures Using C, (1e), Pearson Education, 2008.
2. R. Thareja, Data Structures Using C, (2e), Oxford University Press, 2014.
3Fundamentals of Data Structures in C by Horowitz, Sahni and Anderson-Freed.
4. Data Structures Through C in Depth by S.K Srivastava, DeepaliSrivastava.

Course: DATABASE MANAGEMENT SYSTEM

Course Outcomes: In the context of DBMS, students comprehend client-server computing. Recognize additionally how the SQL environment interacts with the host programming language environment. In order to create relational table schemas, students can transform data models (DDL).

UNIT I – (Overview of DBMS and Models)   **(Credits: 1.5)**
Theory
Introduction: Introduction to Database management system, some examples, characteristics of the database approach, Relational Model. ER Models: Database modeling using the entity-relationship model, entity types, entity sets attributes and keys, relationships.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Relational Model
2	ER Models Operations
3	Create E-R Diagram and convert entities and relationships to relation table.

UNIT II (**Database Design and SQL**)   **(Credits: 1.5)**
Theory
Database Design: Functional dependencies and normalization for relational databases. SQL the Relational Database Standard: Data definition, constraints, Basic Queries in SQL, More complex SQL queries, Insert, Update and Delete Statements in SQL.

Practical: (Credit: 1)

S.No.	Name of Practical
1	MySQL setup: correlated sub-queries
2	Data migration from MySQL to portable file as well as uploading data from portable file to MySQL.
3	SQL: Creating, Altering, and Dropping tables with Constraints, Insert Table.
4	SQL detailed SELECT with sub-queries
5	EQUI-JOINS
6	GROUPING, SET, UPDATE, DELETE, VIEWS. PL/SQL:
7	Program Development: Iterative PL/SQL Blocks.

UNIT III (**Transaction Processing**)   **(Credits: 1.5)**
Theory
Transaction Processing: Transaction processing concepts: Introduction to transaction processing, transaction and system concepts, desirable properties of transactions, schedules and recoverability.
Introduction to Cursors and Triggers.

Reference Books:

1. 1. R. Ehmasri, S. Navathe, Fundamentals of Database Systems, (6e), Addison-Wesley, 2011.
2. A. Silberschatz, H. F. Korth, S. Sudarshan ,Database System Concepts, (6e), McGraw-Hill, 2013.
3. C.J. Date, Introduction to Database Systems, (8e), Pearson Education, 2003.

Course: PRINCIPLES OF PROGRAMMING LANGUAGES

(Credits: 6)

Course Outcomes: To comprehend how differential equations are created from the supplied physical issues and to solve the first order ordinary differential equation using a variety of techniques. to be able to evaluate definite integrals and derivatives of integrals with variable integration limits using the calculus fundamental theorem.

Unit-I (Programming language) (Credits:2)
Theory

Introduction: Programming language - design, spectrum and the study motivation, Compilation and interpretation. Programming environments. Names, Scope, and Bindings: Concept of binding time, Object lifetime and storage management, Scope rules and implementing scope, the binding of reference environments, Binding within a scope, Separate compilation; Control Flow: Expression evaluation, Structured and unstructured flow, Sequencing, Selection, Iteration, Recursion, No determinacy.

Unit-II (Linear Algebra) (Credits: 2)
Theory

Data Types: Type systems and checking, Records and variants, Arrays, Strings, Sets, Pointers and recursive types, Lists, Files and Input/output, Equality testing and assignment. Subroutines and Control Abstraction: Stack layout, calling sequences, Parameter passing, Generic subroutines and modules, Exception handling, Co-routines. Data Abstraction.

Unit-III (Infinite Series) (Credits: 2)
Theory

Infinite Series: Convergence, divergence, comparison test, ratio test, Cauchy's root test, Cauchy's integral test, alternating series, Leibnitz's theorem, absolute and conditional convergence, expansion of functions into Taylor's and Maclaurin's series.

Reference Books:
1. S. Narayan, P.K. Mittal, *Differential calculus*, S. Chand & Co, Delhi, 2012.
2. S. Narayan, P.K. Mittal, *Integral calculus*, S. Chand & Co, Delhi, 2012.
3. M.D. Raisinghania, *Differential calculus*, S. Chand & Co, Delhi, 2010.
4. B. N. Mukherjee, *Integral Calculus*, U.N. Dhur, 1977.
Publications.

III SEMESTER

Course: BASIC STATISTICS AND PROBABILITY (Credits: 6)

Course Outcomes: In probability theory, is a possible result of an experiment or trial. Each possible outcome of a particular experiment is unique, and different outcomes are mutually exclusive.

Unit-I (Overview of Statistics) (Credits: 2)
Theory
Basic Statistics: Population, sample and data condensation, definition and scope of statistics, concept of population and simple with illustration, raw data, attributes and variables, classification, frequency distribution, cumulative frequency distribution.
Measures of Central Tendency: Concept of central tendency, requirements of a good measure of central tendency, arithmetic mean, median, mode, harmonic mean, geometric mean for grouped and ungrouped data.

Unit-II (Overview of Permutations and Combinations) (Credits: 2)
Theory
Measures of Dispersion: Concept of dispersion, absolute and relative measure of dispersion, range variance, standard deviation, coefficient of variation.

Permutations and Combinations: Permutations of 'n' dissimilar objects taken 'r' at a time (with or without repetitions), $nPr = n!/(n-r)!$(without proof). Combinations of 'r' objects taken from 'n' objects, $nCr = n!/(r!(n-r)!)$ (Without proof).Simple examples, applications.

Unit-III (Probability) (Credits: 2)
Theory
Probability: Sample space, events and probability, experiments and random experiments, ideas of deterministic and non-deterministic experiments, definition of sample space, discrete sample space, events, types of events, union and intersections of two or more events, mutually exclusive events, complementary event, exhaustive event, simple examples. Classical definition of probability, addition & multiplication theorems of probability without proof (up to three events are expected).

Definition of conditional probability.Definition of independence of two events, total probability theorem and Baye's theorem, simple numerical problems.Multiple correlation and regression (for the three variables only).

Reference Books:

1. S. C. Gupta, Fundamentals of statistics, (7e), Himalaya Publishing House, 2016.
2. A.M.Gun, M.K.Gupta , D. Gupta, Fundamentals of statistics,(1e) ,World Press, 2016.
3. V.K.Rohtagi, An Introduction to Probability and Mathematical Statistics, (1e), Wiley, 1976.
4. S.P. Gupta, Statistical Methods, (1e), S.Chand, 2012.

Course: COMPUTER ORGANIZATION AND ARCHITECTURE

Course Outcomes: To understand the structure, function and characteristics of computer systems. Students understand the design of the various functional units and components of computers. This subject identifies the elements of modern instruction sets and their impact on processor design.

Unit-I (Introduction to Computer Architecture and Design) (Credits: 2)
Theory
General Computer Architecture: Block Diagram of typical Computer, Memory Section, Input/output Section, CPU, Registers, Arithmetic Unit, Instruction handling Areas, Stacks.
Micro operations: Register Transfer, Bus and Memory Transfer, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shit Unit.
Basic Computer Organization and Design: Instruction Codes, Operation code, Timing and Control, Instruction Cycle, Memory Reference Instructions, Input Output Instructions and Interrupts.

UNIT-II (Memory) (Credits: 2)
Theory
Control Memory: Control Word, Microinstruction, Microprogramming, Control Memory, Hardwired Central Processing Unit: General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, RISC, CISC Pipelining and Vector Processing: Parallel
Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, Vector Processing.

UNIT-III (Languages) (Credits: 2)
Theory
Array Processors Input Output Organization: I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA, IOP, Serial Communication. Memory Organization: Associative Memory, Cache Memory, And Virtual Memory Introduction to Microprocessor: Machine Language, Assembly Language, Assembler, High Level Language, Compiler, Interpreter, And Internal Architecture 8085.

Reference Books:
1. C. Hammacher, Computer Organization, (5e), Tata McGraw-Hill, 2011.
2. M.M. Mano, Computer System Architecture, (3e), Pearson, 2007.
3. B.Govindarajalu, Computer Architecture and Organization, (2e), Tata McGraw-Hill, 2017.

Course: WEB PROGRAMMING

Course Outcomes: Become familiar with graphic design principles related to web design and learn how to apply the principles in practice. To develop skills in analyzing the usability of a web site.

UNIT I – (Introduction of HTML and CSS)   **(Credits: 1.5)**
Theory
Introduction: HTML, features, uses & versions Using various HTML syntax, Head & Body Sections, , Inserting texts, Text alignment, Using images in pages, Hyperlinks – text and images, bookmarks, Backgrounds and Color controls, creating and using Tables in HTML, and presentation, Use of font size & Attributes, List types and its tags. Cascading Style sheets – defining and using simple CSS. Use of Frames and Forms in web pages, Image editors, Issues in Web site creations & Maintenance.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Simple HTML document using basic elements like: <HTML>, <body>, <head>, <title>, , <hr>.
2	Text formatting tag: center, sup, em, ins, sub, font, h1 to h6
3	Computer output tag: code, kbd, samp, tt, var, pre.
4	Programming based on HTML, HTML with CSS.

UNIT II- (Web Hosting Concepts)   **(Credits: 1.5)**
Theory
Website Creation and maintenance, Web Hosting and Publishing Concepts; Client-Side Programming: The JavaScript Language, History and Versions; Introduction to JavaScript in Perspective: Syntax, Variables and Data Types, Statements, Operators, Literals, Functions, Objects, Arrays, Built-in Objects, JavaScript Debuggers; Representing Web Data: XML-Documents and Vocabularies Versions and Declaration-
Namespaces, Displaying

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	DHTML with JavaScript, Servlet.
2	JSP and Database Connectivity Web pages.
3	Classes and Objects, Display records by using database.
4	Data list link control & Data binding using dropdown list control.
5	Inserting record into a database & Deleting record into a database.

UNIT III (**XML Documents**)   **(Credits: 1.5)**
Theory
XML Documents in Browsers; Server-Side Programming: Java Servlets- Architecture , Overview- Servlet, Generating Dynamic Content, Life Cycle, Parameter Data, Sessions, Cookies; Electronic commerce: E - Business model, E – Marketing, Online payments and security. Database and Connectivity: ADO.Net. Distributed Application in C#, Visual programming interface with C#. Web controls, Web Forms.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Data binding using data list control & Data list control templates.
2	Data binding using data grid & Data grid control template.
3	Data grid hyperlink & Data grid button column.
4	Creating own table format using data grid.
5	Web Form application.

Reference Books:
1. S. Powers, Dynamic Web Publishing, (2e),Sams , 1997.
2. K. Jamsa, K. King, HTML & Web Design, (1e), McGraw-Hill, 2002.
3. M. Michaelis, Essential C# 3.0: For .NET Framework, (2e), Pearson, 2010.

Course: OBJECT ORIENTED PROGRAMMING USING JAVA

Course Outcomes: It emphasizes the fundamentals of structured design with classes including programming development, testing, implementation and documentation. Object-oriented programming techniques include classes and objects. The Java programming language is used as the teaching vehicle for this course.

UNIT – I (Basics of OOPs)   **(Credits: 1.5)**
Theory

Introduction to OOP: Features of Java, How Java is different from C++, Data types, Control Statements, identifiers, arrays, and operators. Inheritance: Multilevel hierarchy, method overriding, abstract classes, Final classes, String Class. Packages and Interfaces: Defining, Implementing and Importing Packages.

Practical (0.5Credit)

S.No.	Name of Practical
1	Data structures such as arrays, structures and functions.
2	Programs related to Interfaces & Packages.
3	Programs related to Abstract classes.

UNIT – II (Exceptions and Threading)   **(Credits: 1.5)**
Theory

Exceptions: Fundamentals, Types, Uncaught Exceptions, Multiple catch Clauses, Java's Built-in Exception. Multithreading: Creating, Implementing and Extending thread, thread priorities, synchronization suspending, resuming and stopping Threads. String: String Constructors, Various Types of String Operations.

UNIT – III (JAVA)   **(Credits: 2)**
Theory

Basic Packages of Java: Java.lang, Java.util, Java.i.o. Event Handling: Event Model, Event Classes, Sources of Events, Event Listener Interfaces AWT: Working with Windows, AWT Controls, Layout Managers Applet Class, Architecture, Skeleton, Display Methods. Swings: Japplet, Icons, labels, Text Fields, Buttons, Combo Boxes. Introduction to JSP.

Practical (0.5Credit)

S.No.	Name of Practical
1	Java programs using classes & objects and various control constructs such as loops etc
2	Java programs for creating Applets for display of images and texts.
3	Input/output and random files programs in Java
4	Java programs using Event driven concept
5	Programs related to network programming.

Reference Books :

1. H. Schildt, Java The Complete Reference, (10e), Tata McGraw-Hill, 2017.
2. E. Balaguruswamy, Programming with JAVA, (5e,) McGraw-Hill, 2014.
3. D. Liang, Introduction to JAVA Programming, (7e), Pearson, 2009.
4. R.Elmasri ,S. Navathe, D. V. L. N. Somayajulu, S.K. Gupta, Fundamentals of Database Systems, (6e), Pearson, 2011 .

Course: DATA COMMUNICATION & PROTOCOLS

Course Outcomes: It allows businesses to reduce expenses and improve efficiency by sharing data and common equipment among many different computers. Networks can be connected through cables, telephone lines, and infrared beams.

Unit –I - (Introduction to Data Transmission)   **(Credits: 2)**
Theory
Data Transmission: Concepts and Terminology, Analog and Digital Data Transmission, Transmission Impairments, Channel Capacity. Transmission Media: Guided Transmission Media, Wireless Transmission, Wireless Propagation, Line-of-Sight Transmission. Signal Encoding Techniques: Analog and Digital Signals.

Unit –II– (Data Communication Techniques)   **(Credits: 2)**
Theory
Digital-To-Digital Conversion: Line Coding Schemes, Block Coding, Scrambling, Analog-To-Digital Conversion: Pulse Code Modulation, Delta Modulation, Digital-To-Analog Conversion: Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying. Digital Data Communication Techniques: Asynchronous and Synchronous Transmission, Types of Errors, Error Detection, Error Correction, Line Configurations.

Unit –III–(Data Link Control Protocols)   **(Credits: 2)**
Theory
Data Link Control Protocols: Flow Control, Error Control, High-Level Data Link Control (HDLC). Multiplexing: Frequency-Division Multiplexing (FDM), Time-Division Multiplexing (TDM), Code-Division Multiple Access (CDMA). Spread Spectrum: The Concept of Spread Spectrum, Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum (DSSS).Cellular Wireless Communication Techniques: Introduction, Generations: 1G, 2G, 3G, 4G, and 5G.

References Book:
1. W.Stallings., Data and Computer Communications, (8e), Pearson Education, 2007.
2. B. Forouzan, Data Communications & Networking, (5e), McGraw Hill, 2012.
3. T. Bertsekas, K. Dimitri, G. Gallager, T. Robert, Data Networks, (2e), Prentice Hall of India, 2011.

IV SEMESTER

Course: NUMERICAL METHODS

(Credits: 6)

Course Outcomes: Making information plain and understandable is the goal of technical communication in order to increase company productivity and improve the convenience of consumer goods. The advancement of our economy is aided by technological communication, which promotes sustainable research and development.

Unit-I (Finite Differences) (Credits: 2)
Theory

Finite Differences: Definition of operators and derivation of inter-relations among them, properties of Δ and E (without proof), factorial notation for positive and negative exponent, representation of polynomial in factorial notations.

Unit-II (Numerical Integration) (Credits: 2)
Theory

Interpolation With Equal Intervals: Newton's forward difference formula, Newton's backward difference formula. Interpolation with unequal intervals. Central Difference Interpolation Formula: Gauss forward, Gauss backward, Stirling's formula. Numerical Integration: Trapezoidal rule and its geometrical significance, Simpson's one-third rule, Simpson's three-eighth rule.

Unit-III (Differential Equations) (Credits: 2)
Theory

Solution of Algebraic and Transcendental Equations: Secant, Regula-Falsi method, Newton-Raphson Method, Iterative method. Solution of Ordinary differential equations: Picard method, Taylor series method, Euler methods, Euler's modified method, Runge-Kutta methods.

Reference Books:

1. R. K. Jain, S.R.K.Iyengar, Numerical Methods,(1e), New Age International Publishers,2013 .
2. B. S. Grewal, Numerical Methods, Khanna publications, (1e), 2013.
3. J.H.Mathews, K.D. Fink, Numerical Methods using MATLAB, (4e), Pearson, 2015.
4. C.F.Gerald ,P.O. Wheately, Applied Numerical Analysis,(7e), Pearson, 2007.

Course: OPERATING SYSTEMS

(Credits: 6)

Course Outcomes: To make aware of different types of Operating System and their services. And different process scheduling algorithms and synchronization techniques to achieve better Performance of a computer system.

Unit-I (Basic of OS) **(Credits: 1.5)**

Theory

Introduction: Basic concepts, Simple Batch Systems, Multi-programmed Batched Systems, Time Sharing Systems, Protection; Processes and CPU scheduling: Process Concept, Process scheduling.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Unix Commands: date, clear, chmod, man, mail, passwd, pwd, cat, ls, mv, mkdir, cd, rm, rmdir, wc etc.
2	Program Based on introduction to Vi editor ; UNIX shell : wild cards, redirection, pipes.
3	Program on sequencing, grouping, background processing.

Unit-II (Process Synchronization) **(Credits: 1.5)**

Theory

Operation on Processes, Cooperating Processes, Inter-process Communication. Scheduling Criteria, Scheduling algorithms; Process Synchronization: The Critical-Section problem, Synchronization Hardware, Basics of Semaphores.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	command substitution, sub shells; Shell programming
2	Program Based on loops (for, while), and conditional statements (if else, case), Shell variables.
3	Program on arguments to shell procedure, test command, arithmetic with EXPR command
4	Page Replacement : FIFO,Optimal, LRU

Unit-III (Deadlocks) (Credits: 2)

Theory

Deadlocks: Deadlock characterization, Methods of Handling Deadlock, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection & Recovery from Deadlock; Memory Management: Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging. Virtual Memory: Demand paging, Page replacement, Page-replacement algorithms.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	interactive shell procedures with read
2	CPU scheduling Algorithms: FCFS,SJF,RR
3	Semaphores: Readers Writers Problem
4	Producer-Consumer Problem
5	Bankers Algorithm

Reference Books:

1. Operating systems by William Stallings
2. A.Silberschatz, P.B Galvin,G.Gagne ,Operating system concepts,(9e), Wiley, 2016 .
3. H.M.Deitel, An introduction to operating system,(1e) ,Wiley, 1983.

Course: PYTHON PROGRAMMING

Course Outcomes: This is designed to provide Basic knowledge of Python. Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.

UNIT I – (Introduction to Python Programming) (Credits: 1.5)
Theory
Python concepts: Expressions, values, types, variables, programs & algorithms, control flow, file I/O, the Python execution model.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Programs based on Implement a sequential search, create a calculator.
2	Programs based on Explore string functions.
3	Program Implement on Selection Sort.
4	Program Implement on Stack, Read and write into a file.
5	Demonstrate usage of basic regular expression.

UNIT II- (Data Structure) (Credits: 1.5)
Theory
Data structures: List, set, dictionary (mapping), tuple, graph (from a third-party library), List slicing (sub list), list comprehension (shorthand for a loop), Mutable and immutable data structures, Distinction between identity and (abstract) value.

Practical: Credit: 0.5)

S.No.	Name of Practical
1	Write script to work like a SQL SELECT statement for internal Data Structure made in earlier exercise
2	Write script to work like a SQL Inner Join for an internal Data Structure made in earlier exercise.
3	Program on Load CSV files into internal Data Structure.

UNIT III (**Functions**) (Credits: 1.5)
Theory
Functions: Procedural abstraction, functions as values, recursion, function design methodology. The Python Library: String and Text Handling, Data Structures and Algorithms, Threading, Networking, Web Programming, Graphical Programming, Database Access.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Programs based on Demonstrate use of advanced regular expressions for data validation.
2	Demonstrate use of List.
3	Demonstrate use of Dictionaries.
4	Create Comma Separate Files (CSV).

Reference Books:

1. D. M. Beazley, Python Essential Reference, (1e) Amazon Books, 2010.
2. M. Lutz, Programming Python, (4e), O'Reilly Media, 2010.
3. Automate the Boring Stuff with Python, 2nd Edition.

Course: SOFTWARE ENGINEERING

Course Outcomes: In The Context of SE, demonstrate agility in solving software and systems challenges with a broad set of skills appropriate to the needs of a dynamic global computing-based society.

UNIT I – (Introduction to System Concepts)   **(Credits: 2)**
Theory
Introduction to System Concepts: Definition, Elements of System, Characteristics of System, Types of System, System Concepts. Introduction to Software Engineering: Definition, Need for software Engineering, Software Characteristics, Software Qualities (McCall's Quality Factors) Requirement.
Analysis: Definition of System Analysis, Requirement Anticipation, Knowledge and Qualities of System Analyst, Role of a System Analyst, Feasibility Study and It's Types, User Transaction Requirement, User design Requirements.

UNIT II(Database Design and SQL)   **(Credits: 2)**
Theory
Software Development Methodologies: SDLC (System Development Life Cycle),System Requirement Specification (SRS), Waterfall Model, Spiral Model, Prototyping Model, Introduction to Agile Model. Analysis and Design Tools: Entity Relationship Diagrams, Data Flow Diagrams (DFD), Data Dictionary & Elements of Data Dictionary, Pseudo code, Input and Output Design.

UNIT III(Structured System Design)   **(Credits: 2)**
Theory
Structured System Design: Modules Concepts and Types of Modules, Structured Chart, Qualities of Good Design, Coupling, Types of Coupling, Cohesion, and Types of Cohesion. Software Testing: Definition, Test characteristics, Types of testing - Black Box Testing, White-Box Testing, Stress Testing, Performance Testing.

Reference Books:

1. R. S. Pressman, Software Engineering, (5e), Tata McGraw Hills, 2009.
2. I. Sommerville, Software Engineering, (6e), Pearson Education Asia, 2005.
3. P.Jalote,An Integrated Approach to Software Engineering,(3e) , Narosa , 2010.

V SEMESTER

Course: DATA WAREHOUSING USING OLAP (Credits: 6)

Course Outcomes: Data Warehousing helps to pre-store and pre-compute the information available in the collection. The biggest advantage OLAP provides is its multidisciplinary approach in data organization and analysis.

Unit-I (Data Warehousing Introduction) (Credits: 2)
Theory

Data Warehousing Introduction: Data Warehouse, Data Warehouse Architecture, Implementation, Data Warehousing to Data Mining, Data warehousing components, building a data warehouse, mapping the data warehouse to architecture, data extraction.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Reading data from files and working with datasets
2	Study of Graphs.
3	Classifiers: Lazy, Decision Trees

Unit-II (Data Marts) (Credits: 2)
Theory

Transform and Load, cleanup transformation tools, metadata, Data Warehouse characteristics and definition; the purpose of Data Warehouse; Data Marts: Data Warehouse Cost-Benefit Analysis / Return on Investment.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Clustering: K-Means.
2	Study of Partitioning Method.
3	Implement classification using K nearest neighbor.
4	Hierarchical Method

Unit-III (OLAP) (Credits: 1)
Theory

OLAP: Patterns and models – Data visualization principles, Data Mining functionalities, Major issues in Data Mining.

Reference Books:

1. J.Han, M. Kamber, Data Mining Concepts and Techniques, (3e), Elsevier, 2011.
2. M. Berry, G. Linoff, Data Mining Techniques, (3e), Wiley, 2011.
3. T.H. Davenport, J.G.Shankar, Competing on Analytics, (1e), Harvard Business Review, 2007.
4. R.N Prasad, S. Acharya, Fundamentals of Business Analytics, (2e), Wiley, 2011.

Course: MOBILE APPLICATION DEVELOPMENT

Course Outcomes: MAD is using for Analysis, design, implementation and evaluation of a computer based system, process, component or program to meet the desired needs. Identify problems and create solutions for systems and organizations.

Unit-I (Introduction to Android) (Credits: 2)
Theory
Introduction: Android, Android versions and its feature set The various Android devices on the market, The Android Market application store, Android Development Environment - System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE). An Overview of Threads, The Application Main Thread. Multimedia: Audio, Video, Camera Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures. Android Architecture Overview: The Android Software Stack, The Linux Kernel, Android Runtime - Dalvik Virtual Machine, Android Runtime – Core Libraries, Dalvik VM Specific Libraries, Java Interoperability Libraries, Android Libraries, Application Framework.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Develop an application that uses GUI components, Font and Colors.
2	Develop an application that uses layout managers and event listeners.
3	Develop a native calculator application to calculate the arithmetic operations.
4	Write an application that draws basic graphical primitives on the screen
5	Develop an application that makes use of database for add the info, and show the search result.

UNIT-II (Android Software Development Platform) (Credits: 2)
Theory
Android Software Development Platform: Understanding Java SE and the Dalvik Virtual Machine, The Directory Structure of an Android Project , Common Default Resources Folders. Android Framework Overview: Android Application Components, Android Activities: Defining the UI, Android Services: Processing in the Background, Broadcast Receivers: Announcements and Notifications Content Providers: Data Management, Android Intent Objects: Messaging for Components Android Manifest XML: Declaring Your Components. Understanding Android Views, View Groups and Layouts Designing for Different Android Devices, Views and View Groups, Android Layout Managers, The View Hierarchy, Designing an Android User Interface using the Graphical Layout Tool.

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Implement an application that implements multi-threading.
2	Develop a native application that uses GPS location information.
3	Implement an application that writes data to the SD card.
4	Implement an application that creates an alert upon receiving a message.
5	Write a mobile application that creates alarm clock.

UNIT-III (Graphical User Interface)   **(Credits: 1)**

Theory

Graphical User Interface Screen with views: Displaying Text with Text View, Retrieving Data from Users, Using Buttons, Check Boxes and Radio Groups, Getting Dates and Times from Users, Using Indicators to Display Data to Users. Displaying Pictures: Gallery, Image Switcher, Grid View, and Image View views to display images, Creating Animation. Files, Content Providers, and Databases: Saving and Loading Files, SQLite Databases, Android Database Design, Exposing Access to a Data Source through a Content Provider, Content Provider Registration, Native Content Providers.

Reference Books:

1. B. Phillip , C. Stewart, B. Hardy, K. Marsicano, Android Programming, The Big Nerd Ranch Guide, (3e), 2017.
2. R. Meier, Professional Android 4 Application Development, (3e), Wiley India (Wrox), 2012.
3. J. C. Sheusi, Android Application Development for Java Programmers, (1e), Cengage Learning, 2013.
4. W.M.Lee, Beginning Android 4 Application Development, (1e), Wiley India (Wrox), 2013.

Course: OOAD USING UML

Course Outcomes: UML is used for non-software systems, with an emphasis on modeling OO software applications. Most of the UML diagrams discussed so far are used to model various aspects like static, dynamic.

UNIT I – (Introduction of UML Classes and Objects) (Credits: 2)
Theory

Complexity The inherent complexity of software, The Structure of complex systems, Bringing order to chaos, on designing complex systems, Categories of analysis and Design methods. The Object Model: The evolution of object model, Elements of object model. Classes and Objects: The Nature of an Object, Relationship among objects, nature of a class, Relationship among classes.

UNIT II- (Introduction to Modeling) (Credits: 2)
Theory

Introduction to Modeling and UML: Importance of modeling, principles of modeling, object oriented modeling, overview of UML conceptual model of the UML, Architecture. Basic Structural Modeling: Common Mechanism: Terms and Concepts, Common modeling techniques. Diagrams, Class Diagrams. Advanced Structural Modeling: Interfaces, Types and Roles, Packages, Object Diagrams.

UNIT III(Deployment Diagram and Case Study) (Credits: 2)
Theory

Basic Behavioral Modeling: Interaction, Interaction Diagram,Use case, Use case diagram. Advanced Behavioral Modeling: State Machines, State Diagrams. Case Study: Any application can be discussed with help of an open tool. Architectural Modeling: Deployment, Deployment Diagram, Collaboration

Reference Books:

1. G.Booch, R.A.Makimchul, M.W.Eagel, J.Conallen, K.A.Houston, Object Oriented Analysis and Design with Applications, (3e), Addison-Wesley Professional, 2013.
2. G.Booch, J.Rumbaugh, I.Jacobson,The Unified Modeling Language User Guide, (2e).
3. M.Blaha, J.Rumbaugh, Object Oriented Modeling and Design with UML, (2e), Pearson, 2010.

Course: INTRODUCTION TO CLOUD COMPUTING

Course Outcomes: Cloud computing aims to provide easy, scalable access to computing resources and IT services. Cloud infrastructure consists of the hardware and software components required for the proper implementation of the cloud computing model.

UNIT – I (Introduction to Cloud Computing)   **(Credits: 2)**

Theory

Introduction to Cloud Computing, Evolution, Benefits and Barriers, Cloud SPI models, Cloud Computing Vs Cluster Computing, Technology Involved in Cloud Computing, NIST Cloud architecture, Modern Cloud architecture, Cloud Characteristics, Service Model and Deployment Model, Types of hypervisor. Data and Network Management- Introduction- Objectives, Classic datacenters (CDCs) technologies, Virtualized Data Centers (VDCs), Storage Virtualization, Virtual Machine Storage Options, Block & File level Storage Virtualization.

UNIT – II (Virtualization of Cloud Computing)   **(Credits: 2)**

Theory

Virtual Provisioning, Compute Virtualization, Virtual Machine Components, Compute Virtualization Techniques, Converting Physical Machines to Virtual Machines, Desktop and Application Virtualization. Virtualized Data Center– Networking- Network virtualization in VDC, VDC network infrastructure and components, Virtual LAN (VLAN) and Virtual SAN (VSAN), Components of VDC Network Infrastructure, Virtual Network Component, VLAN and VSAN Technologies, Network traffic management techniques in VDC Service. Management in Cloud Computing, Service Level Agreements (SLAs), Quality of Service (QoS),

UNIT – III (Cloud Services)   **(Credits: 2)**

Theory

Billing and Accounting, Scaling Cloud Hardware, Managing Data, Cloud Security and Privacy, Infrastructure security, Data security and Storage, Data privacy, access management, Cloud computing standards and Interoperability, technical considerations for migration to the cloud. Migrating to the Cloud-Introduction- Objectives, Cloud Services for individuals- Available Services - Skytap Solution, Cloud Services Aimed at the mid – market, Live Migration. Case Studies.

Reference Books :

1. R. K.Buyya, J. Broberg, A. M. Goscinski, Cloud Computing: Principles and Paradigms, (1e) Wiley Publications, 2013.
2. S. Barrie, Cloud computing bible, (1e), John Wiley & Sons, 2010.
3. N. Antonopoulos, L. Gillam, Cloud Computing: Principles, Systems and Applications, (1e), springer,2012.
4. T. Mather, S.Kumaraswamy, S.Latif, Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, (1e), O'Reilly, 2009.

VI SEMESTER

Course: CRYPTOGRAPHY FUNDAMENTALS (Credits: 6)

Course Outcomes: The purpose of cryptography is to hide information from observation. To "encrypt" the data so that it can be transmitted to another competent party for decryption and observation, without allowing any encrypted data to do so.

Unit-I (Fundamentals of Cryptography) (Credits: 2)

Theory

Elements of Number Theory: Euclid Algorithm, Prime Number Theorem, Euler's, Fermat's Little theorems, Entropy; Classical Cipher Techniques: Caesar, Affine, Mono-alphabetic, And Transposition.

Unit-II (Security Attacks) (Credits: 2)

Theory

Polyalphabetic Ciphers; Security Attacks: Active V/S Passive, Security Services; Symmetric Encryption: Fiestel Cipher, Confusion and Diffusion, DES Algorithm; Asymmetric Encryption: Principles of Public Key

Unit-III (Digital Signatures) (Credits:2)

Theory

Cryptosystems, RSA Algorithm; Message Authentication & Hashing; Digital Signatures: RSA Based, ElGamal Signatures; Key distribution; User Authentication Protocols; E-Mail Security: PGP, S/MIME; IPsec: AH & ESP; SSL; TLS.

Reference Books:

1. S. Williams, Cryptography and Network Security: Principles and Practices, (7e) Pearson Education, 2017.
2. A. Kahate, Cryptography and Network Security, (2e),TataMc-Graw Hill, 2009.
3.C.kaufmen, R.Perlman,M.Speciner, Network Security: Private Communication in a Public World, (2e), prentice Hall, 2008.
4. V.S.Bagad, I.A.Dhotre, Cryptography and Network Security, (1e) Technical Publications.

Course: FUNDAMENTALS TO MACHINE LEARNING

(Credits: 6)

Course Outcomes: Machine learning aims to discover patterns in user data and then make predictions based on these and generate complex patterns to answer business questions and solve business problems.

Unit-I (Introduction to Machine Learning)   (Credits: 1.5)
Theory

Introduction to Machine Learning: Basics of Machine Leaning, Supervised Machine Learning, K- Nearest Neighbors, Naïve Bayes, Decision tree, Support Vector Machines, Unsupervised Machine.

Practical: (Credit: 0.5)

1. Introduction to R Programming, History of R, and R packages, CRAN, R community, R-bloggers.
2. Stack Overflow, Coursera, and DataCamp.R Syntax Basics: Constants, operators, functions, variables.
3. Random numbers, Vectors and vector indexing, simple descriptive stats, Loops, Conditional expressions.

Unit-II (Analysis)   (Credits: 1.5)
Theory

Learning: Cluster analysis, K means, Association Rule Mining, Apriori algorithms, Regression Analysis: Linear Regression, Nonlinear Regression, and Problem Solving: State Space Search.

Practical: (Credit: 0.5)

1. Data Types: Levels of measurement (nominal, ordinal, interval, ratio scale) Vector types, data. Frame objects, rows and columns, indexing, Characteristics of tidy data.
2. Basic Data Transformations: Create new variables in a data. Frame, Filter rows and columns, merging datasets.
3. Introduction to Complex Data Transformations: Filtering and ordering data, Summaries and aggregates, new variables, Relational data, Joins on Keys.

Unit-III (Capital Management and Leverage Analysis)   (Credits: 1.5)
Theory

Production System, Depth First Search, Breadth First Search, Heuristic Search (Hill Climbing, Best First Search and Problem Reduction).

Practical: (Credit: 0.5)

1. Introduction into fuzzy joins, transforming wide and long tables, Converting Numeric Variables into Factors, Date Operations, String Parsing, Geocoding.
2. Data Visualization using R. Dirty Data Problems, Data Sources: sqlite examples for relational databases,.
3. Loading SPSS and SAS files, Reading from Excel and Google Spreadsheets, API and web scraping examples.

Reference Books:
1. G.Grolemund, Handbook of programming with R, (1e), O'REILLY, 2014.
2. 1. T.M.Mitchell, Machine Learning, (1e), McGraw- Hill Education, 2017.
3. 2. E.Alpaydin, Introduction to Machine Learning, (3e), PHI, 2015.

Course: FUNDAMENTALS TO MOBILE COMPUTING

Course Outcomes: This computing includes mobile communications, mobile hardware and mobile software. It include ad hoc networks and communication properties, protocols, data formats and concrete technologies.

UNIT I – (Introduction to Mobile Communication)   **(Credits: 2)**
Theory
Introduction: Mobile Communication and Overall View of the Syllabus and Lesson Plan, Introduction to Wireless Communication: Evolution of Mobile communications, Wireless and Mobile Radio-The First 150+ Years.

UNIT II- (Transmission Fundamentals)   **(Credits: 2)**
Theory
Transmission fundamentals: Basics of Propagation, Propagation Models, Free-Space Propagation Model, Large-Scale Path Loss, Small Scale Multipath Propagation, Modulation Techniques for Mobile Radio: Modulation Criteria, Modulation Techniques, Liner Modulation Techniques - ASK, PSK, FSK, MSK.

UNIT III (SSMC)   **(Credits: 2)**
Theory
Spread spectrum modulation Cellular concepts: Frequency reuse, Channel assignment strategies, Handoff strategies; Mobile Computing: Mobile IP, ubiquitous and nomadic computing WWWW & Mobile Agent wireless World Wide Web; Mobile agent technology and standards.

Reference Books:
1. T.S. Rappaport, Wireless Communications - Principle and Practice,(2e), PHI, 2005.
2. W. Stallings, Wireless Communication and Network, (2e), PHI, 2004.
3. K. Garg, Mobile Computing, (1e), Pearson Education India, 2010.

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Faculty of Education & Methodology
Department Science & Technology

DIPLOMA IN TECHNOLOGY (DET)
COMPUTER SCIENCE & ENGINEERING(CSE)

SESSION – 2022-23

DURATION – 3 YEARS (6 SEMESTERS)

SYLLABUS FOR:
I- III YEARS

PROGRAM DETAIL

Name of Program	Diploma InTechnology (DET)
Program Code	DET CSE
Mode of Program	Semester
Duration of Program	3 years/6Semester
Total Credits of Program	199
Curriculum Type and Medium Choice	English

I SEMESTER

Nature of Course	Course Name	C	T	P
Chemistry	Applied Chemistry	5	5	0
Mathematics	Mathematics-I	6	6	0
Physics	Applied Physics -I	5	5	0
English	Communication Skills in English	5	5	0
Engineering Drawing/Graphics	Engineering Graphics	3	0	3
Engineering	Engineering Workshop Practice	2	0	2
Physics	Applied Physics-I Lab	1	0	1
Chemistry	Applied Chemistry Lab	1	0	1
Communication	Communication Skills in English-Lab	1	0	1
University Compulsory Course	Extra Curricular Activities	1*	0	1
University Optional Course	Community Development Activity	1*	0	1
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	0.5	0.5	0
Total Credits		31.5	21.5	10

II SEMESTER

Nature of Course	Course Name	C	T	P
Core Computer Science	Mathematics -II	6	6	0
Core Computer Science	Applied Physics -II	6	5	1
Core Computer Science	Introduction to IT Systems	6	5	1
Electrical & Electronics Engineering	Fundamentals of Electrical & Electronics Engineering	6	5	1
Mechanics	Engineering Mechanics	6	5	1
University Compulsory Course	Extra Curricular Activities	1*	0	1
University Compulsory Course	Community Development Activities	1*	0	1
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	1	1	0
University Optional Course	Professional Activity	--	--	--
Total Credits		33	27	6

III SEMESTER

Nature of Course	Course Name	C	T	P
Core Computer Science	Computer Programming	6	5	1
Core Computer Science	Scripting Language (Python)	6	5	1
Core Computer Science	Data Structures	6	5	1
Core Computer Science	Computer System Organization	6	6	0
Core Computer Science	Algorithms	6	6	0
Core Computer Science	Summer Internship–I	4	0	4
University Mission Course	Women's Rights And Law	1	1	0
University Compulsory Course	Extra Curricular Activities	1*	0	1
University Compulsory Course	Community Development Activities	1*	0	1
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	0.5	0.5	0
University Optional Course	Professional Activity	--	--	--
Total Credits		37.5	28.5	9

IV SEMESTER

Nature of Course	Course Name	C	T	P
Core Computer Science	Operating Systems	6	5	1
Core Computer Science	Introduction to DBMS	6	5	1
Core Computer Science	Computer Networks	6	5	1
Core Computer Science	SSAD/Software Engineering	6	6	0
Electronics and Communication	Web Technologies	6	5	1
Core Computer Science	Minor Project	2	0	2
University Compulsory Course	Extra Curricular Activities	1*	0	1
University Compulsory Course	Community Development Activities	1*	0	1
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	1	1	0
University Optional Course	Professional Activity	--	--	--
Total Credits		35	27	8

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V SEMSETER

Nature of Course	Course Name	C	T	P
MANAGEMENT	Introduction to e-Governance	6	6	0
Core Computer Science	Internet of Things	6	6	0
MANAGEMENT	Open Elective-I * Economic Policies in India * Engineering Economics & Accountancy	6	6	0
Core Computer Science	Programme Elective -II * Data Sciences: Data Warehousing and Data Mining * Fundamentals of AI	7	6	1
Core Computer Science	Programme Elective -III *Advance Computer Networks *Mobile Computing	6	6	0
Core Computer Science	Summer Internship –II (6 weeks after IV Sem.)	3	0	3
Professional Development Activity	Minor Project	1	0	1
University Mission Course	Help Aid	1	0	0
University Compulsory Course	Extra Curricular Activities	1*	0	1
University Compulsory Course	Community Development Activities	1*	0	1
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	0.5	0	0
University Optional Course	Professional Activity	--	--	--
Total Credits		38.5	30	7

VI SEMESTER

Nature of Course	Course Name	C	T	P
Core Management	ENTREPRENEURSHIP AND START-UPS	6	6	0
Core Management	Open Elective-II * Project Management * Renewable Energy Technologies	6	6	0
Core Computer Science	Programme Elective IV * Multimedia , Technologies *Software Testing	6	5	1
Core Computer Science	Major Project	4	0	4
Core Computer Science	Seminar	2	2	0

I SEMESTER

SUBJECT: MATHEMATICS-I

COURSE OUTCOME: STUDENTS WILL UNDERSTAND ABOUT TRIGONOMETRY, DIFFERENTIAL CALCULAS, PRATIAL FRACTIONS, PERMUTTIONS , COMBINATIONS AND BINOMIAL THEORM.

UNIT-I(TRIGONOMETRY)
(CREDIT-2)

TRIGONOMETRY: Concept of angles, measurement of angles in degrees, grades and radiance and their conversions. T-Ratios of Allied angles (without proof), Sum, difference formulae (without proof).Applications of Sum and difference formulae, Product formulae (Transformation of product to sum, difference and vice versa). T- Ratios of multiple angles (2A, 3A). Graphs of sin x, cos x and tan x.

UNIT-II(DIFFERENTIAL CALCULUS)
(Credit-2)

DIFFERENTIAL CALCULUS: Definition of function; Graphs of ex, log x and |x|. Concept of limits. Differentiation of trigonometric functions. Differentiation of inverse trigonometric functions. COMPLEX NUMBERS: Definition, Real and imaginary parts of a Complex number. Addition, Subtraction, Multiplication and Division of a complex number. Introduction of De-movier's theorem, Application of De-movier's theorem

UNIT-III(PARTIAL FRACTIONS, PERMUTATIONS, COMBINATIONS AND BINOMIAL THEOREM)
(Credit-2)

PARTIAL FRACTIONS: Definition of polynomial fraction, Proper & improper fractions. Definition of partial fractions. To resolve proper fraction into partial fraction with denominator containing non-repeated linear factors, to resolve proper fraction into partial fraction with denominator containing repeated linear factors. PERMUTATIONS, COMBINATIONSANDBINOMIAL THEOREM: Value of ^nP_r and ^nC_r and formula-based problems. Problems based on General term.

Recommended Books & References:
1. Applied Mathematics, Dr. D.KS. Rewar ,Dr. S. K. Sharma, O.P. Baheti
2. Applied Mathematics, Dr. D.C. Gokhroo
3. Polytechnic Mathematics, H. K. Dass
4. Text Book on Differential Calculus,Chandrika Prasad
5. Text Book on Integral Calculus, Chandrika Prasad
6. Differential Calculus, M. Ray, S. S. Seth, & G. C. Sharma
7. Integral Calculus, M. Ray, S. S. Seth, & G. C. Sharma
8. Calculus and Analytic Geometry   B.S. Grewal,KhannaPublishers,New Delhi, 40th Edition, 2007
9. Engineering Mathematics, Reena Garg, Khanna Publishing House, New Delhi(Revised Ed.2018)
10. Engineering Mathematics V. Sundaram, R. Balasubramanian, K.A. Lakshminarayanan, , 6/e., Vikas Publishing House.
11. Advanced Engineering Mathematics Reena Garg & Chandrika Prasad, , Khanna Publishing House, New Delhi

SUBJECT: APPLIED PHYSICS-I

COURSE OUTCOME: STUDENTS WILL UNDERSTAND CONCEPT OF APPLIED PHYSICS LIKE MEASUREMENT UNITS,FORCE AND WORK, ENERGY,PROPERTIES OF MATTER.

UNIT-I(PHYSICAL WORLD, UNITS AND MEASUREMENTS)
(CREDIT-1.5)
PHYSICAL WORLD, UNITS AND MEASUREMENTS: Physical quantities, Fundamental and derived, Dimensions and dimensional formulae of physical quantities, Principle of homogeneity of dimensions, Measurements, Measuring instruments, least count, Types of measurement (direct, indirect), Errors in measurements (systematic and random), Absolute error, Relative error, Significant figures.

UNIT-II(FORCE WORK AND ENERGY)
(CREDIT-2)
FORCE WORK AND ENERGY: Force, Momentum- Statement and derivation of conservation of linear momentum, Applications such as recoil of gun, rockets, Work Concept and units, Examples of zero work, positive work and negative work, Energy and its units, Kinetic energy, Gravitational potential energy, and Mechanical energy, Conservation of mechanical energy for freely falling bodies, Power and its units, Power and work relationship, Calculation of power (numerical problems). ROTATIONAL MOTION: Circular motion, Definition of angular displacement, Angular velocity, angular acceleration, frequency and time period, Centripetal and Centrifugal forces with live examples

UNIT-III(PROPERTIES OF MATTER)
(CREDIT-1.5)
PROPERTIES OF MATTER: Elasticity, Definition of Stress and Strain, Hooke's law and, Modulus of elasticity, Significance of stress-strain curve, Pressure, Definition, units, Atmospheric pressure, gauge pressure, absolute Pressure, Surface tension, Cohesive and adhesive forces, Angle of contact, Applications of surface tension, Effect of temperature and impurity on surface tensionHEAT AND THERMOMETRY: Concept of heat and temperature, Modes of heat transfer with examples (Conduction, Convection and Radiation), Newton's law of cooling, Scales of temperature and their relationship, Types of Thermometers (Mercury, Platinum resistance thermometer, Pyrometer) and their uses

Recommended Books & References:

1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi.
3. Concepts in Physics by HC Verma, Vol. I & II, BhartiBhawan Ltd. New Delhi
4. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5. Engineering Physics by DK Bhhatacharya&PoonamTandan; Oxford University Press, New Delhi.
6. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications (P) Ltd., New Delhi
7. Practical Physics by C. L. Arora, S. Chand Publication.
8. e-books/e-tools/ learning physics software/websites etc.
9. Engineering Physics by Gaur & Gupta.
10. Engineering Physics by S.L. Kakani& S. Kakani
11. Applied Physics Vol.-I by HariHarlal, NITTTR
12. Applied Physics Vol.-II by HariHarlal, NITTTR

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SUBJECT: APPLIED CHEMISTRY

COURSE OUTCOME: STUDENTS WILL UNDERSTAND CONCEPT OF APPLIED CHEMISTRY LIKE, ATOMIC STRUCTURE, WATER, CHEMISTRY OF FUELS AND LUBRICANTS, ELECTRO CHEMISTRY.

UNIT-I(ATOMIC STRUCTURE, WATER)
(CREDIT-2)
Atomic Structure, Chemical Bonding and Solutions: Hydrogen spectrum explanation based on Bohr's model of atom, Heisenberg uncertainty principle, Quantum numbers – Principal Quantum Numbers, azimuthal Quantum Numbers, Magnetic Quantum Numbers, Spin Quantum Numbers orbital concept with shape of orbitals, Aufbau rule, electronic configuration. Solution–idea of solute, solvent and solution, methods to express the concentration of solution- molarity (M = mole per litre), normality, molality, ppm, mass percentage, volume percentage, mole fraction and PH.

WATER: Classification of soft and hard water based on soap test, Problems caused by the use of hard water in boiler (scale and sludge, foaming and priming, corrosion etc.), Water softening techniques, Soda lime process, Zeolite process, Municipal water treatment (in brief only), Sedimentation, Coagulation, Filtration, Sterilization.

UNIT-II(ENGINEERING MATERIALS, CHEMISTRY OF FUELS AND LUBRICANTS)
(CREDIT-1.5)
ENGINEERING MATERIALS: Natural occurrence of metals, Minerals, Ores of iron, aluminum and copper, Gangue (matrix), Flux, Slag, Metallurgy - brief account of general principles of metallurgy. Portland cement and hardening, Glasses, Refractory, Rubber _Natural Rubber, Vulcanization of rubber

CHEMISTRY OF FUELS AND LUBRICANTS: Definition of fuel, Combustion of fuel, Classification of fuels, Calorific values (HCV and LCV), Calculation of HCV and LCV using Dulong's formula, petrol and diesel - fuel rating (octane and cetane numbers), Chemical properties of lubricants, Coke number, Total acid number, Saponification value

UNIT-III(ELECTRO CHEMISTRY)
(CREDIT-1.5)
ELECTRO CHEMISTRY: Faradays laws of electrolysis, Simple numerical problems. Introduction to Corrosion of metals – Definition, Types of corrosion (chemical and electrochemical), H_2 liberation and O_2 absorption mechanism of electrochemical corrosion, Factors affecting rate of corrosion, Internal corrosion preventive measures – Purification Alloying, Heat treatment, External corrosion preventive measures- metal (anodic, cathodic) coatings organic inhibitors.

Recommended Books & References:

1.   Text Book of Chemistry for Class XI& XII (Part-I, Part-II); N.C.E.R.T., Delhi,2017-18.
2.   Agarwal, &Shikha, Engineering Chemistry, Cambridge University Press; New Delhi,2015.
3.   C.N.R. Rao, Understanding Chemistry, Universities Press (India) Pvt. Ltd.,2011.
4.   Dara, S. S. &Dr.S.S.Umare, Engineering Chemistry, S.Chand. Publication, New Delhi,2015.
5.   Jain & Jain, Engineering Chemistry, DhanpatRai and Sons; New Delhi,2015.
6.   Dr.Vairam, S., Engineering Chemistry, Wiley India Pvt. Ltd., New Delhi,2013.
7.   Dr. G.H. Hugar& Prof A.N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications,2013-14.
8.   Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt. Ltd.,20

SUBJECT: COMMUNICATION SKILLS IN ENGLISH

COURSE OUTCOME: STUDENTS WILL UNDERSTAND COMMUNICATION SKILL/SOFT SKILLCONCEPT .

UNIT-I(COMMUNICATION THEORY AND PRACTICES)
(CREDIT-1.5)
COMMUNICATION THEORY AND PRACTICE: Basics of Communication: -Introduction, Meaning and Definition, Process of Communication, Types of Communication: -Formal and Informal, Verbal and Non-verbal, Art of Effective Communication, Choosing Words, Voice and Modulation, Framing of questions and answers.

UNIT-II(SOFT SKILLS)
(CREDIT-2)
SOFT SKILLS FOR PROFESSIONAL EXCELLENCE: Introduction: Soft Skills and Hard Skills. Applying Soft Skills across Cultures.READING COMPREHENSION: Comprehension, vocabulary enhancement and grammar exercises based on reading of the following texts: "The Blind Dog" (a story from Malgudi Days) by R.K. Narayan "The Gift of the Magi" (story) by O. Henry, "If" (poem) by Rudyard Kipling, "Where the Mind is Without Fear" (poem) by Rabindranath Tagore.

UNIT-III(PROFESSIONAL WRITING)
(CREDIT-1.5)
PROFESSIONAL WRITING: Letters: Formal letters, Job Application with CV, Drafting E-mail and Notice.
VOCABULARY AND GRAMMAR: Types of Sentences with correct form of the verb, Active and Passive Voice, Modals (may, might, can, could, would, should, ought to, will, shall, must)

Recommended Books & References:
1. Lindley Murray. An English Grammar: Comprehending Principles and Rules. London: Wilson and Sons,1908.
2. Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Edition 2018)
3. Margaret M. Maison. Examine your English. Orient Longman: New Delhi,1964.
4. M. Ashraf Rizvi. Effective Technical Communication. Mc-Graw Hill: Delhi,2002.
5. John Nielson. Effective Communication Skills. Xlibris,2008.
6. Oxford Dictionary
7. Collin's EnglishDictionary
8. Roget's Thesaurus of English Words andPhrases

SUBJECT: ENGINEERING GRAPHICS

COURSE OUTCOME: STUDENTS WILL UNDERSTAND CONCEPT OF ENGINEERING DRAWING AND PROJECTION.

UNIT-I(BASIC ELEMENT OF DRWAING AND ORTHOGRAPHIC PROJECTION)
(CREDIT-1)
BASIC ELEMENTS OF DRAWING: Drawing Instruments and supporting materials: method to use them with applications. Convention of lines and their applications. Representative Fractions – reduced, enlarged and full-size scales, Engineering Scales such as plain and diagonal scale. Dimensioning techniques as per SP-46:2003.Geometrical and Tangency constructions. (Redraw the figure)

ORTHOGRAPHIC PROJECTIONS: Introduction of projections-orthographic, perspective, isometric and oblique, Concept and applications. (No question to be asked in examination). Introduction to orthographic projection, First angle and Third angle method, their symbols. Conversion of pictorial view into Orthographic Views – object containing plain surfaces, Slanting surfaces, Slots, Ribs, Cylindrical surfaces. (Use First Angle Projection method only).

UNIT-II(ISOMETRIC PROJECTION AND CAD INTERFACE)
(CREDIT-1)
ISOMETRIC PROJECTIONS: Introduction to isometric projections. Isometric scale and Natural scale.Isometric view and isometric projection. Illustrative problems related to objects containing lines, circles and arcs shape only.FREE HAND SKETCHES OF ENGINEERING ELEMENTS: Free hand sketches of machine elements: Thread, profiles, Nuts, Bolts, Studs, Set screws, Washer, Locking arrangements, Free hand sketches of orthographic view (on squared graph paper), Free hand sketches of isometric view (on isometric grid paper)

COMPUTER AIDED DRAFTING INTERFACE: Computer Aided Drafting, Concept, Hardware and various CAD, software available, System requirements and understanding the interface, Components of AutoCAD, software window: Title bar, Standard tool bar, Menu bar, Object properties tool bar, draw tool bar, modify tool bar, Cursor cross hair, Command window: Status bar, drawing area, UCS icon. File features: - New file, Saving the file, opening an existing drawing file, creating templates, Quit. Setting up new drawing: - Units, Limits, Grid, Snap, Undoing and redoing action.

UNIT-III (COMPUTER AIDED DRAFTING)
(CREDIT-1)
COMPUTER AIDED DRAFTING: Draw basic entities like Line, Circle, Arc, Polygon, Ellipse, Rectangle, Multiline, Polyline, Method of specifying points: Absolute coordinates, Relative Cartesian and Polar coordinates.Modify and edit commands like trim, extend, delete, copy, offset, array, block, layers. Dimensioning: Linear, Horizontal Vertical, Aligned, Rotated, Baseline, Continuous, Diameter, Radius, Angular Dimensions, Dim scale variable.Editing dimensions. Text: Single line Text, Multiline text. Standard sizes of sheet. Selecting various plotting parameters such as Paper size, paper units, drawing orientation, plot scale, plot offset, plot area, print preview.

Recommended Books & References:
1. Bureau of Indian Standards. Engineering Drawing Practice for Schools and Colleges IS: Sp-46. BIS. Government of India, Third Reprint, October 1998; ISBN:81-7061-091-2.
2. Bhatt, N. D. Engineering Drawing. Charotar Publishing House, Anand, Gujrat 2010; ISBN: 978-93-80358-17-8.
3. Jain &Gautam, Engineering Graphics & Design, Khanna Publishing House, New Delhi (ISBN: 978-

SUBJECT: ENGINEERING WORKSHOP PRACTICE
(CREDIT-2)

CARPENTRY: Demonstration of different wood working tools / machines. Demonstration of different wood working processes, like plaining, marking, chiseling, grooving, turning of wood etc.One simple job involving any one joint like mortise and tenon, dovetail, bridle and half lap.

FITTING: Demonstration of different fitting tools and drilling machines and power tools, Demonstration of different operations like filing, drilling, tapping, sawing, cutting etc. One simple fitting job involving practice of cutting, filing, marking, hacksawing, drilling, tapping, etc.

WELDING: Demonstration of different welding tools / machines.Demonstration on Arc Welding, Gas Welding, MIG welding, gas cutting and rebuilding of broken parts with welding.One simple job involving butt and lap joint using electric arc welding.

SHEET METAL WORKING: Demonstration of different sheet metal tools / machines. Demonstration of different sheet metal operations like sheet cutting, bending, edging, end curling, lancing, soldering, brazing, and riveting.One simple job involving sheet metal operations, soldering and riveting.

PLUMBING: Demonstration of different plumbing tools, accessories, valves and different pipe fittings and joints (GI and PVC). Demonstration of different plumbing operations like cutting, threading, pipe fitting (GI and PVC).One simple job involving pipe cutting and external thread cutting on GI pipe.

Recommended Books & References:
1. S.K. HajaraChaudhary, Workshop Technology, Media Promoters and Publishers, New Delhi,2015
2. B.S. Raghuwanshi, Workshop Technology, Dhanpat Rai and sons, New Delhi 2014
3. K. Venkat Reddy, Workshop Practice Manual, BS Publications, Hyderabad2014
4. Kents Mechanical Engineering Hand book, John Wiley and Sons, NewYork
5. RoopLal and Bharadwaj P. K., PrarambhikKaryashalaTakneeki (Hindi), Vayu Education of India, NewDelhi

SUBJECT: APPLIED PHYSICS-I L
(CREDIT-1)

LIST OF PRACTICALS/ACTIVITIES (Minimum 8 practical's must be performed)

1. To measure length, radius of a given cylinder, a test tube and a beaker using a Verniercaliper and find volume of each object.
2. To determine diameter of a wire, a solid ball and thickness of cardboard using a screw gauge.
3. To determine radius of curvature of a convex and a concave mirror/surface using a Spherometer.
4. To verify triangle and parallelogram law of forces.
5. To find the co-efficient of friction between wood and glass using a horizontal board.
6. To determine force constant of a spring using Hook'sLaw.
7. To verify law of conservation of mechanical energy (PE toKE).
8. To find the viscosity of a given liquid (Glycerin) by Stoke'slaw.
9. Tomeasureroomtemperatureandtemperatureofahotbathusingmercurythermometerand convert it into different scales.
10. To verify Newton's law of cooling.
Recommended Books & References:
1. Text Book of Physics for Class XI& XII (Part-I, Part-II); N.C.E.R.T.,Delhi
2. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publications(P)Ltd.,
3. Practical Physics by C. L. Arora, S. Chand Publication.

SUBJECT: APPLIED CHEMISTRY LAB
(CREDIT-1)

LIST OF PRACTICALS/ACTIVITIES (Minimum 10 practicals must be performed) Perform any 10 (ten) Laboratory Practical's.

VOLUMETRIC AND GRAVIMETRIC ANALYSIS:
1. Identification of Acid and Basic Radicals in a salt.
2. Preparation of standard solution of oxalic acid or potassium permanganate.
3. To determine strength of given sodium hydroxide solution by titrating against standard oxalic acid solution using phenolphthalein indicator.
4. To determine the strength of Ferrous Sulphate using standard Ferrous Ammonium Sulphate and Potassium Dichromate as intermediate solution.
5. TodetermineofstrengthofHydrochloricacidsolutionbytitratingagainstsodiumhydroxideusing methylorange indicator.
6. Volumetric estimation of total acid number (TAN) of given oil.
7. Volumetric estimation of
   a. Total hardness of given water sample using standard EDTA solution.
   b. Alkalinity of given water sample using 0.01M sulphuric acid
8. Proximate analysis of coal
   a. Gravimetric estimation moisture in given coal sample
   b. Gravimetric estimation ash in given coal sample

INSTRUMENTAL ANALYSIS:
1. Determine the conductivity of given water sample.
2. Determination of the Iron content in given cement sample using colorimeter.
3. Determination of calorific value of solid or liquid fuel using bomb calorimeter.
4. Determination of viscosity of lubricating oil using Redwood viscometer.
5. Determination of flash and fire point of lubricating oil using Able's flash point apparatus.
6. To verify the first law of electrolysis of copper sulphate using copperelectrode.
7. Construction and measurement of emf of electrochemical cell (Danielcell).
8. Determination of PH values of given samples using digital PHmeter.
9. Determination of melting point and boiling point of compounds using Thiele tube method.

Recommended Books & References:

1. Text Book of Chemistry for Class XI & XII (Part-I, Part-II); N.C.E.R.T., Delhi,2017-18.
2. Dr.G.H.Hugar and Prof A. N. Pathak, Applied Chemistry Laboratory Practices, Vol. I and Vol. II, NITTTR, Chandigarh, Publications,2013-14.
3. Agnihotri, Rajesh, Chemistry for Engineers, Wiley India Pvt.Ltd.2014.
4. Jain & Jain, Engineering Chemistry, DhanpatRai and Sons; New Delhi,2015.

SUBJECT: COMMUNICATION SKILLS IN ENGLISH – LAB
(CREDIT-1)

LISTENING SKILLS: Listening Process and Practice, Listening to Recorded Lectures / Dialogues / Poems / Interviews and Speeches etc.

INTRODUCTION TO PHONETICS: Sounds: - Consonants, Vowels (Monophthongs and Diphthongs), Transcription of Words (IPA), Syllable Division and Word Stress

SPEAKING SKILLS: Formal Speech and Public Speaking, Presentation Skills, Conversation Practices in various situations such as asking address, enquiries and at places such as retail shop, service centre, bank, customer care, etc. (role-play based)

PROFESSIONAL SKILLS: Group Discussion, Telephonic Conversation and Video Conferencing, Mock Interview, Personal Grooming (manners and etiquettes, appearance, hygiene, gestures, postures etc.)

BUILDING VOCABULARY: Word-formation, Phrasal Verbs, Foreign Phrases, Idioms and Phrases, Word Games such as crosswords, scrabble, quiz, spell-it etc. (to enhance self-expression and vocabulary of participants)

Recommended Books & References:
1.   Daniel Jones. The Pronunciation of English. Cambridge: Cambridge University Press, 1956.
2.   James Hartman& et al. Ed. English Pronouncing Dictionary. Cambridge: Cambridge University
3.   Kulbhushan Kumar, Effective Communication Skills, Khanna Publishing House, New Delhi (Revised Ed. 2018)
4.   J.D.O'Connor. Better English Pronunciation. Cambridge: Cambridge University Press, 1980.
5.   Lindley Murray. An English Grammar: Comprehending Principles and Rules. London: Wilson and Sons, 1908.
6.   Margaret M. Maison. Examine your English. Orient Longman: New Delhi,1964.
7.   J.Sethi& et al. A Practice Course in English Pronunciation. New Delhi: Prentice Hall,2004.
8.   Pfeiffer, William Sanborn and T.V.S Padmaja. Technical Communication: A Practical Approach. 6th ed. Delhi: Pearson, 2007

II SEMESTER

SUBJECT: MATHEMATICS-II

COURSE OUTCOME: STUDENTS WILL UNDERSTAND MATHEMATICS CONCEPTS LIKE DETERMINATS AND MATRICES, INTEGRAL CALCULAS AND DIFFERENTAL EQUATIONS, TWO-DIMENSIONALCOORDINATES GEOMETRY AND VECTOR ALGEBRA.

UNIT-I (Determinates and matrices)
(CREDIT-1)
DETERMINANTS AND MATRICES: Algebra of matrices. Elementary properties of determinants up to 3rd order.Consistency of equations, Crammer's rule.Inverse of a matrix.Inverse Matrix method to solve a system of linear equations in 3 variables.

UNIT-II(integral calculus and differential equations)
(CREDIT-3)
INTEGRAL CALCULUS AND DIFFERENTIAL EQUATIONS: Integration as inverse operation of differentiation. Simple integration by substitution, by parts and by partial fractions (for linear factors only).Use of formulas $\int_0^{\pi/2}$ sinmxcosnx dx for solving problems where m and n are positive integers. Definition of Differential Equation, Order and Degree of Differential Equation

TWO-DIMENSIONALCO-ORDINATE GEOMETRY: General Introduction, Distance formula and section formula. Equation of straight line in various standard forms. Slope form, Intercept form, Perpendicular form.One-point slope form, Two-point form, General form (without proof). Angle between two lines, Parallel and perpendicular lines.Perpendicular distance formula.

UNIT-III(Circle and conics, vector algebra)
(CREDIT-2)
CIRCLE AND CONICS: General equation of a circle and its characteristics. To find the equation of a circle, given:Centre and radius, three points lying on it, Coordinates of end points of a diameter

VECTOR ALGEBRA: Definition notation and rectangular resolution of a vector.Addition and subtraction of vectors.

Recommended Books & References:
1.   B.S.Grewal,HigherEngineeringMathematics,KhannaPublishers,NewDelhi,40thEdition,2007.
2.   G.B.Thomas,R.L.Finney, Calculusand AnalyticGeometry,AddisonWesley,9thEdition,1995.
3.   S.S.Sabharwal,SunitaJain,EagleParkashan,AppliedMathematics,Vol.I&II,Jalandhar.
4.   ComprehensiveMathematics, Vol.I&IIbyLaxmiPublications,Delhi.
5.   ReenaGarg&ChandrikaPrasad,AdvancedEngineeringMathematics,KhannaPublishing House,NewDelhi

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

SUBJECT: APPLIED PHYSICS-II

COURSE OUTCOME: STUDENTS WILL UNDERSTAND APPLIED PHYSICS CONCEPTS LIKE WAVE MOTION, OPTICS, ELECTROSTATIC AND CURRENT ELECTRICITY, ELECTROMAGNETISM AND SEMICONDUCTOR.

UNIT-I (Wave motion and its application, optics)
(CREDIT-1.5)
WAVE MOTION AND ITS APPLICATIONS: Wave motion, Transverse and longitudinal waves with examples, Definitions of wave velocity, frequency and wave length and their relationship, Principle of superposition of waves, Stationary waves and Resonance tube, Simple Harmonic Motion (SHM): Definition. Simple harmonic progressive wave and energy transfer

OPTICS: Basic optical laws, Reflection and refraction, Lens formula, power of lens (only formula), Total internal reflection, Critical angle and conditions for total internal reflection, Applications of total internal reflection in optical fiber, Optical Instruments, Simple and compound microscope (introduction and uses)

UNIT-II(Electrostatics and current electricity,)
(CREDIT-2)
ELECTROSTATICS AND CURRENT ELECTRICITY: Coulombs law, Unit of charge, Electric field, Electric lines of force and their properties, Electric flux, Electric Current and its units, Direct and alternating current, Kirchhoff's law, Wheatstone bridge and its applications (meter bridge), Concept of terminal potential difference and Electro motive force (EMF)

ELECTROMAGNETISM: Magnetic field and its units, Magnetic intensity, Magnetic lines of force, Magnetic flux and units, Concept of electromagnetic induction, Faraday's Laws and Lenz's law, Magnetic Force on moving charge, Force on current carrying conductor, Force on rectangular coil placed in magnetic field, moving coil galvanometer: -principle, construction and working, Conversion of a galvanometer into ammeter and voltmeter

UNIT-III(Semiconductor and modern physics)
(CREDIT-1.5)
SEMICONDUCTOR AND MODERN PHYSICS: Energy bands in solids, Types of materials (insulator, semi-conductor, conductor), p-n junction, Junction diode and V-I characteristics, Types of junction diodes (Zener and Photo Diode), Diode as rectifier – half wave and full wave rectifier (centre taped), Lasers: Energy levels, ionization and excitation potentials, Spontaneous and stimulated emission, Population inversion, Pumping methods, Types of lasers (Ruby and He-Ne Laser), Laser characteristics, Engineering and medical applications of lasers, Nanoscience and Nanotechnology: Introduction only

Recommended Books & References:
1. TextBookofPhysicsforClassXI&XII(Part-I,Part-II);N.C.E.R.T.,Delhi
2. AppliedPhysics,Vol.IandVol.II,TTTIPublications,TataMcGrawHill,Delhi
3. ConceptsinPhysicsbyHCVerma,Vol.I&II,BhartiBhawanLtd.NewDelhi
4. EngineeringPhysicsbyPVNaik,PearsonEducationPvt.Ltd,NewDelhi.
5. ModernapproachtoAppliedPhysics-IandII,ASVasudeva,ModernPublishers.
6. ATextbookofOptics,NSubramanyam,BrijLal,MNAvahanulu,SChandandCompanyLtd.
7. IntroductiontoFiberOptics,AjoyGhatakandKThyagarajan,CambridgeUniversityPressIndiaP vt.Ltd, NewDelhi.
8. NanoscienceandNanotechnology,KKChoudhary,NarosaPublishingHouse,Pvt.Ltd.NewDelhi.
9. Nanotechnology:ImportanceandApplications,M.H.Fulekar,IKInternationalPublishingHouse Pvt.Ltd, NewDelhi.

SUBJECT: INTRODUCTION TO IT SYSTEMS

COURSE OUTCOME: STUDENTS WILL UNDERSTAND ABOUT COMPUTER SYSTEM & INTERNET, BASIC OF WEB DEVELOPMENT AND INFORMTION SECURITY.

UNIT-I (Basic computer & internet skills , operating system)
(CREDIT-2)
BASIC COMPUTER & INTERNET SKILLS: General understanding of various computer components: Block Diagram of Computer- CPU, Memory, Display, Keyboard, Mouse, HDD and Pen Drive, Peripheral Devices (Printers, Scanners, Web camera & Barcode Reader), Computer Languages: Machine, Assembly & High-level Language, Computer & Communication: Meaning of Web Address, URL, IP address, E-mail, Awareness about Digital India portals (state and national portals) and college portals.

OPERATING SYSTEMS: Introduction and Definition Operating Systems, Brief Introduction to Types of Operating Systems, OS Installation: MS Windows, Brief Introduction to Unix Shell

UNIT-II (Basic of web development)
(CREDIT-1.5)
BASICS OF WEB DEVELOPMENT: CSS- Introduction: Font Attributes, Colour, Background. Making basic personal webpage. OFFICE TOOLS: Open Office Writer: Writer Interface, Starting, Opening, Saving, Closing & Printing a document, Selecting, Cutting, Pasting, Finding & Replacing a text, Formatting Paragraph, Checking Spelling & Autocorrect, Open Office Spreadsheet (Calc): Spreadsheets, Sheets & Cell, Starting, Opening, Saving, Closing, Printing a Spreadsheet, Open Office Impress: Adding Animation in Slide, Printing Slide Show

UNIT-III(Information security)
(CREDIT-1.5)
INFORMATION SECURITY BEST PRACTICES: Desktop & Smartphone security: Password, pattern lock, Two Step authentication (OTP), Biometric Authentication, Computer Viruses: Scanning & Removing, Guidelines for: Setting up a Secure password, Wi-fi security

Recommended Books & References:
1.   R.S.Salaria,ComputerFundamentals,KhannaPublishingHouse

2.   RameshBangia,PCSoftwareMadeEasy–ThePCCourseKit,KhannaPublishingHouse

3.   OnlineResources,Linuxmanpages,Wikipedia

4.   MasteringLinuxShellScripting:ApracticalguidetoLinuxcommand-

        line,Bashscripting,andShellprogramming, byMokhtarEbrahim,AndrewMallett.

SUBJECT: FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OUTCOME: STUDENTS   WILL UNDERSTAND BASIC OF ELECTRONICS COMPONENTS AND SIGNALS,ANALOG AND DIGITAL ELECTRONICS AND A.C.CIRCUITS.

UNIT-I (Basic of electronic component and signal)
(CREDIT-1.5)
OVERVIEW OF ELECTRONIC COMPONENTS & SIGNALS: Passive components and their applications- Resistors, type of resistors, Capacitors, type of capacitor, Inductors, type of inductor. Types of waveforms- Sinusoidal waveform as alternating Voltage Signal v(t) = Vmsin(wt), non-Sinusoidal alternating waveforms (triangular, rectangular, square) as voltage signals

UNIT-II(Basic analog and digital electronics)
(CREDIT-2)
OVERVIEW OF BASIC (ANALOG) & DIGITAL ELECTRONICS: Introduction to Semi-Conductors- Different Semiconductor materials (Si, Ge), Doping (impurities) in Semiconductors- Intrinsic and Extrinsic Semiconductor, Atomic structure of Intrinsic and Extrinsic Semiconductor, Conductivity - carrier transport: diffusion & drift current, mobility, resistivity, generation and recombination of charge carriers, PN junction, Active components and their application- Diodes, VI Characteristics, forward and reverse bias, Bipolar Junction Transistors (BJT), PNP and NPN BJT, Characteristics. Boolean Algebra- Logic Gates (NOT, AND, OR, NAND, NOR, EX-OR, EX-NOR), Binary code of a Decimal Number
ELECTRIC AND MAGNETIC CIRCUITS: EMF, Current, Potential Difference, Power and Energy, Ohm's Law, Combination of resistances. M.M.F, magnetic flux.Analogy between electric and magnetic circuits.

UNIT-III(A.C. circuits and transformers)
(CREDIT-1.5)
A.C. CIRCUITS: Introduction to AC waveform and terminology- Cycle, Frequency, Time Period, Amplitude, Angular velocity, RMS value, Average value, Form Factor.

TRANSFORMERS: Principal of operation, emf equation, Construction. Principle of single-phase transformer, transformation ratio and step up and step-down transformers.

Recommended Books & References:
1. RituSahdev, Basic Electrical Engineering, Khanna Publishing House
2. Mittle and Mittal, Basic Electrical Engineering, McGraw Education, New Delhi, 2015, ISBN : 978-0-07-0088572-5
3. Saxena, S. B. Lal, Fundamentals of Electrical Engineering, Cambridge University Press, latest edition ISBN : 9781107464353
4. Theraja, B. L., Electrical Technology Vol – I, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924405
5. Theraja, B. L., Electrical Technology Vol – II, S. Chand Publications, New Delhi, 2015, ISBN: 9788121924375
6. Jegathesan, V., Basic Electrical and Electronics Engineering, Wiley India, New Delhi, 2015, ISBN
7. : 97881236529513
8. Sedha, R.S., A text book of Applied Electronics, S.Chand, New Delhi, 2008, ISBN-13: 978-8121927833
9. Malvino, Albert Paul, David, Electronics Principles, McGraw Hill Education, New Delhi,2015, ISBN-13: 0070634244-978

SUBJECT: ENGINEERING MECHANICS

COURSE OUTCOME: STUDENTS WILL UNDERSTAND FUNDAMETAL OF MECHANICS LIKE MACHINE AND FORCE SYSTEM, FRICTION AND GRAVITY.

UNIT-I (About mechanics and force system and equilibrium)
(CREDIT-2)

BASICS OF MECHANICS AND FORCE SYSTEM: Significance and relevance of Mechanics- Applied mechanics, Statics, Dynamics. Definitions of Space, time, mass, particle, flexible body and rigid body, Scalar and vector quantity, Units of measurement (SI units)- Fundamental units, Derived units. Force - Unit, Representation as a vector and by Bow's notation, Characteristics and effects of a force. Law of parallelogram.

EQUILIBRIUM: Equilibrium and Equilibrant- Free body and Free body diagram, Lami's Theorem – statement and explanation- Application for various engineering problems. Types of beams, Types of supports (simple, hinged, roller and fixed), Types of loads acting on beam (vertical and inclined point load, uniformly distributed load, couple)

UNIT-II (Friction)
(CREDIT-1.5)
FRICTION: Friction and its relevance in engineering, Types and laws of friction, limiting equilibrium, Limiting friction, Co-efficient of friction, Angle of friction (only theory), Angle of repose (only theory), Relation between co-efficient of friction and angle of friction. Equilibrium of bodies on level surface subjected to- Force parallel to plane, Force inclined to plane.

UNIT-III (Centroid and centre of gravity)
(CREDIT-1.5)
CENTROID AND CENTRE OF GRAVITY: Center of gravity of: Square, Rectangle, Triangle, Circle, Semi-circle and Quarter circle (No derivation), Centroid of composite figures composed of not more than three geometrical figures, Centre of Gravity of Cube, Cuboid, Cone, Cylinder, Sphere and hemisphere (No derivation),

SIMPLE LIFTING MACHINE: Simple lifting machine- Related terms: load, effort, mechanical advantage, Applications and advantages. Velocity ratio, Efficiency of machines. Law of machine, Ideal machine- Friction in machine, Maximum Mechanical advantage and efficiency

Recommended Books & References:
1.   EngineeringMechanicsD.S.Kumar

2.   AppliedMechanicsS.Chand&Co.NewDelhi. R.S.Khurmi

3.   EngineeringMechanicsA.R.Basu

4.   EngineeringMechanics,KhannaPublications,NewDelhi(2008) D.S. Bedi,

5.   AtextbookofEngineeringMechanicsLaxmiPublications. BansalRK

6.   EngineeringMechanicsS.Chand&Co.NewDelhi. Ramamrutham

7.   FundamentalofAppliedMechanicsPuneVidhyarthiGruh. Dhade, Jamadar&Walawelkar

SUBJECT: APPLIED PHYSICS II LAB

LIST OF PRACTICALS/ACTIVITIES:(To perform minimum 10 Practicals)

1. To determine acceleration due to gravity using simple pendulum.
2. To verify laws of reflection from a plane mirror/interface.
3. To verify laws of refraction(Snell' slaw)using a glass slab.
4. To determine focal length and magnifying power of a convex lens.
5. To verify Ohm's law by plotting graph between current and potential difference.
6. To verify laws of resistance sinse ries and parallel combination.
7. To determine specific resistance of material using meter bridge.
8. To determine internal resistance of a primary Cell using potentiometer.
9. To compare EMF of two primary cells using potentiometer.
10. To find resistance of a galvanometer by half deflection method.
11. To convert a galvanometer into an ammeter.
12. To convert a galvanometer into a voltmeter.
13. To draw V-I characteristics of a semi conductor diode(Ge, Si)and determine its knee voltage.

Recommended Books & References:
1. Text Book of Physics for Class XI & XII (Part-I,Part-II);N.C.E.R.T.,Delhi
2. ComprehensivePracticalPhysics,Vol,I&II,JNJaiswal,LaxmiPublications(P)Ltd.,NewDelhi
3. Practical Physics by C. L.Arora,S.Chand&CompanyLtd.e-books/e-tools/learningphysicssoftware/youTubevideos/websitesetc.

SUBJECT: INTRODUCTION TO IT SYSTEMS LAB

LIST OF PRACTICALS/ACTIVITIES:

1. Read Wikipedia pages on computer hardware components, look at those components in lab,
2. identify them, recognise various ports/interfaces and related cables, etc.
3. Connect various peripherals (printer, scanner, etc.) to computer, explore various features of peripheral and their device driver software.
4. Browser features, browsing, using various search engines, writing search queries.
5. Visit various e-governance/Digital India portals, understand their features and services offered.
6. Install Windows operating system on lab machine and explore various options.
7. Install Linux operating system on lab machine and explore various options.
8. Practice various HTML tags.
9. Make your own Webpage using HTML tags.
10. Explore features of Open Office Writer and practice to create documents.
11. Explore features of Open Office Calc and practice to create spreadsheets.
12. Explore features of Open Office Impress and practice to create presentations.
13. Explore security features of Operating Systems and Tools.
14. Demonstration of various digital payment methods (Net Banking, Digital Wallet, UPI etc.)

Recommended Books & References:
1. Online resources, Linux man pages, Wikipedia.
2. R.S. Salaria, Computer Fundamentals, Khanna Publishing House.
3. Ramesh Bangia, PC Software Made Easy – The PC Course Kit, Khanna Publishing House.
4. Mastering Linux Shell Scripting: A practical guide to Linux command-line, Bash scripting, and Shell programming, by MokhtarEbrahim, Andrew Mallett.

SUBJECT: FUNDAMENTALS OF ELECTRICAL AND ELECTRONICS ENGINEERING LAB

LIST OF PRACTICALS/ACTIVITIES:

S.No.	Practical Course Outcomes
1.	Study of Symbol, Specification of Common Electrical Accessories, Tools and Wires & Cables.
2.	a) Electric safety precaution and use of fire fighting equipment b) Study of basic Electricty Rules for a Domestic Consumer.
3.	Use of Phase Tester, Series Test Lamp, Tong Tester and Meggerin Testing of Electrical Installation
4.	Measurement of current ,voltage, power and energy in AC and DC circuits.
5.	PreparationofWiringDiagram,Wiring,Testing,FaultFinding&Costingfor: a) ControlofoneLEDLampbyoneSwitch(usingcasingcapping&Flushtypeswitch) b) Control of Stair Case Wiring c) Control of one Bell Buzzer and Indicator byone switch
6.	Prepare one Switch Board as per requirement (Using Flush type Switches, Sockets, Ceiling rose, Lamp holder, MCB, Etc.)
7.	Study,Connecting,TestingandFaultFindingofFluorescentTubeanditsAccessories
8.	Study,Connecting,TestingandFaultFindingofCeilingFanwithElectronicRegulator
9.	Connectsinglephasetransformer.Measureinputandoutputquantitiesdetermineitstransformation ratio.
10.	PrepareaPotentialDividerandMeasureResistanceofaFilamentLampUsingVoltmeter and Ammeter.
11.	Study and functioning of automatic electric iron.
12.	Study and functi on ning of electric water pump and air cooler.
13.	Sketching of different Electronic Components Symbol on Drawing Sheet.
14.	Identify various passive electronic components in the given circuit a) Resistors-Fixed Resistors and Variable Resistors b) Capacitors-Electrolytic Capacitors and Ceramic Capacitors c) Inductors
15.	Solderingofdifferentpassivecomponentcombinationongeneralpurpose PCB.
16.	Testing of the following electronic components using digital multimeter. a) Resistor b) PN Junction Diode c) Bipolar Junction Transistor
17.	Study of devices used in electronic workshop. a) Function Generator b) CRO c) LCR Meter
18.	Use of LCR meter to measure the value of given Capacitor and Inductor.
19.	Measurement of amplitude and frequency of as in usoidal signal using CRO.
20.	Measurementofamplitudeandfrequencyofanon-sinusoidalsignalusingCRO.

21.	TesttheperformanceofPNJunctionDiodeandZenerDiode
22.	TesttheperformanceofTransistorAmplifierCircuit.
23.	Verifythetruthtablesofdifferentlogicgates
24.	VerificationofOhm'slawusingResistiveCircuitandAnalog/DigitalMeters

SUBJECT: ENGINEERING MECHANICS LAB

LISTOFPRACTICALTOBEPERFORMED:

1. Verification of the Law of Parallel gourmand Polygon of Forces
a. By using Force Board
b. By using Force Table
2. Determination of Reactions in Case of Simply Supported Beams.
3. To Determine Coefficient of Friction between two Surfaces on
a. Horizontal Plane
b. Inclined Plane.
4. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Simple Wheel and Axle
5. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of differential Wheel and Axle
6. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Single Purchase Crab
7. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Double Purchase Crab
8. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Worm and Worm Wheel
9. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Screw Jack
10. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of First System of Pulleys
11. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Second System of Pulleys

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III SEMESTER

SUBJECT: COMPUTER PROGRAMMING
OUTCOME: STUDENTS WILL UNDERSTAND BASIC OF COMPUTER PROGRAMING LANGUAGE LIKE VARIABLE,DATATYPES, OPERATOR AND CONTROL STATEMENT , ARRAY.

UNIT-I(BASIC OF 'C' LANGUAGE)
(Credit-2)

The language of choice will be C. The focus will be on problem solving and problem where these ideas can be applied. The main focus of the class will to take examples of problems where these ideas can be employed. INTRODUCTION TO PROBLEM SOLVING: Computational way of thinking, Variables, Representation.

UNIT-II(OPERATORS AND CONTROL STATEMENT)
(Credit-1.5)

OPERATORS AND FORMATTING: Introduction to Operators- Arithmetic Operators, Relational Operators, Logical and Bitwise Operators. Input, Output, Formatting and File I/O. CONTROL STATEMENTS: Conditional Statements, Repeat Statements- Loops, Nested Loops.

UNIT-II(ARRAY AND RECURSION)I
(Credit-1.5)

ARRAYS: Arrays and Memory Organization, Strings, Multidimensional Arrays, Functions and Parameter Passing. RECURSION: Introduction to Recursion, Recursive solutions

Recommended Books & References:

1.   Let Us C,Yashavant Kanetkar

2.   Problem Solving and Programming in C, R.S.Salaria, Khanna Publishing House

3.   C Programming Absolute Beginner's Guide, Dean Millerand Greg Perry

4.   The C Programming Language, Kernighan and Ritchie,Prentice HallofIndia

5.   Programming in ANSI C, E.Balagurusamy,Tata McGraw-Hill

6.   CProgramming&DataStructures,B.A.FouruzanandR.F.Gilberg,CENGAGELearning.

7.   Outline of Programming with C, By ron Gott fried,Schaum,McGraw-Hill

SUBJECT: SCRIPTING LANGUAGE (PYTHON)

OUTCOME: STUDENTS WILL UNDERSTAND BASIC OF PYTHON LANGUAGE AND PYTHON PACKAGES.

UNIT-I(ABOUT PYTHON)
(Credit-1.5)

INTRODUCTION,VARIABLES AND DATA TYPES: History, Features, setting up path, Installation and Working with Python/Perl, Basic Syntax, Understanding Python variables, Numeric data types, using string data type and string operations, Basic Operators, understanding coding blocks, Defining list and list slicing, Other Data Types(Tuples, List, Dictionary-Python, Arrays, Associative Arrays).

UNIT-II(CONTROL STRUCTURE, MODULE AND PACKAGES)
(Credit-2)

CONTROLSTRUCTURES: Conditional blocks using if, else and elif, For loops and iterations, while loops, Loop manipulation using continue ,break and pass, Programming using conditional and loops block

FUNCTIONS,MODULES AND PACKAGES: Organizing codes using functions, organizing projects into modules, importing own module as well as external modules, Understanding Packages.

UNIT-III(FILE OPERATIONS AND REGULAR EXPRESSIONS)
   (Credit-1.5)

FILE I/O,TEXT PROCESSING,REGULAR EXPRESSIONS: Understanding read functions, Understanding write functions, Programming using file operations, Power full pattern matching and searching, Power of pattern searching using regex.

FRAME WORKS: Overview of Django, Django Design Philosophy, Creating a simple Django Project, Django App lifecycle.

Recommended Books & References:

1. Taming Python by Programming,JeevaJose,KhannaPublishingHouse
2. Starting Outwith Python, Tony Gaddis, Pearson
3. Core Pyton Programming ,WesleyJ.Chun,PrenticeHall
4. PythonProgramming:UsingProblemSolvingApproach, ReemaThareja,Oxford University
5. IntroductiontoComputationandProgrammingUsingPython.JohnV.Guttag,MITPress.
6. BeginningPythonusingPython2.6andPython3,JamesPayne,Wroxpublishing
7. PracticalProgramming:AnIntroductionto Computer Science usingPython3,
    PaulGries,ThePragmatic Bookshelf

SUBJECT: DATA STRUCTURES

OUTCOME: STUDENTS WILL UNDERSTAND BASIC OF DATA STRUCTURE (LINER AND NON-LINEAR DATA STRUCTURE).

UNIT-I(FUNDAMENTAL OF DATA STRUCTURE)
(Credit-1.5)

INTRODUCTION TO DATA STRUCTURES: Basic Terminology, Classification of Data Structures, Operations on Data Structures. LINEAR DATA STRUCTURES: Stacks- Introduction to Stacks, Array Representation of Stacks, Operations on a Stack, Applications of Stacks- Infix-to-Postfix Transformation, Evaluating Postfix Expressions.

UNIT-II(QUEUE AND LINKED LIST)
(Credit-2)

QUEUES: Introduction to Queues, Array Representation of Queues, Operations on a Queue, Types of Queues- DeQueue, Circular Queue. Applications of Queues-Round Robin Algorithm.

LINKED LISTS: Introduction to Linked List- Singly Linked List- Representation in Memory, Operations on a Single Linked List. Circular Linked Lists, Doubly Linked Lists, Linked List Representation and Operations of Stack, Linked List Representation and Operations of Queue.

UNIT-III(LINEAR DATA STRUCTURE)
(Credit-1.5)

NON-LINEAR DATA STRUCTURES: TREES- Basic Terminologies, Definition and Concepts of Binary Trees, Representations of a Binary Tree using Arrays and Linked Lists, Operations on a Binary Tree-Insertion, Deletion, Traversals. Types of Binary Trees.

GRAPHS- Graph Terminologies, Representation of Graphs- Set, Linked, Matrix. Graph Traversals.

Recommended Books & References:

1.   Data Structures, R.S.Salaria,KhannaBook Publishing,NewDelhi
2.   Data Structures Using C, Reema Thareja,Oxford University Press India.
3.   Classic Data Structures, Samanta Debasis,Prentice Hall of India.
4.   Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj,
        Anderson-Freed, Susan,UniversityPress,India.
5.   DataStructures:APseudocodeapproachwithC,Richard
6.   Concepts,TechniquesandApplications,G.A.V.Pai,McGraw-HillEducation,India.

SUBJECT: COMPUTER SYSTEM ORGANIZATION

OUTCOME: STUDENTS WILL UNDERSTAND COMPUTER STRUCTURE, MICRO PROGRAMMED CONTROL, PRE-PROCESSOR ,ASSEMBLY LANGUAGE AND DIGITAL INTERFACE.

UNIT-I(COMPUTER STRUCTURE)

(Credit-2)

STRUCTURE OF COMPUTERS: Computer Functional units, Von-Neumann architecture, Bus structures, Basic Operational Concepts, Data representation(Fixed and Floating point), Error detecting codes. Register Transfer and Micro Operations - Register transfer, Bus and memory transfers, Arithmetic micro-operations, Logic micro-operations, Shift micro-operations, Arithmetic logic shift unit.

UNIT-II(MICRO PROGRAMMED CONTROL AND PRE-PROCESSOR)

(Credit-2)

MICRO PROGRAMMED CONTROL: Control memory, Address sequencing, Design of control unit, Computer Arithmetic- Addition and Subtraction, Multiplication and Division algorithms, Floating-point arithmetic operation, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

INTRODUCTIONTOMICROPROCESSORARCHITECTURE: Instruction Set Architecture design principles from programmer's perspective. One example microprocessor(Intel, ARM,etc).

UNIT-III(ASSEMBLY LANGUAGE PROGRAMMING AND DIGITAL INTERFACE)

(Credit-2)

ASSEMBLY LANGUAGE PROGRAMMING: Simple programs, Assembly language programs involving-logical, branch, call instructions, sorting, evaluation of arithmetic expressions, string manipulation, assembler directives, procedures and macros.

MEMORY AND DIGITAL INTERFACING: addressing and address decoding, Interfacing of- RAM, ROM, EPROM

Recommended Books & References:

1. Computer System Architecture,M. MorisMano,Pearson/PHI India.

2. MicroprocessorsInterface,DouglasV.Hall,TataMcGraw-Hill.

3. ComputerOrganization,CarlHamacher,ZvonksVranesic,SafeaZaky,McGraw-Hill

4. AdvancedMicroprocessorsandPeripherals-Architecture,Programmingandinterfacing,A.K.Ray, K.M.Bhurchandi,TataMcGraw-Hill,NewDelhi,India.

5. Computer Organization and Design:AHardwar/SoftwareInterface(MIPSEdition)by PattersonandHennessy.

SUBJECT: ALGORITHMS

OUTCOME: STUDENTS WILL UNDERSTAND BASIC OF ALGORITHM, SORTING PROBLEN AND SOLUTION'S , DIFFERENT TYPE OF SEARCHING TECHNIQUES AND DIRECTED AND UNDIRECTED GRAPH.

UNIT-I(ALGORITHM FUNDAMENTAL AND SORTING)
(Credit-2)

FUNDAMENTALS**:** Programming Models, Data Abstraction- Sets, Multi sets, Stacks, Queues. Asymptotic and worst-case analysis of algorithms.
SORTING: The sorting problem, Bubble sort, Selection sort, Insertions ort, Merge sort, Quicks ort.

UNIT-II(SEARCHING)
 (Credit-2)

SEARCHING: Symbol Tables, Binary Search Trees, Balanced Search Trees, Hash Tables. STRINGS: String Sort, Tries, Substring Search, Regular Expressions, Elementary Data compression.

UNIT-III(GRAPHS)
 (Credit-2)

GRAPHS: Definition of a directed and undirected graph- Paths, Cycles, Spanning trees. Directed Acyclic Graphs, Topological Sorting, Minimum Spanning Tree algorithms- Shortest Path algorithms: Dijkstra's algorithm, Flow-based algorithms.

Recommended Books & References:
1.   Algorithms, Sedgewickand Wayne, Pearson
2.   IntroductiontoAlgorithms, Cormen,Leiserson,RivestandStein. MITPress
3.   IntroductiontoTheory of Computation,SipserMichael,CengageLearnng.
4.   Design&AnalysisofAlgorithms, GajendraSharma, KhannaPublishing House

SUBJECT: COMPUTER PROGRAMMING LAB

LISTOFPRACTICALTOBEPERFORMED:

S. No.	TopicsforPractice
1	Familiarization with program in environment (Editor,Compiler,etc.)
2	Programs using, I/ Ostatementsand various operators
3	Programsusing expression evaluation andprecedence
4	Programsusingdecisionmakingstatementsandbranchingstatements
5	Programsusingloopstatements
6	Programsto demonstrate applicationsofndimensionalarrays
7	Programsto demonstrate useofstringmanipulationfunctions
8	Programstodemonstrateparameterpassing mechanism
9	Programstodemonstraterecursion
10	Programsto demonstrate useofpointers
11	Programsto demonstrate command linearguments

12	Programsto demonstrate dynamic memoryallocation
13	Programstodemonstratefileoperations

The languageofchoicewillbeC.Thisisaskillcourse.Moreyoupractice,betteritwillbe.

Recommended Books & References:

1. LetUsC,YashavantKanetkar
2. ProblemSolvingandProgramminginC,R.S.Salaria, KhannaPublishing House
3. CProgramming Absolute Beginner'sGuide,Dean Millerand GregPerry
4. The CProgrammingLanguage,KernighanandRitchie,PrenticeHallofIndia
5. ProgramminginANSIC,E.Balagurusamy,TataMcGraw-Hill
6. CProgramming&DataStructures,B.A.FouruzanandR.F.Gilberg,CENGAGELearning.

SUBJECT: SCRIPTING LANGUAGE (PYTHON)LAB

LISTOFPRACTICALTOBEPERFORMED:

S. No.	Topics for Practice
1	Practice basic coding syntax
2	Write and execute scripts based on data types
3	Write and execute Python scripts with conditional sand loops
4	Write and execute Scripts based on Functions and Modules
5	File Processing scripts
6	Write and execute Regular Expressions
7	Write and execute SQL Queries

Lecturer may choose any one scripting language. This is a skill course. More student practice and try to find solution on their own, better it will be.

Recommended Books & References:

1. TamingPythonbyProgramming,JeevaJose,KhannaPublishingHouse
2. StartingOutwithPython,TonyGaddis,Pearson
3. CorePythonProgramming,WesleyJ.Chun,PrenticeHall
4. Python Programming: Using Problem Solving Approach, ReemaThareja,OxfordUniversityPress
5. IntroductiontoComputationandProgrammingUsingPython.JohnV.Guttag,MITPress.
6. BeginningPythonusingPython2.6andPython3,JamesPayne,Wroxpublishing
7. Practical Programming: An Introduction to Computer Science using Python3, Paul Gries, ThePragmatic Bookshelf

SUBJECT: DATA STRUCTURES LAB

LISTOFPRACTICALTOBEPERFORMED:

S. No.	Topics for Practice
1	Write a program using recursive and non-recursive functions to perform search operation in a given list of integers using linear search technique
2	Search operation in a given list of integers using binary search technique
3	Write a program to implement insertion sorting for a given random data
4	Write a program to implement bubble sorting for a given random data
5	Write a program to implement quick sorting for a given random data
6	Write a program to implement selection sorting for a given random data
7	Write a program to implement heap sorting for a given random data
8	Write a program to implement single linked list
9	Write a program to implement double linked list
10	Write a program to implement circular linked list
11	Write a program to Implement Stack operations using array and linked list
12	Write a program to Implement Queue operations using array and linked list.
13	Write a program to implement Bread the First Search (BFS)
14	Write a program to implement Depth First Search(DFS)
15	Write a program to implement a binary tree of integers

Use 'C' as programming language for the purpose. This is a skill course. More student practice and try to find solution on their own, better it will be.

Recommended Books & References:
1. DataStructures,R.S. Salaria,KhannaBookPublishing
2. Data StructuresUsingC,ReemaThareja,OxfordUniversityPressIndia.
3. ClassicDataStructures,SamantaDebasis,PrenticeHallofIndia.
4. Fundamentals of Data Structure in C, Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, UniversityPress,India.
5. DataStructures:APseudocodeapproachwithC,RichardF.Gilberg,BehrouzA.Forouzan,C ENGAGELearning,India.
6. Data Structures and Algorithms: Concepts, Techniques and Applications, G.A.V. Pai, McGraw- Hill Education,India.

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JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

IV SEMESTER

SUBJECT: OPERATING SYSTEMS
OUTCOME: STUDENTS WILL UNDERSTAND OPEARTING SYSTEM, PROCESS AND FILE MANAGEMENT , INPUT OUTPUT SYATEM AND OPERSTING SYSTEM SECURITY.

UNIT-I(Operating System Introduction)
(CREDIT-2)

OVERVIEW OF OPERATING SYSTEM: Basic concepts, UNIX/LINUX, Architecture, Kernel, Services and systems calls, System programs.
PROCESS MANAGEMENT: Process concepts, Operations on Processes: Ipc, Process scheduling: FSFC, SJF, Priority, Round Robin, Multi- threaded programming, Memory management: Memory allocation, Swapping, paging, Segmentation, virtual memory .

UNIT-II(File Management)
(CREDIT-1.5)

FILE MANAGEMENT: Access Concept of a file methods Directory structure, File system   structure and implementation, Directory implementation Free- space management, Efficiency and performance, Different types of file systems.

UNIIT-III (Input Output System and OS Security)
(CREDIT-1.5)

I/O SYSTEM: Mass storage structure, Overview Disk structure, Disk attachment Disk scheduling algorithms- FCFS, SSTF, SCAN, LOOL, Swap space management, Raid.

OS SECURITY: Authentication, Access control, Access Right, system logs

Recommended Books & References:

1.   Operating System Concepts, Silbers chatz and Galvin,Wiley India Limited

2.   UNIX Concepts and Applications, Sumitabha Das, McGraw-Hill Education

3.   Operating Systems, Internals and Design Principles, Stallings, Pearson Education, India

4.   Operating System Concepts, EktaWalia,Khanna Publi shing House

5.   Modern Operating Systems,Andrew S.Tanenbaum,PrenticeHallofIndia

6.   Operating systems, Deitel&Deitel,PearsonEducation,India

SUBJECT: INTRODUCTION TO DBMS

OUTCOME: STUDENTS WILL UNDERSTAND CONCEPTS OF DBMS, DATA MODELING,E-R MODEL,RELATIONAL MODEL AND NORMALIZATION FORMS.

UNIT-I (DBMS Introduction)
(CREDIT-2)
Introduction, Components of DBMS Advantage of DBMS Database System v/s File System Database System Concepts and Architecture Application Architecture of DBMS Overall Database Structure.
Data modelling using the Entity-Relationship Model: Notations of ER Diagram, Mapping Constraints, Keys, The Enhanced Entity-Relationship (EER) model

UNIT-II(Relational Model)
(CREDIT-1.5)
The Relational Data Model and Relational Database Constraints: Codd's Rule of DBMS, ER/EER to Relational Model map- ping, Relational Algebra, Relational Calculus.
SQL-99- Schema definition, Constraints, Queries and Views Security Introduction to SQL programming Techniques.

UNIT-III(Normalization)
(CREDIT-1.5)
Functional dependencies and normalization for relational databases: Normalization Concepts, Normal Forms (1NF, 2NF, 3NF, BCNF), Relational database design algorithms and further dependencies. Multi-Valued Dependency and 4NF, Join Dependency and 5NF

Recommended Books & References:

1.   Fundamentals of Database Systems, Elmasri&Navathe, Pearson Education
2.   Database Management Systems, Raghurama Krishnan, Johannes Gehrke, TataMcGraw-Hill.
3.   Database System Concepts, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, McGraw- Hill, New Delhi, India.
4.   Introduction to Database Systems, C.J.Date, Pearson Education
5.   Introduction to SQL, Rick F.VanderLans, Pearson Education

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

SUBJECT: COMPUTER NETWORKS
OUTCOME: STUDENTS WILL UNDERSTAND NETWORK MODELS, OSI AND TCP/IP MODEL, WORKING OF NETWORK LAYER AND TRANPORT LAYER DESIGN ISSUES AND PROTOCOLS.

UNIT-I (Introduction)
(CREDIT-2)

Introduction to computer networks: Network Models, OSI Reference Model, TCP/IP Model.
Transmission media- Principles, Issues and examples, wired media – coaxial, UTP, STP, Fiber optic cables, Wireless media – hf, vhf, uhf, microwave, ku band, Network topologies, Data link layer, Design issues, Example protocols (Ethernet, wan, Bluetooth), Switching techniques.

UNIT-II(Network Layer)
(CREDIT-1.5)

Network layer: Design issues, Example protocols (ipv4), Routing- Principles/issues, Algorithms (distance-vector, link-state) and protocols (rip, OSPF)

UNIT-III (Transport layer)
(CREDIT-1.5)

Transport layer: Design issues, Example protocols (TCP), Application layer protocols (SMTP, DNS).
Network Functioning of Devices: NIC, Hub, Switch, Router, Wi-Fi Devices, Network Management System and example protocol (SNMP).

Recommended Books & References:

1. Computer Networks, 4th Edition (or later), Andrew S. Tanenbaum, PHI
2. TCP/IP Illustrated, Volume-1, W. Richard Stevens, Addision Wesley
3. Data and Communications, William stalling, PHI
4. An Engineering Approach to Computer Networking, S. Keshav, Addision Wesley/Pearson
5. An Integrated Approach to Computer Networks, BhavneetSidhu, Khanna Publishing House

SUBJECT: SSAD/SOFTWARE ENGINEERING

OUTCOME: STUDENTS WILL UNDERSTAND SOFTWARE DEVELOPMENT LIFE CYCLE, DEVELOPMENT ACTIVITIES,TESTING TOOLS AND PROJECT MANAGEMENT.

UNIT-I (Introduction)
(CREDIT-2)
Introduction to Software Engineering: Lifecycle, Process Models, Traditional v/s agile processes
Development Activities: Requirements Gathering and Analysis Design Concepts, Software architecture and Architectural styles, Basic UI design, Effective Coding and Debugging techniques

UNIT-II(Testing)
(CREDIT-2)
Testing Basics Software: Unit, Integration, System and Acceptance Testing, Introduction to various testing techniques (e.g. Stress testing), Writing and executing test cases, Quality Assurance

UNIT-III (Project Management)
(CREDIT-2)
Project Management: Project management concepts, Configuration and Release Management, Version Control and its tools (Git), Release Planning, Change Management Software Maintenance

Recommended Books & References:

1.   Software Engineering – A Practitioner's Approach, 7th Edition, Roger Pressman.

2.   Software engineering, Ian Sommerville, Pearson Education

3.   An Integrated Approach to Software Engineering, PankajJalote, Springer Verlag

4.   Software Engineering, Nasib Singh Gill, Khanna Book Publishing Co. India.

5.   Software Engineering, K. K. Agarval, Yogesh Singh, New Age International Publishers

SUBJECT: WEB TECHNOLOGIES

OUTCOME: STUDENTS WILL UNDERSTAND BASIC STRUCTURE OF HTML ,USE OF JS AND PHP IN WEB PAGE.

UNIT-I(Introduction)
(CREDIT-2)

INTRODUCTION TO WWW: Protocols and programs, Secure connections, Application and users Dynamic IP Web Design, Web site design principles, Planning the site and navigation.
WEB SYSTEMS ARCHITECTURE: Architecture of Web based systems, Client/server (2-tier) architecture 3-Tier architecture, Building blocks of fast and scalable data access Concepts Caches-Proxies- Indexes-Load Balancers- Queues Web Application architecture (WAA)

UNIT-II(Java Script)
 (CREDIT-1.5)

JAVASCRIPT: Client-side scripting, what is JavaScript, Simple JavaScript, Variables, Functions, conditions, Loops and repetition.
ADVANCE SCRIPTING: JavaScript and objects, JavaScript own objects, DOM and web browser environments, forms and validations, HTML Combining HTML, CSS and JavaScript, Ajax Introduction to XML, Introduction to Web Services

UNIT-III (PHP)
(CREDIT-1.5)

PHP: Server-side scripting, Arrays, Function and forms, Advance PHP, Databases: Basic command with PHP examples Connection to server, creating database, selecting   a database, listing database, Listing table- names creating a table, Inserting data Altering tables, queries, deleting database, deleting data and tables, myadmin and database bugs.

Recommended Books & References:

1. "Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson,

2. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education

3. "Web programming- Building Internet Application", Chris Bales

4. Web Applications: Concepts and Real World Design, Knuckles.

SUBJECT: INFORMATION SECURITY

OUTCOME: STUDENTS WILL UNDERSTAND INFORMATION SECURITY,SECURITY WEAKNESSES, NETWORK SECURITY PRODUCT AND SECURITY POLICIES.

UNIT-I (Introduction)
(CREDIT-2)
Introduction to Information Security: Various aspects of information security (PAIN), Security Features of Operating Systems, Authentication, Logs, Audit Features, File System Protection, User Privileges, RAID options, Anti-Virus Software, etc.

UNIT-II (Security Weaknesses and protocols)
(CREDIT-2)

Understanding security weaknesses in popular networking protocols: IP, TCP, UDP, RIP, OSPF, HTTP SMTP etc. Security weaknesses in common networking devices: Hub, Switch, Router, Wi-Fi

Security solutions to mitigate security risk of; Networking protocols (IPsec, HTTPS, etc.), Devices (VLAN, VPN, Ingress Filtering, etc.).

Basics of Cryptography: PKI, Security considerations while developing software's **UNIT-III (Network Security product and Security policies)**

(CREDIT-2)

Network Security Products: Firewall, IDS/IPS, VPN Concentrator, Content Screening Gateways, etc.
Introduction to Security Standards: ISO 27001, Indian IT Act, PR Laws, Security Audit procedures
Developing Security Policies, Disaster Recovery, Business Continuity Planning

Recommended Books & References:

1. Information Security and Cyber Laws, Sarika Gupta, Khanna Publishing House
2. Various Acts, Laws and Standards (IT Act, ISO27001 Standard, IPR and Copyright Laws, etc.)
3. Security Guideline documents of Operating Systems (OS Manual, Man Pages, etc)

SUBJECT: NETWORK FORENSICS

OUTCOME: STUDENTS WILL UNDERSTAND NEEATTWORKING CONCEPTS AND PROTOCOLS , DATA LINK LAYER AND PHYSICAL LAYER PROTOCOLS, AUDIT FEATURE OF OPEARTING SYSTEM AND SYSTEM LIMITATIONS.

UNIT-I(Networking concepts and protocols)
(CREDIT-2)

Review of Networking concepts and Protocols: Introduction to Network Forensics, Various aspects of Network Forensics. Introduction to Network Forensic Tools and techniques Wireshark, TCP Dump, Syslog, NMS, Promiscuous Mode, Network Port Mirroring,Snooping,Scanning tools, etc.

UNIT-II (Data link layer and Physical layer)
(CREDIT-2)

Understanding and Examining Data Link Layer Physical Layer, Ethernet Switch Logs, MAC Table, ARP Table, etc. Understanding and Examining Network Layer: Router Logs, Wi-Fi Device logs, Firewall logs,

UNIT-III(Audit feature of operating system and limitations)
(CREDIT-2)

Understanding audit features of OS and applications: Enabling and Examining Server logs, User activity logs, Browser history analysis, Proxy server logs, Antivirus logs, Email logs

Limitations and challenges of network forensics due to Encryption, Spoofing, Mobility, Storage limitations

Recommended Books & References:

1. Manuals of OS, application software, network devices
2. RFCs of various networking protocols (https://www.ietf.org/)
3. https://www.sans.org/
4. https://www.cert-in.org.in/
5. Handbook of Digital Forensics and Investigation, Eoghan Casey, Elsevier Academic Press
6. Cyber Forensics, Albert Marcella and Doug Menendez, CRC Press
7. Computer Forensics (5 volume Set) mapping to CHFI (Certified Hacking Forensics Investigator), by EC-Council

SUBJECT: OPERATING SYSTEMS LAB

LISTOFPRACTICALTOBEPERFORMED:

S.No.	Topics for Practice
1	Revision practice of various comm. And slike man, cp, mv,ln,rm, unlink,mkdir,rmdir.
2	Implement two-way process communication using pipes
3	Implement message queue form of IPC
4	Implement shared memory and semaphore form of IPC
5	Simulate the CPU scheduling algorithms-Round Robin, SJF,FCFS, priority
6	Simulate Bankers algorithm for Dead lock Avoidance and Prevention
7	Simulate all FIFO Page Replacement Algorithm using C program
8	Simulate all LRU Page Replacement Algorithms using C program
9	Simulate Paging Technique of Memory Management
10	Practicevariouscommands/utilitiessuchascatnl,uniq,tee,pg,comm,cmp,diff,tr,tar,cpio,mount,umount,find,umask,ulimit,sort,grep,egrep,fgrepcut,paste,join,du,df,ps,who, etcandmanymore.

This is a skill course. More student practice and try to find solution on their own, better it will be.

Recommended Books & References:
1. OperatingSystemConcepts, Silberschatz,AbrahamandGalvin,Peter,WileyIndiaLimited
2. UNIXConceptsandApplications,SumitabhaDas, McGraw-HillEducation
3. OperatingSystemConcepts,EktaWalia,KhannaPublishingHouse
4. Data Structures and Algorithms: Concepts, Techniques and Applications, G.A.V. Pai, McGraw- Hill Education, India.

SUBJECT: INTRODUCTION TO DBMS LAB

LISTOFPRACTICALTOBEPERFORMED:

S.No.	Topics for Practice
1	Case Study-1: Employee database – 'Create' employee table, 'Select' and display an employee matching a given condition, 'Delete' duplicate records, delete rows using triggers, insert and update records, find net salary, etc.
2	Case Study-2:Visit or Management data base
3	Case Study-3:Students Academic data base
4	Case Study-4:Inventory Management System data base
5	Case study-5:Bank Operations database
6	Case Study-6:BusOperator(Roadways)–DorelatedactivitiessuchasprepareE-RModel,RelationalModel,doNormalization,CreateTables,Insertdata,Delete Data,Querydatabase,createstoredprocedures,etc.

This is a skill course. More student practice and try to find solution on their own, better it will be.
Recommended Books & References:
1. Elmasri & Navathe, Fundamentals of Database Systems, Pearson Education
2. Raghu rama Krishnan, Johannes Gehrke, Database Management Systems, Tata McGraw-Hill, New Delhi, India.

3. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Database System Concepts, McGraw- Hill, New Delhi, India.
4. Introduction to Database Systems, C.J.Date, Pearson Education
5. Introduction to SQL, Rick F.VanderLans, Pearson Education

SUBJECT: COMPUTER NETWORKS LAB

LISTOFPRACTICALTOBEPERFORMED:

S.No.	Topics for Practice
1	Showing various types of networking cablesandconnectors, identifying themclearly
2	Looking atspecificationsofcablesandconnectorsofvariouscompaniesonInternet,findout differences.
3	Makingpatchcordsusingdifferenttypesofcablesandconnectors-crimping,splicing,etc
4	Demonstrationofdifferenttypeofcabletesters,usingthemfortestingpatchcordspre-paredbythestudentsinLab andstandardcablespreparedbyprofessionals
5	Configuringcomputingdevices(PC,Laptop,Mobile,etc)fornetwork,exploringdifferentoptionsandtheirimpact–IPaddress,gateway,DNS,securityoptions,etc
6	Showingvariousnetworkingdevices– NICs,Hub,Switch,Router, WiFiaccesspoint, etc.
7	Looking atspecificationsofvariousnetworkingdevicesvariouscompaniesonInternet,findoutdifferences.
8	Setting up asmallwiredLANinthe Lab
9	Setting up asmallwirelessLANintheLab

This is a skill course. More student practice and try to find solutionontheirown,betteritwillbe.

Recommended Books & References:

1. Cisco press books on CCNA
2. User manual of networking devices available in the lab
3. Wiki pages on networking devices

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

SUBJECT: WEB TECHNOLOGIES LAB

LISTOFPRACTICALTOBEPERFORMED:

S.No.	TopicsforPractice
1	CodingServerClientPrograms
2	Developing WebApplicationusingHTML,JavaScript
3	DevelopingAdvancedWebApplicationProgramsusingCSS
4	PracticingPHP: Basics
5	PracticingPHP: WebApplication Development
6	PracticingPHP:MySql-tieredApplications
7	Developing afullyfunctionalWebServiceApplicationusingallthetechnologieslearnedinthiscourse.

   This is a skill course. More student practice and try to find solution on their own, better it will be.

Recommended Books & References:

1. "Web Technologies--A Computer Science Perspective", Jeffrey C.Jackson,
2. "Internet & World Wide Web How To Program", Deitel, Deitel, Goldberg, Pearson Education
3. "Web programming- Building Internet Application", Chris Bales
4. Web Applications: Concepts and Real World Design, Knuckles

SUBJECT: MINOR PROJECT

In this course student has to select a project work based on a topic of interest. Periodically the supervisor will evaluate the implementation. This work, started in eighth semester of which, the student will be evaluated internally and externally.

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V SEMESTER

SUBJECT: INTRODUCTION TO E-GOVERNANCE

Course outcome: Students will understand e-goverenance,e-government project and e-governance lifecycle, models and impact

UNIT-I (INTRODUCTION OF E-GOVERNANCE)   **(CREDIT-2)**
Exposure to emerging trends in ICT for development, Understanding of design and implementation of, e-Government projects, e-governance lifecycle.

Need for Government Process Re-engineering (GPR) National e-Governance Plan (NeGP) for India, SMART Governments & Thumb Rules.

UNIT-II (MODELS OF E-GOVERENCE)   **(CREDIT-2)**

Architecture and models of e-Governance, including Public Private Partnership (PPP), Need for Innovation and Change Management in e-Governance, Critical Success Factors, Major issue including corruption, resistance for change, e-Security and Cyber laws

UNIT-III(IMPACT AND CASE STUDIES)   **(CREDIT-2)**

Focusing on Indian initiatives and their impact on citizens; Sharing of case studies to highlight best practices in managing e-Governance projects in Indian context. Visits to local e-governance sites (CSC, eSeva, Post Office, Passport Seva Kendra, etc) as part of Tutorials.

Mini Projects by students in groups – primarily evaluation of various e-governance projects

Recommended Books & References:

1.   Managing Transformation –Objectives to Course Outcomes. J Satyanarayana, Prentice Hall India
2.   The State, IT and Development. Kenneth Kenniston, RK Bagga and Rohit Raj Mathur, Sage Publications India Pvt Ltd.
3.   e-Government -The Science of the Possible. J Satyanarayana, Prentice Hall, India

SUBJECT: INTERNET OF THINGS

Course outcome: Students will understand iot concept, communication protocols, networks, basic of arduino programming and implementation of iot.

UNIT-I (INTRODUCTION) (CREDIT-2)
Introduction to IOT; Sensing; Actuation.
Basics of IoT Networking, Communication Protocols, Sensor networks

UNIT-II (ABOUT ARDUINO PROGRAMMING) (CREDIT-2)
Introduction to Arduino programming, Integration of Sensors/Actuators to Arduino.

UNIT-III (IMPLEMENTTION OF IOT) (CREDIT-2)
Implementation of IoT with Raspberry Pi; Data Handling Analytics.
Case Studies: Agriculture, Healthcare, Activity Monitoring

Recommended Books & References:
1. "The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press)
2. Internet of Things by Dr.Jeeva Jose, Khanna Publishing House (Edition 2017)
3. "Internet of Things: A Hands-on Approach", by ArshdeepBahga and Vijay Madisetti (Universities Press)
4. Internet of Things: Architecture and Design Principles, Raj Kamal, McGraw Hill

SUBJECT: ECONOMIC POLICIES IN INDIA

Course outcome: students will understand basic feature and problems of Indian economy, external sector in India and industrial development.

UNIT-I(BASIC FEATURES AND PROBLEMS OF INDIAN ECONOMY) (CREDIT-2)
BASIC FEATURES AND PROBLEMS OF INDIAN ECONOMY: Economic History of India; Nature of Indian Economy, Demographic features and Human Development Index, Problems of Poverty, Unemployment, Inflation, income inequality, Black money in India.
SECTORAL COMPOSITION OF INDIAN ECONOMY: Issues in Agriculture sector in India, land reforms, Green Revolution, agriculture policies of India,

UNIT-II (INDUSTRIAL DEVELOPMENT AND ECONOMIC POLICIES) (CREDIT-2)
INDUSTRIAL DEVELOPMENT: Small scale and cottage industries, Industrial Policy, Public sector in India, Service sector in India.
ECONOMIC POLICIES: Economic Planning in India, Planning commission v/s NITI Aayog, Five Year Plans, Monetary policy in India, Fiscal Policy in India, Centre state Finance Relations, Finance commission in India, LPG policy in India.

UNIT-III (EXTERNAL SECTOR IN INDIA) (CREDIT-2)
EXTERNAL SECTOR IN INDIA: India's foreign trade value composition and direction, India Balance of payment since 1991, FDI in India, Impact of Globalization on Indian Economy, WTO and India.
Recommended Books & References:
1. Dutt Rudder and K.P.M Sunderam (2017). Indian Economy .S Chand &Co.Ltd. New Delhi.
2. Mishra S. K & V. K Puri (2017). Indian Economy and Its Development Experience. Himalaya Publishing House.
3. Singh, Ramesh, (2016): Indian Economy, Tata-McGraw Hill Publications, New Delhi.
4. Dhingra, I.C., (2017): March of the Indian Economy, Heed Publications Pvt. Ltd.
5. Karam Singh Gill, (1978): Evolution of the Indian Economy, NCERT, NewDelhi

SUBJECT: ENGINEERING ECONOMICS & ACCOUNTANCY

Course outcome: Students will understand demand and supply, production, cost analysis and pricing and financial accounting.

UNIT-I(IINTRODUCTION, DEMAND AND SUPPLY) **(CREDIT-2)**

INTRODUCTION: Managerial Economics; Relationship with other disciplines; Firms: Types, objectives and goals; Managerial decisions; Decision analysis.

DEMAND & SUPPLY ANALYSIS: Demand- Types of demand; Determinants of demand; Demand function; Demand elasticity; Demand forecasting, Supply- Determinants of supply; Supply function; Supply elasticity.

UNIT-II(PRODUCTION , COST ANALYSIS AND PRICING) **(CREDIT-2)**

PRODUCTION AND COST ANALYSIS: Production function; Returns to scale; Production optimization; Least cost input; Iso quants; Managerial uses of production function; Cost Concepts- Cost function; Types of Cost; Determinants of cost; Short run and Long run cost curves; Cost Output Decision; Estimation of Cost.

PRICING: Determinants of Price; Pricing under different objectives and different market structures; Price discrimination; Pricing methods in practice; Role of Government in pricing control.

UNIT-III(FINANCIAL ACCOUNTING) **(CREDIT-2)**

FINANCIAL ACCOUNTING (ELEMENTARY TREATMENT): Balance sheet and related concepts; Profit & Loss Statement and related concepts; Financial Ratio Analysis; Cash flow analysis; Funds flow analysis; Comparative financial statements; Analysis & Interpretation of financial statements; Investments; Risks and return evaluation of investment decision; Average rate of return; Payback Period; Net Present Value; Internal rate of return.

Recommended Books & References:

1. McGuigan, Moyer and Harris,' Managerial Economics; Applications, Strategy and Tactics', Thomson South Western, 10th Edition, 2005.
2. Prasanna Chandra. 'Fundamentals of Financial Management', Tata Mcgraw Hill Publishing Ltd., 4th edition,2005.
3. Samuelson. Paul A and Nordhaus W. D., 'Economics', Tata Mcgraw Hill Publishing Company Limited, New Delhi,
4. 2004.
5. Paresh Shah, 'Basic Financial Accounting for Management', Oxford University Press, NewDelhi, 2007.
6. Salvatore Dominick, 'Managerial Economics in a global economy'. Thomson SouthWestern, 4th Edition, 2001.

SUBJECT: DATA SCIENCES: DATA WAREHOUSING AND DATA MINING

Course Outcome: students will understand basic of warehousing and data mining concepts like data quality, major tasks in data pre-processing, on-line analytical processing, classification and cluster analysis

UNIT-I (INTRODUCTION, PREPROCESSING)

(CREDIT-2)

INTRODUCTION: Motivation, Importance, Definitions, Kind of Data, Data Mining Functionalities, Kinds of Patterns, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of A Data Mining System with A Database or Data Warehouse System, Major Issues in Data Mining, Types of Data Sets and Attribute Values, Basic Statistical Descriptions of- Data, Data Visualization, Measuring Data Similarity.

PREPROCESSING: Data Quality, Major Tasks in Data Preprocessing, Data Reduction, Data Transformation and Data Discretization, Data Cleaning and Data Integration.

UNIT-II (DATA WREHOUSING)

(CREDIT-1.5)

DATA WAREHOUSING AND ON-LINE ANALYTICAL PROCESSING: Data Warehouse basic concepts, Data Warehouse Modeling - Data Cube and OLAP, Data Warehouse Design and Usage, Data Warehouse Implementation, Data Generalization by Attribute-Oriented Induction, Data Cube Computation.

PATTERNS, ASSOCIATIONS AND CORRELATIONS

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Item set Mining Methods, Pattern Evaluation Methods, Applications of frequent pattern and associations. Frequent Patterns and Association Mining: A Road Map, Mining Various Kinds of Association Rules, Constraint-Based Frequent Pattern Mining, Extended Applications of Frequent Patterns

UNIT-III(CLASSIFICATION AND CLUSTER ANALYSIS)

(CREDIT-1.5)

CLASSIFICATION: Basic Concepts, Decision Tree Induction, Bayesian Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Techniques to Improve Classification Accuracy: Ensemble Methods, Handling Different Kinds of Cases in Classification, Classification by Neural Networks, Support Vector Machines, Pattern-Based Classification, Lazy Learners (or Learning from Your Neighbors)..

CLUSTER ANALYSIS: Basic Concepts of Cluster Analysis, Clustering Structures, Major Clustering Approaches-Partitioning Methods, Hierarchical Methods, Density-Based Methods, Model-Based Clustering, why outlier analysis, Identifying and handling of outliers, Outlier Detection Techniques. WEB MINING: Basic concepts of web mining, different types of web mining, PAGE RANK Algorithm, HITS Algorithm

Recommended Books & References:
1. Jiawei Han, MichelineKamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
3. AmiteshSinha, Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

SUBJECT: FUNDAMENTALS OF AI

Course outcome: students will understand AI fundamental searching techniques, finding optical paths, planning and constraints satisfaction.

UNIT-I(INTRODUCTION , SEARCH)

(CREDIT-2)

INTRODUCTION: Overview and Historical Perspective, Turing test, Physical Symbol Systems and the scope of Symbolic AI, Agents.

SEARCH: Heuristic Search: Best First Search, Hill Climbing, Beam Search, Tabu Search, Randomized Search: Simulated Annealing, Genetic Algorithms, Ant Colony Optimization.

UNIT-II(FINDING OPTICAL PATHS)

(CREDIT-1.5)

FINDING OPTIMAL PATHS: Branch and Bound, A*, IDA*, Divide and Conquer approaches, Beam Stack Search. Problem Decomposition: Goal Trees, AO*, Rule Based Systems, Rete Net. Game Playing: Minimax Algorithm, Alpha Beta Algorithm, SSS*.

UNIT-III(PALNNIING AND CONSTRANTS SATISFACTION)

(CREDIT-1.5)

PLANNING AND CONSTRAINT SATISFACTION: Domains, Forward and Backward Search, Goal Stack Planning, Plan Space Planning, Graph plan, Constraint Propagation. LOGIC AND INFERENCES: Propositional Logic, First Order Logic, Soundness and Completeness.

Recommended Books & References:
1. Deepak Khemani. A First Course in Artificial Intelligence, McGraw Hill Education (India)
2. Stefan Edelkamp and Stefan Schroedl. Heuristic Search, Morgan Kaufmann.
3. Pamela McCorduck, Machines Who Think: A Personal Inquiry into the History andProspects of Artificial Intelligence, A K Peters/CRC Press
4. Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw Hill.
5. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach, PrenticeHall
6. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House

SUBJECT: AA COMPUTER NETWORKS

COURSE OUTCOME: students will understand working of network, ip address classess, subnetmask, telecom network and advanced scripting.

UNIT-I(NETWORK BASIC) **(CREDIT-2)**

Review of Networking Basics; Advance Topics in IPv4 – Subnetting, Multicasting, Multicast Routing Protocols (IGMP, PIM, DVMRP); Advance Topics in TCP – flow management, congestion avoidance, protocol spoofing; IPv6

UNIT-II (TELECOM NETWORKS) **(CREDIT-2)**

Telecom Networks, Switching Techniques; Introduction to- Frame Relay, ATM, MPLS; VSAT Communication – Star and Mesh architectures, bandwidth reservation; Wireless Networks – WiFi, WiMax, Cellular Phone Technologies – GSM, CDMA, 3G, 4G.

Network Redundancy, Load Balancers, Caching, Storage Networks; QoS; Network Monitoring –SNMP, RMON;

UNIT-III (ADVANCED SCRIPTING) **(CREDIT-2)**

ADVANCE SCRIPTING: Introduction to Network Security – VLAN, VPN, Firewall, IPS, Proxy Servers.

PHP: Network Simulation, Network design case studies and exercises, IP Addressing schema, Protocol Analyzers (Wireshark, etc)

Recommended Books & References:

1. Communication Networking – An Analytical Approach, Anurag-Manjunath-Joy
2. TCP/IP Illustrated (Vol.1,2), Stevens
3. Data Networks, Bertsekas-Gallager
4. An Engineering Approach to Computer Networking, S. Keshav

SUBJECT: MOBILE COMPUTING

COURSE OUTCOME: students will understand mobile app development activity or activity life cycle, get knowlegde about software development kit(sdk),adt,avd and application elements.

UNIT-I (SDK,ADT AND AVD) **(CREDIT-2)**

A brief history of Mobile, Types of mobile phone generations, The Mobile Ecosystem, Types of Mobile Applications, Mobile Information Architecture Android Versions, Features of Android, Android Architecture, Installing Android SDK Tools, Configuring Android in Eclipse IDE, Android Development Tools (ADT), Creating Android Virtual Devices (AVD)

UNIT-II (ANDROID APPLICATION LIFE CYCLE) **(CREDIT-2)**

Creating first android application, Anatomy of android application, Deploying Android app on USB connected Android device, Android application components, Activity life cycle, understanding activities, Exploring Intent objects, Intent Types, linking activities using intents.

Fragments life cycle, Interaction between fragments, Understanding the components of a screen (Layouts), Adapting to display orientation, Action Bar, Views (UI Widgets)-Button, Toast, ToggleButton, CheckBox, RadioButton, Spinner, WebView, EditText, DatePicker, TimePicker, ListView, ProgressBar, Analog and Digital clock, Handling UI events, List fragment, Dialog fragment

UNIT-III(APPLICATION ELEMENTS) **(CREDIT-2)**

Menus- Option, Context, Popup, Images-Image View, Image Switcher, Alert Dialog, Alarm manager, SMS, E-mail, Media Player, using camera, recording video, Handling Telephony Manage

PHP: Storing the data persistently-Data Storage Options: preferences, Internal Storage, External Storage, Content Provider, The SQLite database, connecting with SQLite database and operations-Insert, Delete, Update, Fetch, Publishing android applications, Deploying APK files

Recommended Books & References:
1. Wei-Meng Lee, Beginning Android 4 Application Development, Wiley Publishing, Inc.
2. Pradeep Kothari, "Android Application Development Black Book", DreamTech Press
3. James C.Sheusi, "Android Application Development for Java Programmers", Cengage Learning
4. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
5. Sayed Y Hashimi and SatyaKomatineni(2009), "Pro Android", Wiley India Pvt Ltd
6. Reto Meier, Professional Android 4 Application Development, Wiley India Pvt Ltd

SUBJECT: DATA SCIENCES: DATA WAREHOUSING AND DATA MINING LAB

LISTOFPRACTICALTOBEPERFORMED:

S.No.	Topics for Practice
1	Study and explore WEKA environment.
2	Create.arfffile using WEKA.
3	Demonstration ofpre-processing of. arfffile.
4	Demonstrate performing associationruleminingondatasets.
5	Demonstrateperformingclassificationondatasets.
6	Demonstrateperformingclusteringondatasets.
7	DemonstrateperformingRegressionondatasets.
8	Demonstrationofassociationrule mining.
9	PerformclassificationusingBayesianclassificationalgorithm.
10	Perform the clusteranalysisbyk-meansmethod.

Recommended Books & References:
1. Jiawei Han, MichelineKamber, Jian Pei, Data Mining: Concepts and Techniques, Elsevier
2. Margaret H Dunham, Data Mining Introductory and Advanced Topics, Pearson Education
3. AmiteshSinha, Data Warehousing, Thomson Learning, India.
4. Xingdong Wu, Vipin Kumar, the Top Ten Algorithms in Data Mining, CRC Press, UK.

SUBJECT: FUNDAMENTALS OF AI LAB

LISTOFPRACTICALTOBEPERFORMED:

S.No.	TopicsforPractice
1	StudyofPrologfeaturesandformat
2	WritesimplefactforthestatementsusingProlog.
3	Programsusingvariablesin Prolog
4	ProgramsusingrulesinProlog
5	ProgramsusingInput,OutputandfailpredicatesinProlog
6	Programsusingcut,not,failpredicatesin Prolog
7	Writeaprogram tosolve8queensproblem
8	Programsto demonstrate depth firstsearch
9	Programsto demonstrate bestfirstsearch
10	Writeaprogramto solve traveling salesmanproblem.

Recommended Books & References:
1. Deepak Khemani. A First Course in Artificial Intelligence, McGraw Hill Education (India)
2. Stefan Edelkamp and Stefan Schroedl. Heuristic Search, Morgan Kaufmann.
3. Pamela McCorduck, Machines Who Think: A Personal Inquiry into the History andProspects of Artificial Intelligence, A K Peters/CRC Press
4. Elaine Rich and Kevin Knight. Artificial Intelligence, Tata McGraw Hill.
5. Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach, PrenticeHall
6. M.C. Trivedi, A classical approach to Artificial Intelligence, Khanna Publishing House

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VI SEMESTER

SUBJECT:ENTREPRENEURSHIP AND START-UPS

COURSE OUTCOME: students will understand about start-up, start-up ideas , financing and protection ideas.

Unit - I (INTRODUCTION TO ENTREPRENEURSHIP AND START-UPS)   **Credit -2**
INTRODUCTION TO ENTREPRENEURSHIP AND START–UPS: Definitions, Traits of an entrepreneur, Intrapreneurship, Motivation, Types of Business Structures, Similarities / differences between entrepreneurs and managers. BUSINESS IDEAS AND THEIR IMPLEMENTATION: Discovering ideas and visualizing the business, Activity map, Business Plan

Unit- II(IDEA TO START-UP)   **Credit-2**
IDEA TO START-UP: Market Analysis– Identifying the target market, Competition evaluation and Strategy Development, Marketing and accounting, Risk analysis, MANAGEMENT: Company's Organization Structure, Recruitment and management of talent. Financial organization and management

Unit-III(FINANCING AND PROTECTION IDEAS)   **Credit-2**
FINANCING AND PROTECTION OF IDEAS: Financing methods available for start-ups in India, Communication of Ideas to potential investors– Investor Pitch, Patenting and Licenses. EXIT STRATEGIES FOR ENTREPRENEURS,BANKRUPTCY, AND SUCCESSION AND HARVESTING STRATEGY

Recommended Books & References:

1.   The Startup Owner's Manual: The Step by- Step Guide for Building a Great Company Steve Blank and Bob Dorf K & S Ranch ISBN–978-0984999392
2.   The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses Eric Ries Penguin UK ISBN–978-0670921607
3.   Demand: Creating What People Love Before They Know They Want It   Adrian J. Slywotzky with Karl Weber Headline Book Publishing ISBN–978-0755388974
4.   The Innovator's Dilemma: The Revolutionary Book That Will Change the Way You Do Business   Clayton M. Chris Tensen   Harvard business ISBN:978-142219602

SUBJECT: PROJECT MANAGEMENT

COURSE OUTCOME: students will understand project life cycle and project estimation process, capital budgeting and project admin work.

Unit-I (INTRODUCTION ABOUT PROJECT) Credit – 2

CONCEPT OF A PROJECT: Classification of projects, Importance of project management, the project Life cycle, establishing project priorities (scope-cost-time), Project priority matrix, Work breaks down structure.

CAPITAL BUDGETING PROCESS: Planning -Analysis-Selection-Financing-Implementation-Review. Generation and screening of project ideas, Market and demand analysis, Demand forecasting techniques. Market planning and marketing research process, technical analysis.

Unit-II (PROJECT ESTIMATION AND CAPITAL BUDGETING) Credit-2

FINANCIAL ESTIMATES AND PROJECTIONS: Cost of projects, means of financing, estimates of sales and production-cost of production, Working capital requirement and its financing, Profitability project, cash flow statement and balance sheet. Breakeven analysis.

BASIC TECHNIQUES IN CAPITAL BUDGETING: Non discounting and discounting methods, pay-back period, accounting rate of return, Net present value, Benefit cost ratio, Internal rate of return. Project risk. Social cost benefit analysis and economic rate of return. Non-financial justification of projects.

Unit-III (PROJECT ADMIN) Credit-2

PROJECT ADMINISTRATION: Progress payments, Expenditure planning, Project scheduling and network planning, Use of Critical Path Method (CPM), Schedule of payments and physical progress, time-cost trade off. Concepts and uses of PERT Cost as a function of time, Project Evaluation and Review Techniques, Cost mechanisms. Determination of least cost duration. Post project evaluation. Introduction to various Project management software.

Recommended Books & References:

1. Project planning, analysis, selection, implementation and review –Prasannachandra–Tata McGraw Hill
2. Project Management – the Managerial Process– Clifford F. Gray& Erik W. Larson-Mc Graw Hill
3. Project management- David I Cleland- Mcgraw Hill International Edition, 1999
4. Project Management– Gopala krishnan– Mcmillan India Ltd.
5. Project Management- Harry – Maylor – Peason Publication

SUBJECT: RENEWABLE ENERGY TECHNOLOGIES

COURSE OUTCOME: students will understand renewable enegry, solar energy, wind energy and bio energy.

UNIT-I (INTRODUCTION)   **Credit-2**
INTRODUCTION: World Energy Use; Reserves of Energy Resources; Environmental Aspects OF Energy Utilization; Renewable Energy Scenario in India and around the World; Potentials; Achievements/ Applications; Economics of renewable energy systems.

Unit-II (SOLAR AND WIND ENERGY)   **Credit-2**
SOLAR ENERGY: Solar Radiation; Measurements of Solar Radiation; Flat Plate and Concentrating Collectors; Solar direct Thermal Applications; Solar thermal Power Generation, Fundamentals of Solar Photo Voltaic Conversion; Solar Cells; Solar PV Power Generation; Solar PV Applications.
WIND ENERGY: Wind Data and Energy Estimation; Types of Wind Energy Systems; Performance; Site Selection; Details of Wind Turbine Generator; Safety and Environmental Aspects.

Unit-III (BIO ENERGY AND RENEWABLE ENERGY SOURCES)   **Credit-2**
BIO-ENERGY: Bio mass direct combustion; Bio mass gasifiers; Bio gas plants; Digesters; Ethanol production; Bio diesel; Cogeneration; Bio mass Applications.
OTHER RENEWABLE ENERGY SOURCES: Tidal energy; Wave Energy; Open and Closed OTEC Cycles; Small Hydro Geothermal Energy; Hydrogen and Storage; Fuel Cell Systems; Hybrid Systems.

Recommended Books & References:
1.   Non-ConventionalEnergySources,Rai.G.D.,KhannaPublishers, NewDelhi, 2011.

2.   RenewableEnergySources, Twidell,J.W.&Weir,A., EFNSponLtd.,UK,2006.

3.   SolarEnergy,Sukhatme.S. P., TataMcGrawHillPublishing CompanyLtd.,NewDelhi,1997.

4.   Renewable Energy,PowerforaSustainableFuture,GodfreyBoyle,OxfordUniversityPress,U.K., 1996.

5.   Fundamentalof Renewable Energy Sources,GNTiwariand M KGhoshal,Narosa, NewDelhi, 2007.

6.   Renewable Energy and Environment A Policy Analysis for India ,NHRavindranath, U K Rao,

       B Natarajan, PMonga,TataMcGrawHill.

7.   Energy and The Environment, R A Ristinen and J JKraushaar, second edition, John Willey &

       Sons, New York,2006.

8.   Renewable Energy Resources,JWTwidelland ADWeir,ELBS,2006.

SUBJECT: PRODUCT DESIGN

COURSE OUTCOME: students will understand product and product life cycle, product design concept and optimization in design.

UNIT-I (INTRODUCTION AND LIFE CYLE OF PRODUCT)   **CREDIT-2**
DEFINITION OF A PRODUCT: Types of products; Levels of product; Product-market mix; New prod-uct development (NPD) process; Idea generation methods; Creativity; Creative attitude; Creative design process; Morpho logical analysis; Analysis of inter-connected decision areas; Brain storming.

PRODUCT LIFECYCLE: The challenges of Product development; Product analysis; Product characteristics; Economic considerations; Production and Marketing aspects; Characteristics of successful Product development; Phases of a generic product development process; Customer need identification; Product development practices and industry-product strategies.

Unit-II (PRODUCT DESIGN CONCEPT)   **credit-2**
PRODUCT DESIGN: Design by evolution; Design by innovation; Design by imitation; Factors affecting product design; Standards of performance and environmental factors; Decision making and iteration; Morphology of design (different phases); Role of aesthetics in design.

Unit-III(INTRODUCTION OPTIMIZATION)   **Credit-2**
INTRODUCTION TO OPTIMIZATION IN DESIGN: Economic factors in design; Design for safety and reliability; Role of computers in design; Modeling and Simulation; The role of models in engineering design; Mathematical modeling; Similitude and scale models; Concurrent design; Six sigma and design for six sigma; Introduction to optimization in design; Economic factors and financial feasibility in design; Design for manufacturing; Rapid Proto typing (RP); Application of RP in product design; Product Development versus Design.
DESIGN OF SIMPLE PRODUCTS DEALING WITH VARIOUS ASPECTS OF PRODUCT DEVELOPMENT: Design Starting from need till the manufacture of the product.

Recommended Books & References:

1.   Product Design and Development, Karl T.Ulrichand Steven D.Eppinger, TataMcGraw–Hill edition.

2.   Engineering Design– George E. Dieter.

3.   An Introduction to Engineering Design methods Vijay Gupta.

4.   Merie Crawford: New Product management, McGraw-Hill Irwin.

5.   Chitale A K and Gupta R C," Product Design and Manufacturing", Prentice Hall of India, 2005. 6.Kevin Otto and Kristin Wood, Product Design, Techniques in Reverse Engineering and New Product Development, Pears on education.

SUBJECT: DISASTER MANAGEMENT

COURSE OUTCOME: students will understand about disaster and disaster types, trends, cause, consequences and disaster control management cycle and frame work, disaster management applications and disaster management in India.

UNIT-I (INTRODUCTION, TYPES, TRENDS, CAUSES, CONSEQUENCES AND CONTROL OF DISASTER)
CREDIT-2
UNDERSTANDING DISASTER: Understanding the Concepts and definitions of Disaster, Hazard, Vulnerability, Risk, Capacity–Disaster and Development, Disaster management.
TYPES, TRENDS, CAUSES, CONSEQUENCES AND CONTROL OF DISASTERS: Geological Disasters (earth quakes, landslides, tsunami, mining); Hydro-Meteorological Disasters (floods, cyclones, lightning, thunder-storms, hailstorms, avalanches, droughts, cold and heat waves) Biological Disasters (epidemics, post attack, forest fire); Technological Disasters (chemical, industrial, radiological, nuclear) Manmade Disasters (building collapse, rural and urban fire, road and rail accidents, nuclear, radiological, chemicals and biological disasters), Global Disaster Trends, Emerging Risks of Disasters, Climate Change and Urban Disasters.

Unit-II (DISASTER MANAGEMENET CYCLE AND FRAME WORK) **Credit-2**
DISASTER MANAGEMENT CYCLE AND FRAME WORK: Disaster Management Cycle, Paradigm Shift in Disaster Management. Pre-Disaster, Risk Assessment and Analysis, Risk Mapping,
Zonation and Micro zonation, Prevention and Mitigation of Disasters, Early Warning System, Preparedness, Capacity Development; Awareness. During Disaster, Evacuation, Disaster Communication, Search and Rescue, Emergency Operation Centre. Incident Comm and System, Relief and Rehabilitation, Post-disaster, Damage and Needs Assessment,
Restoration of Critical Infra structure, Early Recovery Reconstruction and Redevelopment; IDNDR, Yokohama Strategy, Hyogo Frame-work of Action.

Unit-III(DISASTER MANAGEMENT IN INDIA, APLLICATION OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT) **Credit-2**
DISASTER MANAGEMENT IN INDIA: Disaster Profile of India: Mega Disasters of India and Lessons Learnt. Disaster Management Act 2005, Institutional and Financial, Mechanism, National Policy on Disaster Management, National Guidelines and Plans on Disaster Management; Role of Government (local, state and national), Non-Government and Inter Governmental Agencies
APPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DISASTER MANAGEMENT: Geo informatics in Disaster Management (RS, GIS, GPS and RS). Disaster Communication System (Early Warning and Its Dissemination).Land Use Planning and Development Regulations, Disaster Safe Designs and Constructions, Structural and Non-Structural Mitigation of Disasters, S & T Institutions for Disaster Management in India.

Recommended Books & References:
1. Publications of National Disaster Management Authority (NDMA) on Various Templates and Guidelines for Disaster Management
2. Bhandani, R. K., An over view on natural & man-made disasters and their reduction, CSIR, New Delhi
3. Srivastava, H. N., and Gupta G. D. , Management of Natural Disasters in developing countries, Daya Publishers, Delhi
4. Alexander, David, Natural Disasters, Kluwer Academic London
5. Ghosh, G .K. ,Disaster Management, APH Publishing Corporation
6. Murthy, D. B. N., Disaster Management: Text & Case Studies, Deep & Deep Pvt. Ltd.

SUBJECT: MULTIMEDIA TECHNOLOGIES

COURSE OUTCOME: STUDENTS WILL UNDERSTAND MULTIMEDIA ELEMENTS, COMPRESSION TECHNIQUES AND DIGITAL IMAGING.

UNIT-I (MULTIMEDIA CONCEPTS)   **CREDIT-1.5**

Introduction to Multimedia: Multimedia Foundation and Concepts, Multimedia Hardware, Multimedia Software, Multimedia Operating systems, Multimedia communication system

Unit-II(COMPRESSION TECHNIQUES)   **Credit-2.5**
Basic Compression Techniques: Video and Audio Data Compression Techniques – Lossy and Lossless, Example algorithms /standards, Huffman, RLE, JPEG, MPEG, MP3, MP4, LZMA, FLAC, ALAC, ITU G.722, H.261, H.265. Content Development and Distribution: Desktop publishing (Coral Draw, Photoshop, Page maker), Multimedia Animation & Special effects (2D/3D animation, Flash)

Unit-III(DIGITAL IMAGING)   **Credit-2**
Introduction to Digital Imaging: Basics of Graphic Design and use of Digital technology, Definition of Digital images, Digital imaging in multimedia. Introduction to Multimedia Programming and Applications: What is Multimedia Programming, Programming Languages for Multimedia Programming, Applications of Multimedia Programming

Recommended Books & References:
1. AnIntroductiontoMultimediaAuthoring,A.Eliens
2. FundamentalsofMultimedia,PrenticeHall/Pearson, Ze-NianLi&MarkS. Drew.
3. MultimediaandAnimation,V.K.Jain, KhannaPublishingHouse, Edition2018
4. FundamentalsofMultimedia,RameshBangia, Khanna Book PublishingCo.,N.Delhi(2007)

SUBJECT: SOFTWARE TESTING

COURSE OUTCOME: students will understand software testing methods/techniquesexecuation, management, automation and qos.

UNIT-I (INTRODUCTION AND TEST CASES)   **CREDIT-2**

BASICS: Introduction to Software Quality basics- Verification and validation, quality perspectives. Testing terminology, Software Testing Life Cycle (STLC), "V" model of Testing, QA process, cost of testing, types of tests. WRITING TEST CASES: Writing test cases, Functional Testing, non-functional testing, (Performance testing), UI testing. Preparing test data, Writing Unit test, Integration test and User Acceptance Tests, Preparing test scenarios from Software requirements.

Unit-II (TEST EXECUTION AND MANAGEMENT)   **Credit-2**

TEST EXECUTION AND MANAGEMENT: Test execution, Test Oracles, Test planning, test strategy including when to stop testing, test-coverage- Traceability matrix, JIRA, Bugzilla and other bug tracking tools. Test data mining, Test reporting.

Unit-III(TEST AUTOMATION AND QOS)   **Credit-2**

TEST AUTOMATION: Why automation, when not to automate, writing simple automated test cases, learn and practice any one automated testing framework like Selenium
OTHER QUALITY ASSURANCE: Quality and Defect management - Code reviews, Quality tools, Change management, Version control.

Recommended Books & References:
   1. SoftwareEngineering–A Practitioner'sApproach,7thEdition, RogerPressman.

SUBJECT: MULTIMEDIA TECHNOLOGIES LAB

This is a skill course. Topics/tools taught in the class should be practiced in the Lab same week and practiced regularly during the semester till student becomes confident about it. Students should explore features of various tools introduced during the course and become comfortable with their use.
Teacher should give weekly tasks as assignment.

Recommended Books & References:
1. AnIntroductiontoMultimediaAuthoring,A.Eliens
2. FundamentalsofMultimedia,PrenticeHall/Pearson, Ze-NianLi&MarkS. Drew.
3. MultimediaandAnimation,V.K.Jain, KhannaPublishingHouse, Edition2018
4. FundamentalsofMultimedia,RameshBangia, Khanna Book PublishingCo.,N.Delhi(2007)

SUBJECT: SOFTWARE TESTING LAB

LISTOFPRACTICALTOBEPERFORMED:

1. Test cases of different types for a sample system, may be for the minor project done earlier; using Bugzilla to report cases
2. Writing performance test cases for different types of tests (load, stress, benchmarking, etc.)
3. Writing automated test for UI
4. Writing-executing test scripts for a sample system.

Recommended Books & References:

1. SoftwareEngineering–A Practitioner'sApproach,7thEdition, RogerPressman.

SUBJECT: MAJOR PROJECT

In this course student has to select a project work based on a topic of interest. Periodically the supervisor will evaluate the implementation. This work, started in sixth semester of which, the student will be evaluated internally and externally.

Course Outcome of the course: Investigating professional topics, including ethical, legal and security issues, related to computing projects. Design and develop the software with Software Engineering practices and standards. Apply prior knowledge to design and implement solutions for computational problems while considering numerous realistic restraints.

SUBJECT: SEMINAR

In the seminar, the student will submit the idea on which he/she willing to work based upon the industrial training. Same will be happen at the time of VIVA while presenting the project. This is supervised by faculty member and will be evaluated internally or externally.

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JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

Faculty of Education & Methodology
Department of Science & Technology

MASTER OF COMPUTER APPLICATIONS (MCA)

DURATION – 3 YEARS (6 SEMESTERS)

SYALLBUS FOR:
I –III YEAR

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

I SEMESTER

Nature of Course	Course Name	C	T	D&T	P	PS
Core Computer Science	Design and Analysis of Algorithms	10	6	1.2	1.8	1
Core Computer Science	Object Oriented Programming in "C++"	10	6.4	1	1.6	1
Core Computer Science	Software Engineering	7	7	0	0	0
Core Computer Science	Operating System	9	6	0.6	1.4	1
Mathematics	Discrete Mathematics	6	6	0	0	0
University Mission Course	WRL	1	1	0	0	0
University Compulsory Course	Extra-Curricular Activities	1*	0	0	1	0
University Compulsory Course	Community Development Activities	1*	0	0	1	0
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	0.8	0.8	0	0	0
University Optional Course	Professional Activity	--	--	--	--	--
Total Credits		**45.8**	**33.2**	**2.8**	**6.8**	**3**

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

II SEMESTER

Nature of Course	Course Name	C	T	D&T	P
Core Computer Science	Design and Analysis of Algorithms I: Introduction to data structures and algorithms	3.2	2	0.5	0.7
	Design and Analysis of Algorithms II: Graph Algorithm, Searching Algorithm and Greedy Method	3.4	2	0.9	0.5
	Design and Analysis of Algorithms III: Dynamic Programming, Problem Analysis, NP Completeness	2.4	2	0.4	0
	10 Practice Sessions of Algorithm programming using C in Lab	*1*	*0*	*0*	*10 Sessions*
Core Computer Science	Object Oriented Programming in "C++" I: Object Orientation Concepts	2.9	2.2	0.2	0.5
	Object Oriented Programming in "C++" II: Classes and Objects	3.2	2.2	0.5	0.5
	Object Oriented Programming in "C++" III : Inheritance	2.9	2	0.3	0.6
	10 Practice Sessions of Object, Class and inheritance in Lab	*1*	*0*	*0*	*10 Sessions*
Core Computer Science	Software Engineering I : Overview of Software Development and methodology	2	2	0	0
	Software Engineering II : Function-oriented Methodology, Software testing	2	2	0	0
	Software Engineering III : Object-oriented Methodology, Software Project Management	2	2	0	0
Core Computer Science	Operating System I : Introduction and CPU Scheduling	2.2	1.5	0.3	0.4
	Operating System II: Synchronization, Deadlock	2.3	1.5	0.2	0.6
	Operating System III: Logical versus physical address space, Swapping	2.5	2	0.1	0.4
	10 Practice Sessions of Scheduling algorithms and OS commands in Lab	*1*	*0*	*0*	*10 Sessions*
Mathematics	Discrete Mathematics I: Relations, Permutations, Combinations	2	2	0	0
	Discrete Mathematics II: Boolean Algebra, Lattices	2	2	0	0
	Discrete Mathematics III: Graph Theory	2	2	0	0
University Mission Course	WRL	1	1	0	0
University Compulsory Course	Extra-Curricular Activities	1*	0	1	0
	Community Development Activities	1*	0	1	0

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Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	**0.8**	**0.8**	**0**	**0**
University Compulsory Course	Professional Activity	--	--	--	--
Total Credits		**45.8**			

Note:
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- P represents number of Practical Credits.
- PS represents number of practice credit sessions
- *Represent as per university norms

III- SEMESTER

Nature of Course	Course Name	C	T	D&T	P
Core Computer Science	Web Development Techniques I: Introduction, Web Applications	2.6	1.8	0	0.6
Core Computer Science	Web Development Techniques II: Java Scripts	3	2	0.2	0.8
Core Computer Science	Web Development Techniques III: Introduction of PHP	2.4	1.4	0.3	0.7
	2 Practice Sessions from Unit I in University Lab	**0.2**	--	--	**2 Sessions**
Mathematics	Numerical Computation I: Statistical Methods	2	2	0	0
Mathematics	Numerical Computation II: Interpolation and Integration	2	2	0	0
Mathematics	Numerical Computation III: Errors and Approximations in Digital Computers	2	2	0	0
Core Computer Science	Software Project Management I : Project Management	2	2	0	0
Core Computer Science	Software Project Management II : Estimation and Project Scheduling	2	2	0	0
Core Computer Science	Software Project Management III : Quality Management	2	2	0	0
Core Computer Science	Open Source Technology I: Introduction of Open Source	3	2.5	0	0.5
Core Computer Science	Open Source Technology II: Administration	2	1.5	0	0.5
Core Computer Science	Open Source Technology III: Applications	2	1.5	0	0.5
Core Computer Science	UNIT I :Introduction to Grid Computing	2	2	0	0
Core Computer Science	UNIT II :Introduction to Cloud Computing, Virtualization	1.5	1.5	0	0

Core Computer Science	UNIT III :Introduction to intelligent web and Big Data	2	2	0	0
University Compulsory Course	Extra-Curricular Activities	1	0	0	1
University Compulsory Course	Community Development Activities	1	0	0	1
University Compulsory Course	Cyber Security	**1**	**1**	**0**	**0**
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	**2.2**	**2.2**	**0**	**0**
University Optional Course	Professional Activity	--	--	--	--
Total Credits		**37.7**			

Note:
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- D&T represents number of Demo and Tutorial.
- P represents number of Seminars, group discussion, workshop.
- Ps represents number of practice credit sessions.
- *Represent as per university norms

IV- SEMESTER

Objective: This Semester covers the subjects required for application development like Advanced Java, Data Ware Housing and Data Mining, Cognitive psychology.					
Nature of Course	**Course Name**	**C**	**T**	**P**	**PS**
Core Computer Science	Java Programming With GUI I: Introduction the Abstract Window Toolkit (AWT) and Java Swing	3	2	0.5	0.5
	Java Programming With GUI II: Overview of Packages	4	2	1.6	0.5
	Java Programming With GUI III: Data Base Connectivity	4	2	1.6	0.4
Core Computer Science	Data Ware Housing and Data Mining I: Basics of Data Warehouse	2	2	0	0
	Data Ware Housing and Data Mining II : Data Preprocessing, Language, Architectures	2	2	0	0
	Data Ware Housing and Data Mining III: Classification & Clustering	2	2	0	0
Core Computer Science	Cognitive psychology I: history of the cognitive approach	2	2	0	0
	Cognitive psychology II: Communication and Language Processing	2	2	0	0
	Cognitive psychology III: Contribution of cognitive psychology	2	2	0	0
Electronics and Communication	Digital Electronics I: Number systems and different types of number systems	2.6	2	0.4	0.2
	Digital Electronics II : Combinational & Sequential	3	2	0.3	0.7

		C	T	P1	P2
	circuits, flip flops				
	Digital Electronics III : Counters, Asynchronous (ripple), synchronous and synchronous decade counter	1	1	0	0
Core Computer Science	Multimedia System and Animation I: Introduction	3	2	0.8	0.2
	Multimedia System and Animation II: Tools of Multimedia	3.5	1.5	1.2	0.8
	Multimedia System and Animation III: Animation	3	2	0.8	0.2
Professional Development Activity	Certified Training	4	4	0	0
Professional Development Activity	Industrial Visit	1	1	0	0
University Compulsory Course	Extra Curricular Activities	1	0	1	0
University Compulsory Course	Community Development Activities	1	0	1	0
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	0.8	0.8	0	0
Total Credits		46.9			

Note:

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- T represents number of Theory Credit per course.
- P1 represents number of Practical and Practice credits respectively per course.
- P2 represents number of Seminars, group discussion, workshop.
- *Represent as per university norms

V- SEMESTER

Objective: This Semester covers the subjects required for application development like Advance database management system, Artificial intelligence, network programming, and microprocessor.

Nature of Course	Course Name	C	T	P	PS
Core Computer Science	Advance Database Management System I: Introduction to Data Base Systems	2	1.5	0.5	0
	Advance Database Management System II: Relational Model and Normalization	2.8	2.0	0.8	0
	Advance Database Management System III: Concurrency Control, Transaction and Security	2.8	2	0.8	0
Core Computer Science	Artificial Intelligence & Applications I: Introduction to Artificial Intelligence	2	2	0	0
	Artificial Intelligence & Applications II: Knowledge Representation	2	2	0	0
	Artificial Intelligence & Applications III: Game Playing	2	2	0	0
Core Computer Science	Network programming I: Basics of TCP Sockets	2	1.5	0.5	0
	Network programming II: TCP Echo Server-Client	3	2.5	0.5	0
	Network programming III: TCP Echo Server-Client	2	1.5	0.5	0
Electronics and Communication	Microprocessor I : Introduction to microprocessor	3.6	2	1.6	0

	Microprocessor II : 8085 micro processor	2.8	2	0.8	0
	Microprocessor III : Direct memory access	1.7	1	0.7	0
Core Computer Science	Web Intelligence, HADOOP and Big data Analysis I: Introduction to intelligent web and listen and load	1.9	1.5	0	0.4
	Web Intelligence, HADOOP and Big data Analysis II: Clustering and generic Methods	2.5	1.5	0	1
	Web Intelligence, HADOOP and Big data Analysis III: Introduction of HADOOP	2.6	2	0	0.6
University Compulsory Course	Extra Curricular Activities	1*	0	1	0
University Compulsory Course	Community Development Activities	1*	0	1	0
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	**2.2**	**2.2**	**0**	**0**
Total Credits		**39.9**			

Note:

- C represents number of Credit per course.
- T represents number of Theory Credit per course.
- P1 represents number of Practical and Practice credits respectively per course.
- P2 represents number of Seminars, group discussion, workshop.
- *Represent as per university norms

VI SEMESTER

Objective: This Semester is to give the students an insight into various fields like Information Security, Computer Graphics, Software Project Management, Organizational Behavior, Advanced Web Technologies.						

Nature of Course	Course Name	C	T	D & T	P 1	Ps
Core Computer Science	Cryptography & Network Security I: Conventional And Modern Encryption	**2**	**2**	**0**	**0**	**0**
Core Computer Science	Cryptography & Network Security II: Public Key Encryption & Authentication	**2**	**2**	**0**	**0**	**0**
Core Computer Science	Cryptography & Network Security III: System Security	**2**	**2**	**0**	**0**	**0**
Core Computer Science	Computer Graphics I: Application areas of Computer Graphics	**2.7**	**1.7**	**0**	**0.8**	**0.2**
Core Computer Science	Computer Graphics II: 2-D geometrical transforms	**3.5**	**2**	**0**	**1.1**	**0.4**
Core Computer Science	Computer Graphics III: 3-D object representation	**2.8**	**2**	**0**	**0.5**	**0.3**
Management	Organizational Behavior I: Fundamental concepts of OB	**2**	**2**	**0**	**0**	**0**
Management	Organizational Behavior II: Personality & Attitudes	**2**	**2**	**0**	**0**	**0**
Management	Organizational Behavior III: Motivation, Theories of Work Motivation	**1.5**	**1.5**	**0**	**0**	**0**
Core Computer Science	Advanced Web Technologies I: The Basics of PHP scripts. The Building blocks of PHP	**3.5**	**2**	**0**	**1**	**0.5**

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		C	T	D&T	P	PS
Core Computer Science	Advanced Web Technologies II: Working with Objects	3.8	2	0	1.2	0.6
Core Computer Science	Advanced Web Technologies III: Learning the MySQL Data types	2.7	2	0	0.4	0.3
Core Computer Science	Cloud Computing I: Introduction to Cloud Computing, Virtualization	2	2	0	0	0
Core Computer Science	Cloud Computing II :Private, Public & Hybrid Clouds, Setting up your own Cloud	2	2	0	0	0
Core Computer Science	Cloud Computing III: Cloud Security	2	2	0	0	0
University Compulsory Course	Extra Curricular Activities	1*	0	0	1	0
University Compulsory Course	Community Development Activities	1*	0	0	1	0
University Compulsory Course	Seminar	1	0	0	0	1
Portfolio Development Activity	Portfolio (Government/Corporate/Entrepreneur)	2.2	2.2	0	0	0
	Total Credit		40.7			

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- T represents number of Theory Credit per course.
- D&T represents number of Demo and Tutorial credits as per course.
- P represents number of Practical Credits.
- PS represents number of practice credit sessions
- *Represent as per university norms

Program Outcomes:

On completion of MCA degree, the graduates will be able to:

- Apply the knowledge of mathematics and computing fundamentals to various real life applications for any given requirement
- Design and develop applications to analyze and solve all computer science related problems
- Design applications for any desired needs with appropriate considerations for any specific need on societal and environmental aspects
- Analyze and review literatures to invoke the research skills to design, interpret and make inferences from the resulting data
- Integrate and apply efficiently the contemporary IT tools to all computer applications
- Solve and work with a professional context pertaining to ethics, social, cultural and cyber regulations

I SEMESTER

Sub: Design and Analysis of Algorithms

Course Outcomes: By the end of course through lectures, readings, home works, lab assignments and exams, students will demonstrate: - The abilities to apply knowledge of computing and mathematics to algorithm design; to analyze a problem and identify the computing requirements appropriate for its solution;

UNIT – I (Introduction to data structures and algorithms) (2-0.7)

Theory **(2 Credits)**

Introduction of Linear Data Structures, arrays, lists, stacks, queue. Linked Lists**:** Single linked list, linked stacks and queues, Circular linked list, Doubly linked list and Generalized list, Introduction of Non Linear Data Structures: Trees and Graphs. Introduction, Basics of Algorithms, Models of Computation: space and time complexity measures, lower and upper bounds, Abstract Data Type, Complexity analysis and measures, The Running Time of a Program, Use of the Big-Oh, small o, Big-omega and small omega notation,

Practical (0.7 Credit) Practice(0.5 Credit) D&T 0.5 Credit

1.   Perform recursive binary and linear search.
2.   Sort a given set of elements using Heap sort technique.
3.   Sort a given set of elements using Merge sort technique.
4.   Sort a given set of elements using Insertion sort technique.
5.   Sort a given set of elements using Quick sort technique.
6.   Example of a searching algorithm implementation.
7.   Example of a sorting algorithm implementation

UNIT-II(Graph Algorithm, Searching Algorithm and Greedy Method) **(2-0.5)**

Theory (2 Credits)

Study and analysis of basic sorting algorithms like Heap Sort, Radix Sort, Bucket Sort and Merge sort. Graph Algorithms: connectivity, strong connectivity, bi-connectivity, Graph traversals, topological sort, shortest paths, minimum spanning trees, network flow; The disjoint set union problem; String matching; order statistics. Searching algorithm (Depth and Breadth first search in graphs), divide-and-conquer, Backtracking Algorithm. Greedy Method: Knapsack Problem.

Practical (0.5 Credit) Practice (0.5 Credit) D&T 0.9 Credit

1. Check whether a graph is connected using Depth first technique.
2. Sort a given set of elements using Selection sort technique.
3. From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm.
4. Find minimum cost spanning tree of a given undirected graph using Kruskal's algorithm.
5. Print all the nodes reachable from a given starting node in a digraph using Breadth first search technique.

UNIT-III (Dynamic Programming, Problem Analysis, NP Completeness) (2-0)

Theory (2 Credits) D&T 0.4 Credit

Dynamic Programming: Matrix Chain Multiplication, Longest Common Subsequence and 0/1 Knapsack Problem. Branch and Bound: Travelling Salesman Problem and Lower Bound Theory. Pattern Matching Algorithms: KMP Matcher and Boyer Moors Algorithms.

Recommended Text Book:
1.   Rivest and Cormen, Introduction to Algorithms, Prentice Hall of India.

Suggested Readings:
1. Aho A.V., J.E. Hopcroft, J.D. Ullman; Design and Analysis of Algorithms, Pearson Education.
2. Baase, Computer Algorithms Pearson Education.
3. Brassard, Algorithms Prentice Hall.
4. Bazaraa, Linear Programme & Network Flows, John Wiley & Sons.

Sub: Object Oriented Programming in "C++"

Course Outcomes: The objectives of the course are to have students identify and practice the object-oriented programming concepts and techniques, practice the use of C++ classes and class libraries, arrays, vectors, inheritance and file I/O stream concepts.

UNIT I (Object Oriented Concepts) (2.2-0.5)
Theory (2.2 Credits)
Object Orientation Concepts, Object Oriented Methodology, Features, Application and Advantages of OOP's, What is C++, Programming Paradigms, Procedural Programming, Modular Programming, Data Abstraction, Data Types, new operators and keywords, Type conversions in C++, reference variables, arrays etc.
Practical (0.5 Credit)
Practice (0.3 Credit) D&T 0.2 Credit
1. Programs based on variables and assignment.
2. Programs based on arithmetic operators
3. Programs based on logical operators.
4. Programs based on conditional Statements
5. Programs based on looping statements

UNIT II (Classes and Objects) (2.2-0.5)
Theory (2.2 Credits)
Classes and Objects, Classes and Access Specifiers, Defining data members and member functions, Array of objects, Usage of namespace, Managing Console I/O, Usage of Manipulators, Usage of Constructors and Destructors, Functions in C++ , Call by reference, return by reference, Function overloading, Inline Functions, Friend Functions, Static class members, Operator Overloading , Overloading unary and binary operators, Usage of this pointer, Overloading using friend functions, Overloading "<<" and ">>" operator.
Practical (0.5 Credit)
Practice (0.3 Credit) D&T 0.5 Credit
1. Programs related to essentials of object oriented programming:
    i. Classes & Objects
    ii. Constructor & Destructor
2. Access Specifiers, abstract data types
    i. Returning and passing objects as parameter
3. Nested and inner classes
4. Programs based on the Polymorphism concept: function overloading.
5. Programs based on the Polymorphism concept: operator overloading.

UNIT III (Inheritance) (2-0.6)
Theory (2 Credits)
Inheritance, Introduction, Types of Inheritance, Base class and derived class examples, Virtual base class, Abstract class, Virtual functions and pure virtual functions, Exception handling, Error Handling , Error Handling Alternatives, Exception Specification, Exception in Constructors & Destructors, Uncaught Exceptions, Standard Exceptions.
Practical (1 Credit)
Practice (0.4 Credit) D&T 0.3 Credit
1. Programs based on the Inheritance (super class - sub class) concept.
2. Programs based on different types of inheritance.
3. Programs based on Pointers to Objects.
4. Programs based on friend function.
5. Exercise based on static functions.
6. Designing of Object & Class diagram: links and associations.

Recommended Text Books:
1. Object Oriented Programming (C++) – Balaguruswamy
Suggested Readings:
1. The C++ Programming Language - Bjarne Stroustrup
2. Thinking in C++ - Bruce Eckel
3. C++ Programming Today – Barbara Johnstron

Sub: Software Engineering

Course Outcomes: Work as an individual and as part of a multidisciplinary team to develop and deliver quality software. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle.

UNIT- I (Software evolution)(2-0-0)
Theory

(2 Credits)

Issues in Software Engineering, Software evolution: Concepts of product life cycle, Development life cycle models: Waterfall, Spiral, Iterative enhancement and phased development, Computer system engineering: Overview, various phases, analysis, design, development and implementation. Cost Estimation Techniques, Metrics for software productivity and quality, Effort Estimation: Overview, COCOMO, Putnam, Sterling models, automated estimation tools.

UNIT- II (Software Project Scheduling) (2-0-0)
Theory

(2 Credits)

Software Project Scheduling: Task definition and parallelism, effort distribution, scheduling Methods: PERT and CPM, Software project plan outline Software prototyping: Overview, steps, methods, tools, specification, guidelines Requirement analysis methods: introduction, methods Software implementation: Issues, concept of programming support environment Software Testing overview: various tests and methods: top-down, bottom-up, mixed Debugging: definition, techniques and strategies, exhaustive testing, classification.

UNIT - III (System integration)(2-0-0)
Theory

(2 Credits)

System integration: Overview, integration of hardware and software component Strategies software configuration management activity, planning, monitoring Controlling, Resource management, Product assurance: overview, quality assurance Software quality assurance: Definitions, various types, trade-offs, verification and validation Configuration management: identification, control, auditing, status accounting, , overview, definition, V and V life cycle.

Recommended Text Books:

1.   Pressman "Software Engineering A Practitioner's Approach" McGraw-Hill, 5th edition,
Suggested Readings:
1.   Shooman "Software Engineering Design, Reliability and Management" ,McGraw Hill 1983
2.   Fairley "Software Engineering Concepts", McGraw--Hill Series, New York, 1985

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Sub: Operating System

Course Outcomes: To make the computer system convenient to use in an efficient manner. To hide the details of the hardware resources from the users. To provide users a convenient interface to use the computer syste

UNIT – I (Introduction and CPU Scheduling) (1.5-0.4)
Theory **(1.5 Credits)**
Introduction: Types of OS - multiprogramming, time sharing, real time systems, multiprocessor system. Concepts of process, Process and Threads: Life cycle and implementations of process. CPU Scheduling : Review of multiprogramming, concept, scheduling concept, scheduling algorithms, algorithm evaluation, multiple processor scheduling, disk and drum scheduling: Physical characteristics, first come first serve scheduling, shortest seek time first scheduling, SCAN
Practical (0.4 Credit) Practice (0.4 Credit) D&T 0.3 Credit
1. Program based on FCFS Scheduling.
2. Program based on Round robin Scheduling.
3. Program based on shortest job first scheduling.
4. Program based on shortest seek time first scheduling

UNIT – II (Synchronization and Deadlock) (1.5-0.6)
Theory **(1.5 Credits)**
Synchronization: - Peterson's solution - Bakery algorithm - Hardware-based solutions – Semaphores Deadlocks: The deadlock problem, deadlock characterization, deadlock presentation, deadlock avoidance and Banker's algorithms. Concurrent Process: Precedence graph, specification, review of process concept, hierarchy of process, the critical section problem, semaphores, classical process coordination problem, inter process communication -Race conditions, Critical regions, Mutual exclusion with busy waiting, sleep and wakeup.
Practical (0.6 Credit) Practice (0.3 Credit) D&T 0.2 Credit
1. Program for Banker's Algorithm.
2. Program for Deadlock detection and Prevention.
3. Essential Linux commands Understanding shells,
4. Commands for files and directories cd, ls, cp, mv,

UNIT – III (Memory management and Unix File System) (2-0.4)
Theory **(2 Credits)**
Memory management: Bare machine, resident monitor, swapping, multiple partition, paging, segmentations, Paging and Virtual memory, FCFS, FRU - Belady's anomaly, Thrashing - Working set. Virtual memory: overlays, demand paging, page replacement, virtual memory concepts, page replacement algorithms, belody's anomaly, allocation algorithm, thrashing, I/O devices and device controllers; Interrupt handlers, disk arm scheduling algorithm. Design of the Unix File System - Buffer caches - File system organization – I-nodes File tables - Inode tables - Network file systems.
Practical (0.4 Credit) (0.3 Credit) D&T 0.1 Credit
1. file, more, less, creating and viewing files using cat,
2. file comparisons – cmp & comm, View files,
3. disk related commands, checking disk free spaces
4. Creating and editing files with vi editor

Recommended text Books:
1. Operating System Concepts, Seventh Edition, Avi Silberschatz, Peter Baer Galvin, Greg Gagne, Publisher: Wiley
2. W.STALLINGS, "Operating Systems", Prentice Hall, V Edition, 2005

Suggested Readings:
1. A.S. Tanenbaum Modern Operating Systems, Pearson Education Asia.

Sub: Discrete Mathematics

Course Outcomes: Prove mathematical theorems using mathematical induction. Understand sets and perform operations and algebra on sets. Determine properties of relations, identify equivalence and partial order relations, sketch relations. Identify functions and determine their properties.

UNIT – I (Relations, Permutations and Combinations)(2-0-0)
Theory   **(2 Credits)**

Fundamentals: Sets and Relations- Sets, Multi Sets, Operations on Sets, Relations and Properties of Relations, Representation of Relations, Equivalence Relation, Closures of Relations, Method of Contradiction. Permutations and Combinations, Pigeon Hole Principle, Principle of Inclusion and Exclusion.

UNIT – II (Boolean Algebra,Lattices) (2-0-0)
Theory   **(2 Credits)**
Boolean Algebra, Posets and Lattices: Partial Order Set, Poset, Bounding Elements, Well Ordered Set, Lattices, Principle of Duality, Bounded, Distributed, and Complemented Lattices, Finite Boolean Algebra, Boolean Functions and Expressions, Proposition and Propositional Calculus.

UNIT – III (Graph Theory)(2-0-0)
Theory   **(2 Credits)**

Graphs and Group Theory: Basic Introduction of Graphs- Types of Graphs, Path and Circuits, Eulerian Path and Circuits, Hamiltonian Path and Circuits, Trees, tree traversal, Spanning Trees, Dijkstra, Prim's and Kruscal's Algorithms. Finite state machine, Non Deterministic Finite Automata, Deterministic Finite Automata.

Recommended Books:
1. C.L.Liu, "Elements of Discrete Mathematics", TMH, 2000.

Suggested Readings:

1. Keneth H.Rosen, "Discrete Mathematics and Its Applications", TMH, 1999.
2. Trembly J.P. & Manohar P., "Discrete Mathematical Structure with Applications to Computer Science", McGraw Hill, 1997.
3. Narsingh Deo, "Graph Theory with Application to Engineering and Computer Science", PHI, 2004.

Women Rights and Law

Credits-1

Definition of Women, Awareness about Women Rights, Appeal for Remedies, Rights and Awareness on Marriage and Divorce, Rights on Mainitainance, Rights on Adoption, Rights on Sucession, Indian Divorce Act, 1869, Crime Against Women, Immoral Traffic, Sexual Harrasment of Women, Pre-Natal Diagnostic Techniques and Oath

Recommended Text Books:

1. Law relating to Women – S.R.Myneni

2. Law relating to Women – Dr. S.C. Tripathi

Reference Books:

1. Women and Law – Prof. Nomita Aggarwal

2. Women and Law – Dr. Manjula Batra

3. Women and Law – G.P. Reddy

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SEMESTER II

Sub: Web Development Techniques

- **Course Outcomes**: Structure and implement HTML/CSS.
- Apply intermediate and advanced web development practices.
- Implement basic JavaScript.
- Create visualizations in accordance with UI/UX theories.
- Develop a fully functioning website and deploy on a web server**.**

UNIT-I (Internet Principles, Web Applications)(1.8-0.6-0.2)
Theory   **(1.8 Credits)**
Internet Principles-Basic web concepts - client/server model Internet protocols and applications. Introduction about WWW, Web Applications, Web Browsers, HTML: Introduction of HTML, HTML Elements, HTML Basic Tags, HTML Formatting, HTML Entities, HTML Links, HTML Frames, HTML Tables, HTML Lists, HTML Forms, HTML Images. Cascaded Style Sheet: CSS Introduction, Syntax, Setting Background, Text, Font, Border, Margin, Padding, List, Dimension, Classification, Positioning, Pseudo-class, Pseudo-element, CSS Media Types, External, Internal and Inline style sheet.

Practical   (0.6 Credits)
Practice   (0.2 Credits)

S.No.	Name of Practical	Practical	Practice
1	Designing a static web page using HTML.		0.1
2	Designing a dynamic webpage using DHTML using different style sheets.		0.1

UNIT-II (Java Scripts)

                                                                                                   (2-0.8-0)

Theory (2 Credits) D&T(0.2 Credits)
Java Scripts: Variables declaration, If...Else statement, Switch statement, Operators statement, Popup Boxes, Functions, For Loop, While Loop, Break Loops, For...In, Events, Try...Catch, Throw on error. Java Script Objects: Introduction, String, Date, Array, Boolean, Math, JS Browser, JS Cookies, Validation, Animation, Image Maps, Timing, Create Object.

Practical (0.8 Credits)

S.No.	Name of Practical	Practical	Practice
1	Programs on Working with AWT	0.2	
2	Programs on different layouts in Java	0.2	
3	Programs using Java Applets	0.2	
4	Program in Java Script.	0.2	

UNIT-III (PHP) (1.4-0.7-0)

Theory (2 Credits)

Introduction of PHP, Installation, Syntax, Variables, strings, operators, control structures, arrays, functions, forms, GET & POST methods. Advance Operations: Date, Inculde, File & File Upload, Cookies & Session Handling, Error & Exception Handling, Filtering, Database Connectivity.

Practical (0.7 Credits)

D&T(0.3 Credits)

S.No.	Name of Practical	Practical	Practice
1	Basic Implementation in PHP and exception Handling.	0.2	
2	Program of Database connectivity in PHP.	0.2	
3	Program for GET method.	0.2	
4	Program for POST method.	0.1	

Recommended text Books:

1. Core PHP Programming By Atkinson, Leon (Author), Suraski, Zeev (Author) Third Edition, Prentice Hall
2. Head First HTML with CSS & XHTML By Elisabeth Freeman, Eric Freeman December 2005
3. JavaScript: The Complete Reference, 2nd edition, Tata McGraw Hill.
4. Harvey M. Deital and Paul.J.Deitel, "Internet & World Wide Web How to Program", 4th Edition, 2008

Reference Books:

1. PHP 5 For Dummies, by Janet Valade, Wiley Publishing, Inc.
2. Programming PHP, By Rasmus Lerdorf, Kevin Tatroe, O'Reilly

Sub: Numerical Computations

Course Outcomes: Derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations. Analyse and evaluate the accuracy of common numerical methods.

UNIT-I Statistical Methods (2-0-0)
Theory (2 Credits)
Statistical Methods : Treatment of data, Frequency Distribution, measures of central tendency, dispersion & partition values. Probability Probability distribution – Binomial, Poisson & Normal. Method of least square, correlation and regression.

UNIT-II (Interpolation and Integration) (2-0-0)
Theory (2 Credits)
Interpolation: Newton's forward and backward difference formulae, Lagrange's Interpolation formula, inverse interpolation. Numerical Differentiation, derivatives from Newton-Goegory Forward Polynomial. Numerical Integration: Newton-Cotes formulae, Weddle's, Trapezoidal & Simpson's rule, Numerical solution of ordinary differential equations: ODE's as a system of first order ODE's, Euler's, and Picard's.

UNIT-III (Errors and Approximations in Digital Computers) (2-0-0)
Theory (2 Credits)
Errors and Approximations in Digital Computers, Number representation, Floating point Arithmetic. Solution of system of linear equations – direct method, Gauss Jordan & Gauss Elimination methods, Pivoting, Iterative methods – Jacobi & Gauss Seidel methods. Solution of Nonlinear equations in n variable: Localization of the roots, Bisection and Regula- Falsi methods, Newton-Raphson method, successive Approximation method.

Recommended text Books:
1) Computer Oriented Numerical Methods: Raja Raman, V., Prentice Hall.

Reference Books:

1)   Introductory Methods of Numerical Analysis, S.S. Sastry, Prentice Hall, India
2)   Computer Based Numerical Algorithms: Krishnamurthy E.V.;East West Press
3)   Elementary Numerical Analysis : Conte de Boor.
4)   Mathematical Statistics with Applications, John E. Freund's, Pearson publications, New Delhi.

Sub: Software Project Management

Course Outcomes: project management objectives are the successful development of the project's procedures of initiation, planning, execution, regulation and closure as well as the guidance of the project team's operations towards achieving all the agreed upon goals within the set scope, time, quality and budget standards.

Unit-I (Project Management) (2-0-0)
Theory **(2 Credits)**

Project Management: The management spectrum, the people, the product, the process, the project W^5 HH principle, critical practices. Metrics for Process and Project: Metrics in the process and project Domains, software measurements, metrics for software quality, integrating metrics within software Process metrics for small organizations, establishing a software metrics program.

Unit-II (Estimation and Project Scheduling) (2-0-0)
Theory **(2 Credits)**

Estimation: Observations, Project planning Process, software project estimation, decomposition techniques, empirical estimation models, estimation for object oriented projects, estimation for Agile development and web engineering projects, Project Scheduling: Basic concepts, project scheduling, defining a task set and task network, scheduling, earned value analysis. Risk Management: Reactive V/S proactive Risk Strategies, software risks, Risk identification, Risk projection, risk refinement, risk mitigation, monitoring and management, the RMMM plan. Quality Planning: Quality Concepts, Procedural Approach to Quality Management, Quantitative Approaches to Quality Management.

Unit-III (Quality Management) (2-0-0)
Theory **(2 Credits)**

Quality Management: Quality Concepts, Software Quality assurances, software reviews formal technical reviews, Formal approaches to SQA, Project Execution And Closure, The Review Process, Planning, Overview and Preparation, Group Review Meeting, Rework and Follow-up, One-Person Review Guidelines for Reviews in Projects, Data Collection, Project Monitoring and Control.

Recommended Text Books:
1. Bob Hughes, Mikecotterell, "Software Project Management", Third Edition, Tata McGraw Hill, 2004.

Reference Books:
1. Ramesh, Gopalaswamy, "Managing Global Projects", Tata McGraw Hill, 2001.
2. Royce, "Software Project Management", Pearson Education, 1999.
3. Jalote, "Software Project Manangement in Practive", Pearson Education, 2002

Sub: Open Source Technology

Course Outcomes: At the end of this course student will:

Implement various applications using build systems. Understand the installation of various packages in open source operating systems. Create simple GUI applications. Understand various version control sytems. Understand the kernel configuration and virtual environment.

UNIT- I (Introduction of Open Source) (2.5-0.5-0)
Theory   **(2.5 Credits)**

Open Source and Linux Open Source Definition, The distribution terms of open source software, open source technology importance, Free and Open Source (FOSS), LAMP (Linux, Apache, MySQL, PHP, Python, and Perl.). Benefits, Perspectives of Open Source software Linux and Open Source, Linux Usage Basics: Logging into the system, changing users and editing text files. Running Commands and Getting Help, Browsing the File system, Users, Groups and Permissions. Introduction to Web server. Installing Apache on Linux: httpd service.

Practical(0.5 Credit)
1. Red hat Enterprise Linux installation.
2. How to Break Root Password.
3. To Create Encrypted password for Grub.
4. Perform Basic Linux Commands
   - To create a directory.
   - To remove a directory
   - To check content in a directory
   - Create directory into directory
   - To create a File
   - To add content in File
   - To assign permanent IP
   - To copy content of File1 into File2
   - To copy content of File1 & File2 into File3

UNIT- II (Administration) (1.5-0.5-0)
Theory (1.5 Credits)

Linux Administration: Installation of Linux interactively, Perform user and group administration, Administer the Linux printing subsystem, Automate tasks with at, cron ,Install, update, query and remove software packages with RPM.

Practical(0.5 Credit)

1.When we Forgot root password & Grub Password, how to crack root password?

2.Perform the Following:

   - How to set default mode as a text mode.
   - How to set text mode as a default mode.

UNIT- II (Application) (1.5-0.5-0)
Theory (1.5 Credits)

Linux Application: Accessing and Running Applications: cc compiler, gcc Compiler, Mozilla Firefox. Multimedia in Linux : Listening to Audio, Playing video, Using Digital Camera, Recording music / video CDs. 12 Publishing: Open office, Working with Graphics, Printing Documents, Displaying documents with Ghost-script and Acrobat, Using Scanners driven by SANE.

Practical(0.5 Credit)

1.To change and assign permissions to group, user and owner.

2.Perform the Following:

   - How to start system services.
   - To start permanently system services.

Sub: Introduction of Grid Computing, Cloud Computing, WEB INTELLIGENCE and Big Data

Course Outcomes: Cloud computing makes the system all-time accessible. Grid computing refers to a network of the same or different types of computers whose target is to provide an environment where a task can be performed by multiple computers together on a need basis. Each computer can work independently as well.

UNIT I (Introduction to Grid Computing): (2-0-0)

Theory   **(2 Credits)**
Introduction of Grid Computing, Benefits of Grid Computing, Grid Terms and Concepts, Grid User Roles, Standards for Grid environments, Grid Security Requirements, Grid Security Fundamentals, Symmetric and Asymmetric key encryption, Certificate Authority, Grid Security Infrastructure.

UNIT II (Introduction to Cloud Computing, Virtualization): (1.5-0-0)

Theory   **(1.5 Credits)**
What is cloud? Services provided by cloud are categorized :Software As a Service(SaaS) ,Infrastructure As a Service(IaaS) ,Platform As a Service(PaaS) ,Desktop As a Service (DaaS) and VDI etc. How Cloud Computing Works, Advantages & Disadvantages, and Applications for Businesses Cloud Service Providers.Brief overview of major Cloud Service providers – Amazon AWS, Google App Engine, Microsoft, VMware. How Companies are using Cloud Computing Cloud Computing Risks and IssuesVirtualization concepts, Objectives, Types of Virtualization & its benefits, Introduction to Various Virtualization OS (Hypervisor), HA/DR using Virtualization.

UNIT III (Introduction to intelligent web and Big Data): (2-0-0)

Theory   **(2 Credits)**
Inside the search engine - Examples of intelligent web applications - Basic elements of intelligent applications - Machine learning, data mining – Searching, Reading, indexing, and searching. Streams, Information and Language, - Statistics of Text - Analyzing Sentiment and Intent – Load - Databases and their Evolution, Big data Technology and Trends. Working with Big Data: Google File System, Hadoop Distributed File System (HDFS)**.**

Recommended Text Books:
1. **Cloud Computing: Web Based Applications** That Change The Way You Work And Collaborating Online, **By Michael Miller.**

Suggested Readings:
1. Bart Jacob,Michael Brown, **Red Books: Introduction to Grid Computing.**
1. Barrie Sosinsky,**Cloud Computing Bible**
2. *Robin Bloor*, *Marcia Kaufman*, and *Fern Halper,* **Cloud Computing for Dummies**

Cyber Security

Course Outcomes: Conduct a cyber security risk assessment. Measure the performance and troubleshoot cyber security systems. Implement cyber security solutions. Be able to use cyber security, information assurance, and cyber/computer forensics software/tools.

Credit-1

Introduction to Security,What are Physical and Non-Physical threats of a computer,Computer Security, Need of security for computer, Introduction to information Security, Prinicipals of Informtion Security. Browser Application Security,Configuring Chrome,Mozila,Internet Explorer Security Settings, Protect your identity theft,keeping personal information physically secure, Phishing,Avoidance of phishing scams, Protection of Phishing Scam, Identify :Theft Awarness,Password Security,Safe social networking,Secure Online Shopping(Physically and Non Physically),Securing your Emails, Anti-virus, firewall and anti-spyware software, Back up your Data, Removable Media Security,Handheld device security

Internet Ethics:Internet:

Reviewing the concept Internet Ethics, Unethical behavior in Internet & Examples, (a) Using of computer resources improperly, (b)Using computers, data, information to harm others (c) Using Internet,
one shall not forward false communication, Acceptable behavior: (a) While using e-Mail and chatting, (b)Pretending someone else, (c) Avoid Bad Language. Internet Ethics:Internet: Reviewing the concept Internet Ethics, Unethical behavior in Internet & Examples, (a) Using of computer resources improperly, (b)Using computers, data, information to harm others (c) Using Internet, one shall not forward false communication, Acceptable behavior: (a) While using e-Mail and chatting, (b)Pretending someone else, (c) Avoid Bad Language, Cyber Ethics,What is Cyber Security, What is Cyber safety, Difference between cyber safety and cyber security

Cyberbullying

Introduction to Cyberbullying, Risk factors, Signs for Cyber bullying, how to Prevent Cyber bullying, Guidelines for Cyberbullying, Role of Electronoic and Digital Signature, Informaion Security Policies and Case Studies, Cyber Security Law:Introduction to Cyber Laws, Classification of Cyber Crimes, Importance of cyber laws

III- SEMESTER

Sub: Java Programming With GUI

Course Outcomes: The primary objective of Java programming language creation was to make it portable, simple and secure programming language. Apart from this, there are also some excellent features which play an important role in the popularity of this language. The features of Java are also known as Java buzzwords.

UNIT- I (Introduction) (2-0.5-0.5)
Theory **(2 Credits)**

Designing Graphical User Interfaces in Java, Components and Containers, Basics of Components, Using Containers, Layout Managers, AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components, Java Utilities (java.util Package) The Collection Framework : Collections of Objects , Collection Types, Sets , Sequence, Map, Understanding Hashing, Use of ArrayList & Vector.
Introduction the Abstract Window Toolkit (AWT): Working with Windows and AWT, AWT classes, Windows Fundamentals, Working with frame windows, applet vs servlet.

S.No.	Name of Practical	Practical	Practice
1	Write a program to create a textfield and input the value from the user.	0.1	0.1
2	Write a program to create a basic calculator using textfiled,checkbox,buttons.	0.1	0.1
3	Write a program to create a form and get the value from the user.	0.1	0.1
4	Write a program to create a login form and perform authentication if the username is Admin and Password is Admin.	0.1	0.1
5	Write a program to create a signup form and perform authentication if the username is Admin and Password is Admin	0.1	0.l

UNIT- II (Overview of Packages) (2-1.6-0.4)
Theory **(2 Credits)**
Applets: Applet fundamentals, implementation of applet, creating a frame window in applet, paint method, drawing polygons.
Basics :Swing Introduction,MVC,Events and listeners.,Adapters.,Text Components,Look and feel.
Swing Components: JCoponent, JLabael, JButton, Actions,JScrollBar, JSlider, JProgressBar,JList, JComboBox,Containers and Frames,JPanel, JRootPane,JInternalFrame,JDialog, JOptionPane
Layout Managers:Layout managers overview,Flow layout,Grid layout,Border layout,Working without layouts,Gridbag Layout.
Menus and Toolbar:JMenuItem, J Menu Bar, J Popup Menu,J Tool Bar.

S.No.	Name of Practical	Practical	Practice
1	Write programs to demonstrate use of Grid Layout.	0.2	0.1
2	Write programs to demonstrate use of flow and Layout.	0.2	0.1
3	Write programs to demonstrate use of Border Layout.	0.2	
4	Write a program to display any string using available Font and with every mouse click change the size and / style of the string. Make use of Font and Font metrics class and their methods.	0.2	0.1
5	Write a program to design a form using basic swing components	0.2	
6	Write a program to demonstrate the use of scroll panes in Swing.	0.2	
7	Write a program to create a menu bar with various menu items and sub menu items. Also create a checkable menu item. On clicking a menu Item display a suitable Dialog box.	0.2	0.1

UNIT- III (Data Base Connectivity) (2-1.6-0.4)
Theory   **(2 Credits)**
Java Database Backend End: Database client/server methodology, Two-Tier Database Design, Three-Tier Database Design, A JDBC Database Example JDBC Drivers, JDBC-ODBC Bridge, Current JDBC Drivers.
Basics Of Servlet: The Life Cycle of a Servlet, The Java Servlet Development Kit, The Simple Servlet, The Servlet API, The javax.servlet Package, Reading Servlet Parameters, Reading Initialization Parameters, The javax.servlet.http package, Handling HTTP Requests and responses.

S.No.	Name of Practical	Practical	Practice
1	Write an Application program /Applet to make connectivity with database using JDBC API	0.2	0.1
2	Write a servlet for printing My first servlet Program.	0.2	0.1
3	Write an Application program /Applet to create a table and insert the values in database using JDBC API	0.2	
4	Write an Application program /Applet to impliment DML on database using JDBC API	0.2	
5	Write an Application program /Applet to fetch the data from database and create a user defined report database using JDBC API	0.2	
6	Write a servlet for demonstrating the generic servlet class.	0.2	
7	Write a servlet to demonstrate the Http Servlet class using do Get ().	0.2	0.1
8	Write a servlet to demonstrate the Http Servlet class using do Post ().	0.2	0.1

Recommended text Books:
1. Deitel and Deitel, Java, How to Program, Pearson Education Asia.
2. C. Thomas Wu, An Introduction to OOP with Java, Mc Graw Hill.

Reference Books:

1. Cay S. Horstmann and Gary Comell, Core Java, Pearson Education Asia.

Data Ware Housing and Data Mining

Course Outcomes: Modeling and design of data warehouses. - Algorithms for data mining. Skills: - Be able to design data warehouses. - Ability to apply acquired knowledge for understanding data and select suitable methods for data analysis.

UNIT I (Basics of Data Warehouse) (2-0-0)
Theory   **(2 Credits)**

Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, Data Warehouse and OLAP Technology for Data Mining, Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology From Data Warehousing to Data Mining.

UNIT II (DATA PREPROCESSING, LANGUAGE,ARCHITECTURES,KDD) (2-0-0)
Theory   **(2 Credits)**

Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation, Online Data Storage. Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems. Concepts Description: Characterization and Comparison: Data Generalization and Summarization-Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

UNIT III (CLASSIFICATION & CLUSTERING) (2-0-0)
Theory   **(2 Credits)**

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis. Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining. Cluster Analysis Introduction: Types of Data in Cluster Analysis, Partitioning Methods, Density-Based Methods, Grid-Based Methods,

Recommended Text Books:

1. Jiawei Han and Micheline Kamber, "Data Mining : Concepts and Techniques", Harcourt India Private Limited, First Indian Reprint,2001
2. Margaret H. Dunham, "Data Mining : Introductory and Advanced Topics", Pearson Education, First Indian Reprint,2003

Reference Books:

1. Data Mining – Concepts and Techniques - JIAWEI HAN & MICHELINE KAMBER Harcourt India.
2. Data Mining: Introductory and Advanced Topics- Margaret H.Dunham, S.Sridhar
3. Data Warehousing in the Real World,- Sam Anahory, Dennis Murry, Pearson Education.
4. The Data Ware House Toolkit – Ralph Kimball

Cognitive Psychology

Course Outcomes: On completion of the course, the student will have: Advanced theoretical, empirical and applied knowledge of basic mental processes from a cognitive perspective. Knowledge of quantitative research methods used in cognitive psychology.

UNIT I (history of the cognitive approach) (2-0)
Theory **(2 Credits)**
A Brief history of the cognitive approach, cognitive science, Neuro science, Artificial intelligence, The Parallel processing approach. Perceptual Process: Perception, pattern recognition, theories of pattern recognition, Bottom-up vs Top-down Processing, Template matching, feature analysis, prototype matching, pattern recognition: The role of the perceives.

UNIT II (Communication and Language Processing) (2-0)
Theory **(2 Credits)**
Communication and Language Processing: Linguistic Hierarchy, Chomsky's theory of grammer, Psycho-linguistic aspects, Abstraction of linguistic ideas, knowledge and comprehension, non-verbal abstraction – musical syntax, The language of motion. Memory Modules: Memory, process, storage, Short term memory, long term memory, organization in memory, simulation modules of learning and memory, mnemonics, syntactic and semantic issues, Concept formation, problem solving.

UNIT III (Contribution of cognitive psychology) (2-0-0)
Theory **(2Credits)**
Contribution of cognitive psychology to advances in Artificial Intelligence, computer based learning/teaching systems, knowledge acquisition and knowledge based systems, expert systems.

Recommended text Books:

1. Marc de May, "The cognitive Paradigm", Reidel, 1982

Reference Books:

1. R. C. Shank, P. Childers, "Cognitive computer on language, Learning and AI", 1984
2. P.C. Kendall, "Advances in Cognition behavioural research and therapy", Academic Press, 1984.
3. Solso, R.L. "Cognitive Psychology (3rd Edition), 1991, Allyn & Balon.
4. Matlin M.W., "Cognition (3rd Edition), 1995, Harcourt Brace (Prism Indian Edition).
5. Leahey T.H. & Harris R.J., "Learning and Cognition (4th Edition), 1997, PHI.

Digital Electronics

Course Outcomes: Became familiar with the digital signal, positive and negative logic, Boolean algebra, logic gates, logical variables, the truth table, number systems, codes, and their conversion from to others.

UNIT –I (2-0.4-0.2)
 (Theory 2 Credit)
Review of Number Systems & Logic Gates, Non Functional Properties of Logic gates: Minimization Techniques: Using Boolean identities
Lab Experiments: (Practical 0.4 Credit)
               (Practice 0.2 Credit)
1. Study of AND, OR, NOT gates and comparison with discrete components. (0.2 Practical) (0.1 Practice)
2. Design of different types of gates using Universal logic gates. (0.2 Practical) (0.1 Practice)
     (a) AND gate (b) OR gate (c) NOT gate (d) EX-OR gate (e) EX-NOR gate.

UNIT-II (2-0.3-0.7)
 (Theory 2 Credit)
Karnaugh Map, Map entered variables, Quine-McCluskey method. Combinational Circuits: Adder, Subtractor, Encoder, Decoder, Tristate, Multiplexer, Demultiplexer, Parity checker & generator.
Lab Experiments: (Practical 0.3 Credit)
               (Practice 0.7 Credit)
   1. De-Morgan's Theorem.
   2. Half adder and full adder circuits.
    3. Multiplexer/ Demultiplexer combinational logic circuit.

UNIT-III (1-0-0)
 (Theory 1Credit)
Fundamental concepts of sequential logic: Introduction, Synchronous and Asynchronous operation, Latches, Flip Flops,

Recommended Text Books

1. Sandige – Modern Digital Design – MGH
2. Kohavi, Switching and Automata Theory

References Books

1. Bartee T.C. Digital Electronics, TMH
2. Moris-Mano- Digital Electronics
3. Parag K. Lala, Practical Digital Logic Design and Testing – PHI

Multimedia and Animation

Course Outcomes: It involves the advanced study of graphics, special visual effects, sound effects, software technologies that helps the students to learn how to transform reality into virtual imagination.

UNIT- I (Introduction) (2-0.8-0.2)
Theory (2 Credits)

Introduction to Multimedia and animation, Multimedia Systems, Design Fundamentals, Elements of multimedia and animation and their use, Back ground of Art, Color theory overview, Sketching & illustration, Storyboarding, different tools for animation.

Multimedia Projects: Multimedia Skills, Hardware, Use of Graphics in Multimedia, Overview of Vector and Raster Graphics, Basic software tools, Multimedia Authoring Tools, Planning and Costing, Designing and Producing, Contents and talent, Delivering, Enhancing and Testing Multimedia Projects.

Practical: (0.8 Credit)   Practice   **(0.2 Credit)**

1. Procedure to create an animation to represent the growing moon. **(0.2 Credit)**
2. Procedure to create an animation to indicate a ball bouncing on steps. **(0.2 Credit)**
3. Procedure to simulate movement of a cloud. **(0.2 Credit)**
4. Procedure to draw the fan blades and to give proper animation. **(0.2 Credit)**

UNIT- II (Tools of Multimedia) (1.5-1.2-0.8)
Theory   **(1.5 Credits)**
Tools of Multimedia: Paint and Draw Applications, Graphic effects and techniques, Image File Format, Anti-aliasing, Morphing, Multimedia Authoring tools, professional development tools.

Practical:(1.2)   Practice (0.8 Credit)

1.   Procedure to display the background given (filename: tulip.jpg) through your name. **(0.2 Credit)**
2.   Procedure to display the background given (filename: garden.jpg) through your name using mask. **(0.2 Credit)**
3.   Procedure to create an animation with the following features. WELCOME (Letters should appear one by one .The fill color of the text should change to a different colour after the display of the full word.) **(0.2 Credit)**
4.   Procedure to simulate a ball hitting another ball. **(0.2 Credit)**
5.   Procedure to design a visiting card containing at least one graphic and text information. **(0.2 Credit)**
6.   Procedure to take a photographic image. Give a title for the image. Put the border. Write your names. Write the name of institution and place. **(0.2 Credit)**

UNIT- III (Animation) (2-0.8-0.2)
Theory (2 Credits)
Animation: Introduction and Principles of Animations, Power of Motion, Animation Techniques, Animation File Format, Making animation for Rolling Ball, making animation for a Bouncing Ball, Animation for the web, GIF, Plugins and Players, Animation tools for World Wide Web.

Practical:(0.8 Credit) **Practice(0.2 Credit)**
1. Procedure to prepare a cover page for the book in your subject area. Plan your own design **(0.2 Credit)**
2. Procedure to extract the flower only from given photographic image and organize it on a background. Selecting your own background for organization. **(0.2 Credit)**
3. Procedure to change a circle into a square using flash. **(0.2 Credit)**
4. Procedure to display the background given (FILENAME: GARDEN.JPG) through your name using mask **(0.2 Credit)**

Textbook:

1. Ze-Nian Li and Mark S. Drew, " Fundamentals of Multimedia", PHI, New Delhi
2. Multimedia: Making It Work (4th Edition) – by Tay Vaughan, Tata Mcgraw Hills.

Reference Books:

1. Buford, "Multimedia Systems", Addison Wesley.
2. Tay Vaughan, "Multimedia, Making IT Work",Tata McGraw Hill
3. Sleinreitz, "Multimedia System", Addison Wesley.
4. Ze-Nian Li and Mark S.Drew, "Fundamentals of Multimedia", Pearson Education
5. Prabhat K Andleigh, Kiran Thakrar, "Multimedia systems design", PHI Learning Private Limited, Delhi India.
6. Elsom Cook – "Principles of Interactive Multimedia" ,Tata McGraw Hill.

IV- SEMESTER

Sub: Advance Database Management System

Course Outcomes: Knowledge: The candidate will get knowledge of: - Query optimization. - Parallel and distributed database systems. - New database architectures and query operators. Skills: - Be able to develop new methods in databases based on knowledge of existing techniques.

UNIT I (Introduction to Data Base Systems) (1.5-0.5-0)
Theory (1.5 Credits)
Introduction: Database & Database Users. Characteristics of the Database, Approach advantages of using DBMS. Data Models, Schemas & Instances. DBMS Architecture & Data Independence. System Architecture for DBMS and Data Dictionary, Database Users Data Base languages & Interfaces. Data Modeling using the Entity-Relationship Model -Entity types, Entity Sets, Attributes and Keys, Relationship, Relationship Types, Week Entity Types, Structural Constraints, Enhanced ER Model-Specialization Generalization.

Practical (0.5 Credits)
1. Exercise based on Database creation & related queries. (0.1 Practical)
2. Alteration of an existing database (0.1 Practical)
3. Deletion of existing tables from a particular database. (0.1 Practical)
4. Implementation of query language with insertion, Selection & Updating of database tables
(0.2 Practical)

UNIT II (Relational Model and Normalization) (2-0.8-0)
Theory (2 Credits)
Relational Data Model Concepts and Constraints. Relational Algebra - select, project, set theoretic, join operations. Overview of Relational Calculas. SQL – A Relational Database Language. Data Definition commands, View and Queries, transaction commands, Specifying Constraints & Indexes in SQL. Relational Data Base Design: Function Dependencies & Normalization for Relational Databases. Informal design guidelines for relation schemas, Functional Dependencies. Normal forms based on primary keys (INF, 2NF, 3NF& BCNF). Lossless join & Dependency preserving decomposition. Multi-valued dependencies, join dependencies (4NF & 5NF), Denormalization.

Practical (0.8 Credit)
1. Execution of several query statements that includes following operations:
   Deletion of a record Basic data retrieval (0.1 Practical)
2. Execution of several query statements that includes Condition specification
(0.1 Practical)
3. Execution of several query statements that includes following operations: (0.2Practical)
   Arithmetic Operators
   Aggregate Operators
4. Retrieval of records through multiple tables (0.1 Practical)

UNIT III (Concurrency Control, Transaction and Security) (2-0.8-0)
Theory **(2 Credits)**
Security & Integrity: Basic concept; ACID properties; transaction state; implementation of atomicity anddurability; concurrent executions; basic idea of serializability; view and conflict serializabllity Recovery Techniques Failure Classification , Storage Structure, Recovery and Atomicity Log Based Recovery, Shadow

Paging ,stable storage implementation, data access; recovery and atomicity - log based recovery, deferred database modification, immediate database modification, checkpoints.

Practical   **(0.8 Credit)**
1. Join operation on multiple tables.   (0.2 Practical)
2. Set manipulation on records through following operations:
   - ➢ any, in, all,   (0.2 Practical)
   - ➢ contains. not contains, exists,   (0.2 Practical)
   - ➢ not exists, union, minus, intersect.   (0.2 Practical)

Recommended Text Books:
1. Elmsari and Navathe, "Fundamental of Database System", AddisonWesley. New York.
2. H.Korth & A. Silberschatz, "DATABASE SYSTEM CONCEPTS", TMH.
Reference Books:
1. Date. CJ, "An Introduction to Database System", Narosa Publishing House. New Delhi.
2. Desai, B, "An Introduction to Database Concepts", Galgotia Publications. New Delhi.

Sub : Artificial Intelligence & Applications

Course Outcomes: Upon successful completion of the course, the students will be able to Solve basic AI based problems. Define the concept of Artificial Intelligence. Apply AI techniques to real-world problems to develop intelligent systems.

UNIT I (Introduction to Artificial Intelligence) (2-0-0)
Theory   **(2 Credits)**
Introduction to Artificial Intelligence- What is AI? ,Early work in AI,AI and related fields, AI problems and Techniques, Problems, Problem Spaces and Search-Defining AI problems as a State Space, Search: example, Production Systems, Search and Control Strategies, Problem Characteristics
Issues in Design of Search Programs, Additional Problems, Heuristic Search Techniques-Generate-and-test, Hill Climbing, Best First Search, Problem Reduction, Constraint Satisfaction, Mean-Ends Analysis

UNIT II (Knowledge Representation) (2-0-0)
Theory   **(2 Credits)**
Knowledge Representation-Representations and Mappings, Approaches to Knowledge,
Representation, Knowledge representation method, Propositional Logic, Predicate logic, Representing Simple facts in Logic, Representing Instances and Isa, relationships, Computable Functions and Predicates, Slot – and – Filler Structures

UNIT III (Game Playing) (2-0-0)
Theory   **(3 Credits)**
Game Playing- Minimax Search Procedures, Adding alpha-beta cutoffs, Planning, An example Domain: The Blocks world, Component of a planning system, Goal state planning, Nonlinear planning
Hierarchical Planning, Natural Language Processing- Introduction, Syntactic Processing, Semantic analysis, Discourse and Pragmatic Processing, Learning, What is learning, Rote Learning, Learning by taking advice, Learning in problem solving, Learning from examples, Explanation based learning

Recommended Text Books:
1. Elaine Rich and Kevin Knight: Artificial Intelligence – Tata McGraw Hill.
2. Dan W.Patterson, Introduction to Artificial Intelligence and Expert Systems – Prentice Hal of India.
Reference Books:
1. Nils J. Nilsson: Principles of Artificial Intelligence – Narosa Publication house.
2. Artificial Intelligence : A Modern Approach, Stuart Rusell, Peter Norving, Pearson Education 2nd Edition.
3. Artificial Intelligence, Winston, Patrick, Henry, Pearson Education.
4. Artificial Intelligence by Gopal Krishna, Janakiraman.

Network programming

Course Outcomes: demonstrate advanced knowledge of networking. understand the key protocols which support the Internet. be familiar with several common programming interfaces for network communication. demonstrate advanced knowledge of programming for network communications. have a detailed knowledge of the TCP/UDP Sockets.

UNIT I (Basics of TCP Sockets) (1.5-0.5-0)

ELEMENTARY TCP SOCKETS Introduction to Socket Programming – Overview of TCP/IP Protocols – Introduction to Sockets – Socket address Structures – Byte ordering functions – address conversion functions – Elementary TCP Sockets – socket, connect, bind, listen, accept, read, write, close functions – Iterative Server – Concurrent Server.
Practical (1 Credit)
UNIT II (TCP Echo Server-Client)(2-0.5-0)

APPLICATION DEVELOPMENT TCP Echo Server – TCP Echo Client – Posix Signal handling – Server with multiple clients – boundary conditions: Server process Crashes, Server host Crashes, Server Crashes and reboots, Server Shutdown – I/O multiplexing – I/O Models – select function – shutdown function – TCP echo Server (with multiplexing) – poll function – TCP echo Client (with Multiplexing)
Practical (1 Credit)

UNIT III (TCP Echo Server-Client)(1.5-0.5-0)
SOCKET OPTIONS, ELEMENTRY UDP SOCKETS Socket options – getsocket and setsocket functions – generic socket options – IP socket options – ICMP socket options – TCP socket options – Elementary UDP sockets – UDP echo Server – UDP echo Client – Multiplexing TCP and UDP sockets –threaded servers – thread creation and termination – TCP echo server using threads – ping program – trace route program.
Practical   **(1 Credit)**

Recommended text BOOKS

1. W. Richard Stevens, "UNIX NETWORK PROGRAMMING Vol-I" Second Edition, PHI / Pearson Education, 1998.
2. William Stallings, "SNMP, SNMPv2, SNMPv3 and RMON 1 and 2", Third Edition, Addison Wesley, 1999.

REFERENCE BOOKS

1. D.E. Comer, "Intrenetworking with TCP/IP Vol- III", (BSD Sockets Version), second Edition, PHI, 2003.

Microprocessor

Course Outcomes:
At the end of the course, a student will be able to:
Assess and solve basic binary math operations using the microprocessor and explain the microprocessor's and Microcontroller's internal architecture and its operation within the area of manufacturing and performance. Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller. Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements. Analyze assembly language programs; select appropriate assemble into machine a cross assembler utility of a microprocessor and microcontroller. Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.

UNIT-I (2-1.6-0)
(Theory 2Credit)
The 8085 Microprocessor: Block diagram, pins & their description, demultiplexing of buses, control signals & flags. Introduction to 8085 based microcomputer system.Instruction & Timings: Instruction classification, instruction formats, addressing modes, Instruction timings and status, Interrupts.

Lab Experiments: (Practical 1.6 Credit)
- Study the hardware, functions, memory structure and operation of 8085 microprocessor kit.   (0.8 Practical)
- Program to perform integer division: (i) 8-bit by 8-bit (ii) 16-bit by 8-bit. (0.4 Practical)
- Transfer of a block of data in memory to another place in memory in the direct and reverse order. (0.4 Practical)

UNIT-II (2-0.8-0)
(Theory 2Credit)
Programming & Programming Techniques of the 8085: 8085instruction set, data transfer instructions, arithmetic, logic & branch operations. Rotate & compare. Instructions related to stack operations. Looping, counting and indexing, counters & time delays. Subroutines, Interfacing Concepts & Peripherals: Basic interfacing concepts. Memory mapped and peripheral mapped I/O. Description, programming & interfacing of 8155, 8255, 8279 with 8085. Description of simple systems using above chips. Description, programming and interfacing of 8253 and 8259A with 8085 microprocessor.

Lab Experiments: (Practical 0.8 Credit)
1. Searching a number in an array and finding its parity. (0.2 Practical)
2. Sorting of array in: (i) Ascending (ii) Descending order. (0.2 Practical)
3. Program to perform following conversion: (i) BCD to ASCII (ii) BCD to Hexadecimal
(0.2 Practical)
4. Program to multiply two 8-bit numbers.   (0.2 Practical)

UNIT-III (1-0.7-0)
(Theory 1Credit)
Direct memory Access: Basic concepts f DMA techniques. Description, Programming and interfacing of DMA controller 8257.A/D and D/A converters, Serial I/O & Bus stands: Interfacing of AD558, AD7522, ADC0801, 0808 with 8085. Basic concepts in serial I/O, Software controlled serial I/O. RS232C and standard parallel port of PC.

Lab Experiments: (Practical 0.7 Credit)
1. Program to generate and sum 15 Fibonacci numbers. (0.3 Practical)
2. Program for rolling display of message "INDIAN". (0.2 Practical)
3. To insert a number at correct place in a sorted array. (0.2 Practical)

Recommended Text Books
1. P. Mathur Introduction to Microprocessors

References Books:
1. Gaonkar- Microprocessors
2. V. Hall- Microprocessor & Interfacing

WEB INTELLIGENCE, HADOOP AND BIG DATA ANALYSIS

Course Outcomes: The students will be able to:
Identify Big Data and its Business Implications. List the components of Hadoop and Hadoop Eco-System. Access and Process Data on Distributed File System. Manage Job Execution in Hadoop Environment.

UNIT I – INTRODUCTION TO INTELLIGENT WEB and LISTEN AND LOAD (1.5-0.4-0)
Theory **(1.5Credits)**
Inside the search engine - Examples of intelligent web applications - Basic elements of intelligent applications - Machine learning, data mining – Searching, Reading, indexing, and searching. Streams, Information and Language, - Statistics of Text - Analyzing Sentiment and Intent – Load - Databases and their Evolution, Big data Technology and Trends.

Practical (0.4 Credits)

S.No.	Name of Practical	Practical	Practice
1	A practical approach for how SEM works	0.2	
2	Configure and deploy a single instance topology	0.2	

UNIT II – Clustering and generic Methods (1.5-1-0)
Theory **(1.5 Credits)**
Data structures in Java: Linked List, Stacks, Queues, Sets, Maps; Generics: Generic classes and Type parameters, Implementing Generic Types, Generic Methods, Wrapper Classes, Concept of Serialization An overview of clustering algorithms - Clustering issues in very large datasets - The need for classification .

Practical (1 Credits)

S.No.	Name of Practical	Practical
1	Implement the following Data structures in Java a)Linked Lists b) Stacks	0.2
2	Implement the following Data structures in Java a)Queues b) Set c) Map	0.2
3	Increase data capacity of the cluster	0.2
4	Increase data availability of the cluster	0.2
5	Write a program on collections in java	0.1
6	Write a program by using generic methods	0.1

UNIT III – Introduction of HADOOP (2-0.6-0)
Theory   **(2 Credits)**

Working with Big Data: Google File System, Hadoop Distributed File System (HDFS) – Building blocks of Hadoop(Namenode, Datanode, Secondary Namenode, JobTracker, TaskTracker), Introducing and Configuring Hadoop cluster (Local,Pseudo-distributed mode, Fully Distributed mode), Configuring XML files

Practical (0.6 Credits)

S.No.	Name of Practical	Practical
1	Perform setting up and Installing HADOOP in its three operating modes: • Standalone • Pseudo distributed • Fully distributed.	0.2
2	Use web based tools to monitor your HADOOP setup.	0.2
3	Iimplement the following file management tasks in HADOOP • Adding files and directories • Retrieving files • Deleting files	0.2

Recommended text Books:

1. Gautam Shroff, "Intelligent Web - Search, Smart Algorithms, and Big Data", Oxford University Press, 2013.
2. Haralambos Marmanis, Dmitry Babenko, "Algorithms of the Intelligent Web", Manning publications, 2009.
3. hristopher D. Manning, Prabhakar Raghavan, Hinrich Schütze, "An Introduction to Information Retrieval", Cambridge University Press, 2009.
4. Mark Gardener, "Beginning R - The Statistical Pr ogramming Language", John Wiley & Sons, Inc., 2012.
5. Big Java 4th Edition, Cay Horstmann, Wiley John Wiley & Sons, INC
6. Hadoop: The Definitive Guide by Tom White, 3rd Edition, O'reilly Hadoop in Action by Chuck Lam, MANNING Publ.

VI – SEMESTER

Sub: Cryptography & Network Security

Course Outcomes: Analyze and design classical encryption techniques and block ciphers. Understand and analyze data encryption standard. such as Diffie-Hellman Key Exchange, ElGamal Cryptosystem, etc. Protocols.

Unit-I (Conventional and Modern Encryption) (2-0-0)
Theory   **(2 Credits)**
Model of network security – Security attacks, goals of security- prevention, detection and recovery.,services and attacks – OSI security architecture – Classical encryption techniques – SDES – Block cipher Principles- DES – Strength of DES - Block cipher design principles – Block cipher mode of operation – Evaluation criteria for AES – RC5 - Differential and linear crypto analysis – Placement of encryption function – traffic confidentiality

Unit-II (Public Key Encryption & Authentication) (2-0-0)
Theory   **(2 Credits)**
Number Theory – Prime number – Modular arithmetic – Euclid's algorithm - Fermet's and Euler's theorem – Primality – Chinese remainder theorem – Discrete logarithm – Public key cryptography and RSA – Key distribution – Key management – Diffie Hellman key exchange – Elliptic curve cryptography.
Authentication requirement – Authentication function – MAC – Hash function – Security of hash function and MAC – MD5 – SHA - HMAC – Digital signature and authentication protocols – DSS

Unit-III (System Security) (2-0-0)
Theory   **(2 Credits)**
Authentication applications – Kerberos – X.509 Authentication services - E-mail security – IP security - Web security Intruder – Intrusion detection system – Virus and related threats – Countermeasures – Firewalls design principles – Trusted systems – Practical implementation of cryptography and security

Recommended Text Books:

1. William Stallings, "*Cryptography & Network Security*", Pearson Education, 4th Edition 2006.

Reference Books:
1.   D.R. Stinson, *Cryptography - Theory and practice*, CRC Press.
2.   A.J. Menezes, P.C. van Oorschot and S.A. Vanstone, *Applied Cryptography*, CRC Press.
3.   B Schneier, *Applied Cryptography*, Wiley. ISBN 0-471-11709-9
4.   C. Kaufman, R. Perlman, *Network Security*, Prentice Hall.
5.   RICK LEHTINEN, G.T. GANGEMI, SR., "Computer Security Basics, Second Edition", O'Reilly Pubs, June 2006
6.   STEPHEN NORTHCUTT, KAREN KENT, LENNY ZELTSER, "Inside Network Perimeter Security", Sams Pubs 2005

Computer Graphics

Course Outcomes: The course introduces the basic concepts of computer graphics. It provides the necessary theoretical background and demonstrates the application of computer science to graphics. The course further allows students to develop programming skills in computer graphics through programming assignments.

Unit I (Application areas of Computer Graphics) (1.7-0.8-0.2)
Theory (1.7 Credits)
Introduction, Application areas of Computer Graphics, overview of graphics systems, video-display devices, and raster-scan systems, random scan systems, graphics monitors and workstations and input devices Output primitives: Points and lines, line drawing algorithms, mid-point circle and ellipse algorithms. Filled area primitives: Scan line polygon fill algorithm, boundary fill and flood-fill algorithms
Practical (0.8 Credits)
Practice (0.2 Credits)

Program for Line Drawing Algorithm.	(0.2 Practical) (0.1 Practice)
Program for mid point circle Algorithm.	(0.2 Practical) (0.1 Practice)
Program for ellipse Algorithm.	(0.2 Practical)
Program for Boundary Fill Algorithm.	(0.1 Practical)
Program for Flood Fill Algorithm.	(0.1 Practical)

Unit II (2-D geometrical transforms) (2-1.1-0.4)
Theory (2 Credits)
2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms 2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, Cohen-Sutherland and Cyrus-beck line clipping algorithms, Sutherland –Hodgeman polygon clipping algorithm
Practical   (1.1 Credits)
Practice   (0.4 Credits)

Program for 2D translation.	(0.2 Practical) (0.1 Practice)
Program for 2D scaling.	(0.2 Practical)
Program for 2D rotation.	(0.2 Practical)
Description of line clipping.	(0.1 Practical)
Program for Cohen-Sutherland line Clipping.	(0.2 Practical) (0.2 Practice)
Program for window to viewport transformation.	(0.2 Practical) (0.1 Practice)

Unit III (3-D object representation) (2-0.5-0.3)
Theory (2 Credits)
3-D object representation: Polygon surfaces, spline representation, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces, polygon-rendering methods. 3-D Geometric transformations; 3-D viewing: Viewing pipeline, viewing coordinates, parallel & perspective projections, Visible surface detection methods: Classification, back-face detection, depth buffer, A-buffer, scan-line, depth sorting, BSP-tree methods, area sub-division
Practical (0.5 Credits)

Program for 3D Translation.	(0.2 Practical)
Program for scaling of a triangle.	(0.2 Practical)
Program, for translation of a circle.	(0.1 Practical)

Practice (0.3 Credits)
Practice of 2D and 3D rotation, scalling and translations and visible surface detection algorithms (A-buffer, Depth buffer)

Recommended Text Books:
1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education

Reference Books:
1. "Computer Graphics Second edition", Zhigand xiang, Roy Plastock, Schaum's outlines, Tata Mc-Graw hill edition.
2. "Computer Graphics Principles & practice", Second edition in C, Foley, VanDam, Feiner and Hughes, Pearson Education.
3. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.

Advanced Web Technologies

Course Outcomes: At the end of the course the student should be able to:
Define the fundamental ideas and standards underlying Web Service Technology. define the fundamental principles for cloud applications. discuss concepts at the frontier of industrial practice and emerging standards

UNIT I (Installation and configuration of MySQL and Concepts of PHP) (2-1-0.5)
Theory (2 Credits)
Installing and Configuring: Current Versions of MySQL and PHP, Installing MySQL and PHP on Windows, php.ini. Basics, The Basics of PHP scripts. The Building blocks of PHP: Variables, Data Types, Operators and Expressions, Constants. Flow Control Functions in PHP: Switching Flow, Loops, Code Blocks and Browser Output. Working with Functions: Returning the values from User-Defined Functions, Variable Scope, Saving state between Function calls with the static statement, more about arguments. Working with Arrays: Creating Arrays, Some Array-Related Functions.

Practical (1 Credit)
Practice (0.5 Credit)
1. Exercise based on PHP Variables, String, Operators   (0.2 Practical) (0.1 Practice)
2. Exercise based on PHP If...Else, Switch,   (0.2 Practical) (0.1 Practice)
3. Exercise based on PHP Arrays   (0.2 Practical) (0.1 Practice)
4. Exercise based on PHP Looping   (0.2 Practical) (0.1 Practice)
5. Exercise based on several PHP Functions,   (0.2 Practical)   (0.1 Practice)

UNIT II (Objects and Forms) (2-1.2-0.6)
Theory (2 Credits)
Working with Objects: Creating Objects, Object Instance Working with Strings, Dates and Time: Formatting strings with PHP, Investigating Strings with PHP, Manipulating Strings with PHP, Using Date and Time Functions in PHP. Working with Forms: Creating Forms, Accessing Form Input with User defined Arrays, Combining HTML and PHP code on a single Page, Using Hidden Fields to save state, Redirecting the user, Sending Mail on Form Submission, Working with File Uploads.

Practical (1.2 Credit)
Practice (0.6 Credit)
1. Exercise based on Forms,   (0.2 Practical) (0.1 Practice)
2. Exercise based on $_GET,   (0.2 Practical) (0.1 Practice)
3. Exercise based on $_POST   (0.2 Practical) (0.1 Practice)
4. Exercise based on PHP Date, Include function,   (0.2 Practical) (0.1 Practice)
5. Exercise based on state management through Cookies,   (0.2 Practical) (0.1 Practice)
6. Exercise based on Sessions   (0.2 Practical) (0.1 Practice)

UNIT III (MySQL) (2-0.4-0.3)
Theory (2 Credits)
Learning the MySQL Data types, Learning the Table Creation Syntax, Using Insert Command, Using SELECT Command, Using WHERE in your Queries, Selecting from Multiple Tables, Using the UPDATE command to modify records, Using the DELETE Command, Frequently used string functions in MySQL, Using Date and Time Functions in MySQL. Interacting with MySQL using PHP: MySQL Versus MySQLi Functions, Connecting to MySQL with PHP, Working with MySQL Data. Planning and Creating Database Tables, Creating Menu, Creating Record Addition Mechanism, Viewing Records, Creating the Record Deletion Mechanism, Adding Sub-entities to a Record.

Practical (0.4 Credit)
Practice (0.3 Credit)
1. Exercise based on PHP Database: (0.2 Practical) (0.1 Practice)
    i. MySQL Connect,
    ii. MySQL Create,
    iii. MySQL Insert,
    iv. MySQL Select, Where, Order By,
    v. MySQL Update,
    vi. MySQL Delete
2.   Small web based application which demonstrate the Client-Server based transaction.
                                                          (0.2   Practical)   **Recommended**
    Books:
1. Sams Teach Yourself PHP in 24 Hours, Third Edition
2. Wrox, Beginning PHP, Apache, MySQL Web Development
3. Wrox, Beginning PHP

Suggested Readings:
1. Programming PHP, By Rasmus Lerdorf, Kevin Tatroe, O'Reilly
2. PHP Developer's Cookbook, By Sterling Hughes, Publisher: Sams Publishing
3. PHP 5 For Dummies, by Janet Valade, Wiley Publishing, Inc.

Cloud Computing

Course Outcomes: Understand the concepts, characteristics, delivery models and benefits of cloud computing. Understand the key security and compliance challenges of cloud computing. Understand the key technical and organisational challenges.

UNIT I (Introduction to Cloud Computing, Virtualization): (2-0-0)
Theory **(2 Credits)**

What is cloud? Services provided by cloud are categorized :Software As a Service(SaaS) ,Infrastructure As a Service(IaaS) ,Platform As a Service(PaaS) ,Desktop As a Service (DaaS) and VDI etc. How Cloud Computing Works, Advantages & Disadvantages, and Applications for Businesses Cloud Service Providers.Brief overview of major Cloud Service providers – Amazon AWS, Google App Engine, Microsoft, VMware. How Companies are using Cloud Computing Cloud Computing Risks and IssuesVirtualization concepts, Objectives, Types of Virtualization & its benefits, Introduction to Various Virtualization OS (Hypervisor), HA/DR using Virtualization Live Migration of VMs, SAN backend concepts, S/W defined Networking (OpenFlow/OpenVSwitch), S/W Defined Datacenter, S/W Defined Storages. Virtualization for Enterprise

- ➢ VMware
- ➢ Xen
- ➢ KVM with oVirt
- ➢ Hyper-V

UNIT II (Private, Public & Hybrid Clouds, Setting up your own Cloud): (2-0-0)
Theory **(2 Credits)**

What is Private, Public & Hybrid Clouds, and Advantages & Disadvantages On Premises and Off Premises Cloud services, installing a Cloud service using • Eucalyptus • Open Nebula • Open Stack Amazon Web Services Microsoft Azure Google App Engine VMware air.

Setting up your own Cloud

How to build private cloud using open source tools Understanding various cloud plugins, Setting up your own cloud environment Auto provisioning Custom images Integrating tools like Nagios Integration of Public and Private Cloud.

UNIT III (Cloud Security): (2-0-0)
Theory **(2 Credits)**

• Infrastructure Security • Network level security, Host level security, Application level security • Data security and Storage • Data privacy and security Issues, Jurisdictional issues raised by Data location • Identity & Access Management • Access Control • Trust, Reputation, Risk • Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business consideration.

Security in Clouds: Cloud security challenges – Software as a Service Security

Project Work
- ➢ Designing of sample cloud services.
- ➢ Case Study of sample cloud services

Recommended Text Books:
2. **Cloud Computing: Web Based Applications** That Change The Way You Work And Collaborating Online, **By Michael Miller**

Suggested Readings:
1. Barrie Sosinsky,**Cloud Computing Bible**
2. *Robin Bloor*, *Marcia Kaufman*, and *Fern Halper,* **Cloud Computing for Dummies**

Organizational Behavior

Credits: 5.5

Course Outcomes: The course aims to provide an understanding of basic concepts, theories and techniques in the field of human behaviour at the individual, group and organizational levels in the hanging global scenario. The course must be taught using case study method.

UNIT I
- Introduction: Concept and nature of Organizational behaviour; Contributing disciplines to the field of O.B.;
- O.B. Models; Need to understand human behaviour; Challenges and opportunities.
- Individual & Interpersonal Behaviour: Biographical Characteristics; Ability; Values;
- Attitudes- Formation, Theories, Organization Related Attitude, Relationship between Attitude and Behavior;
  - Personality – Determinants and Traits; Emotions;

(Credits :2)

UNIT II
- Learning-Theories and Reinforcement Schedules, Perception –Process and Errors.
- Interpersonal Behaviour: Johari Window; Transactional Analysis – Ego States, Types of Transactions, Life Positions, Applications of T.A.
- Group Behaviour & Team Development: Concept of Group and Group Dynamics; Types of Groups;
  - Formal and Informal Groups; Stages of Group Development, Theories of Group Formation; Group Norms, Group Cohesiveness;

(Credits :2)

UNIT III
- Group Think and Group Shift. Group Decision Making; Inter Group Behaviour;
- Concept of Team Vs. Group; Types of Teams; Building and Managing Effective Teams.
- Organization Culture and Conflict Management: Organizational Culture- Concept, Functions,
- Socialization; Creating and sustaining culture; Managing Conflict – Sources, Types, Process and Resolution of Conflict;
  - Managing Change; Resistance to Change, Planned Change. Managing Across Cultures; Empowerment and Participation.

(Credits :1.5)

Recommended Text Book
- Robbins, S.P. and Sanghi, S., (2009), Organizational Behaviour; 13th edition, Pearson Education.
- Singh, Kavita, (2010), Organizational Behaviour: Text and Cases, 1st edition, Pearson Education.

Suggested Readings:
- Luthans, Fred, (2008), Organizational Behavior, 11th Edition, McGraw Hill Education.
- Mcshane, Steven, Von, Glinow and Sharma, Radha, (2008), Organisational Behaviour, 4th Edition, McGraw Hill Education.
- Kinicki, Angelo and Kreitner, Robert, ((2005)), Organisational Behaviour, 2nd Edition, McGraw Hill Education.

Recommendation:
- **One Existing case Analysis learning & one Current case Analysis on groups beahviour**

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

Faculty of Education & Methodology
Department of Fashion Design & Fine Arts

BACHELOR OF FASHION DESIGN

SESSION – 2022-23

DURATION – 4 YEARS/8 SEMESTER

SYLLABUS FOR:
1-4 YEARS

PROGRAM DETAIL

Name of Program	-	Bachelor of Fashion Design
Program Code	-	Bachelor of Fashion Design
Mode of Program	-	Yearly /Semester
Duration of Program	-	4 years/ 8 Semester
Total Credits of Program	-	176 Credit
Curriculum Type and Medium Choice	-	English

PROGRAM OUTCOMES

Reflective thinking: Formulate independent research and develop innovative products releva[...] of the society by using the process of conceptualization and generating original solutions to d[...]

Effective Communicator: Formulate skills for written, oral, and visual forms to commu[...] based ideas.

Critical thinking: Assess product quality, serviceability, and regulatory compliance standard[...]

Research: Apply concepts and skills through research based assignments and experimental[...] the interrelationships among historic, socio-cultural, and psychological factors of clothing.

Digital Literacy: Appraise the aesthetics of design process through developing digital pr[...] portfolios by using software according to the need of fashion industry.

Self-directive learning: Formulate ability to identify and mobilize resources ind[...] various fashion events & lead clientele in the industry.

Disciplinary knowledge and skills: Asses knowledge and identify the roles and functi[...] industry within which products are developed, marketed, and consumed.

Multicultural competence: Categorize and Evaluate the needs of diverse consumer base[...] related to industry processes with reference to design, production and communication.

Moral and Ethical awareness/reasoning: Relate global and national issues of sustainab[...] interdependence related to the social, economic, and environmental impact of the apparel and[...] chain.

Leadership readiness/ qualities: Prepare as professional industry ready individual for qu[...] strong ethics as well as communication skills to support their careers.

Lifelong Learning: Assess and apply theories of fashion to develop, analytical approach t[...] issues with regards to a specific segment.

SYLLABUS DETAIL

I SEMESTER

S. No.	Credit	Name of Course
1	6	Fundamentals of Design
2	6	Sewing Techniques-I
3	4	Fashion Rendering -I
4	3	Textile Fibers and Yarns
5	4	Basic of computer
Total	**23**	

II SEMESTER

S. No.	Credit	Name of Course
1	2	Fashion Studies
2	4	Pattern Making & Garment Construction
3	4	Fashion Rendering-II
4	2	History of fashion
5	4	Fabric artistry
6	4	Computer Application in fashion-I
Total	**20**	

III SEMESTER

S. No.	Credit	Name of Course
1	6	Garment Manufacturing Techniques
2	6	Traditional Indian Textile &Embroideries
3	4	Fashion sketch coloring and rendering techniques
4	6	Weaving and knitting
5	6	Computer Application in Fashion -II
6	6	Garment Manufacturing Techniques
Total	28	

IV SEMESTER

S. No.	Credit	Name of Course
1	2	Fashion Business
2	4	Fashion Accessories &Trims
3	4	Fashion Forecasting
4	6	Textile Theory &Testing
5	4	Garment Construction
6	6	Computer Application in Fashion –III
Total	**26**	

V SEMESTER

S. No.	Credit	Name of Course
1	4	Occupational Apparels
2	4	Men's Wear Range Development
3	6	Textile & Garment Quality Analysis Assurance
4	4	Draping Techniques
5	2	Visual Merchandising
6	6	Computer Application in Fashion –IV
Total	**26**	

VI SEMESTER

S. No.	Credit	Name of Course
1	2	Garment Pricing and Trade documentation
2	2	Apparel Production management
3	6	Fashion Research Methodology
4	6	Flat Pattern Design
5	4	Digital Portfolio Design
6	4	Computerized Drafting &Garment Construction
Total	**24**	

VII SEMESTER

S. No.	Credit	Name of Course
1	3	GREEN FASHION
2	3	FASHION MARKETIG
3	4	TEXTILE DESIGN
4	3	WORLD TEXTILE AND CONSERVAION
5	3	APPAREL COSTING
6	3	FASHION EVOLUTION
Total	**19**	

VIII SEMESTER

S. No.	Credit	Name of Course
1	4	PORTFOLIO PRESENTATION
2	6	INDUSTRIAL INTERNSHIP
Total	**10**	

BACHELOR OF FASHION DESIGN
Detailed syllabus:
SEMESTER I

1. FUNDAMENTAL OF DESIGN
2. SEWING TECHNIQUES-I
3. FASHION RENDERING-I
4. TEXTILE FIBERS AND YARNS
5. BASIC OF COMPUTER

FUNDAMENTAL OF DESIGN (THEORY)
COURSE OUTCOME:
- ❖ **To develop and initialize a design vocabulary as an essential tool for practicing as designers.**
- ❖ **To create aesthetic sense about designing in apparels.**

Unit 1
Importance of Elements of Design and Fashion.
- Dot- Effect of dot.
- Line – Directing, Dividing, Psychological effects of line, Optical Illusion.
- Shape and form–Geometric, Natural, Non-Course Outcome: Silhouettes.
- Texture – Visual, Tactile, and Audible.

Deliverables- Report on 7 Elements
Unit 2
Principles of Design: Introduction, Importance.
- Rhythm-Repetition
- Balance-Formal and Informal balance.
- Emphasis- Effect on Garments on emphasis.
- Harmony –Scale and Unity Elements of Fashion –Applications of elements of design on various Apparels.
- Proportion –Variety

Unit 3

Color
- Characteristics of Color : hue, value and intensity
- Color Theories
- Color Harmony and Color Schemes
- Psychology of Color and its application on apparel
-
Deliverables- Report on 7 Principles
End Term (70 Marks) Complete Syllabus

FUNDAMENTAL OF DESIGN (LAB)
COURSE OUTCOME:
- ❖ **To impart the knowledge to develop designs skills for creating aesthetically good design.**
- ❖ **Use & application of design elements like Lines, Shapes, Texture & color to form a good design.**

Unit 1
1. Practical Exercise on visual effect of dot.
2. Practical Exercise on different types of lines.
3. Practical Exercise on application of Silhouettes and shapes.
4. Practical Exercise on different types of textures Natural & Artificial
5. Practical Exercise on application of Rhythm.
6. Practical Exercise on effect of balance.

Unit 2
7. Practical Exercise on Drawing Color wheel that includes Primary, Secondary & Tertiary colors.
- Monochromatic colour Scheme
- Analogous colour Scheme
- Complementary colour Scheme
- Double complementary colour Scheme
- Split complementary colour Scheme
- Triad colour Scheme
- Tetrad colour Scheme
- Achromatic colour Scheme

Unit 3
8. Prepare the following**:**
- Value Scale
- Intensity Scale
- Gray Scale
Introduction to different types of motif& designs
Practical Exercise on Natural sketching

Preparation of Sheets
- Practical Exercise on Preparation of floral design
- Practical Exercise on Preparation of Geometrical design
- Practical Exercise on Preparation of Traditional design
- Practical Exercise on Preparation of Abstract design
- Practical Exercise on Preparation of Natural design
- . Practical Exercise on Preparation of Nursery design
- Practical Exercise on Preparation of Ogee design

Deliverables- 20 sheets on Elements of Design, Principle of design and Color wheel
Suggested Readings
- Vikas Gupta, Navneet Kaur, Comdex Fashion Design Vol 2: Ensembles for Your Body Type, DreamtechBiztantra, New Delhi, 2012.
- Kogent Learning Solutions Inc, Comdex Fashion Design, Vol I, Fashion Concepts, Dreamtech Press, 2010.
- Betala, Reeta, Design Comprehension and Visualization, Ane books, New Delhi.
- Lyle, Dorothy S., Contemporary Clothing, Benette & Mc night Publishing Co. Peoria Illinois, 1983.
  References:
- Frings, G., Fashion from concept to consumers, Prentice Hall International, New Jersey, 1991.
- Jane Mills and Janet K.Smith , Design Concepts, Fairchild Publications, New York, 1996.
- Judith Rasband, Wardrobe strategies for women, Delmar publishers, London.

Sewing Techniques- I
COURSE OUTCOME:
- ❖ To impart technical skills in sewing techniques.
- ❖ To acquaint students with knowledge in sewing machine and stitching and finishing for special categories.

UNIT-1
1. Introduction of Sewing Machine with Hand, Treadle and Electric motor
2. Basic Parts and Attachments
3. Functions Defects and Remedies
4. Needle Parts
5. **Basic Hand Stitches: Temporary Stitches:** Basic, Basting even, Uneven, Diagonal &Running, and overcastting.
6. **Permanent Stitches**: Running stitch, Hemming, Slip
7. Stitch, Back stitch, Run and Back stitch, over casting,
8. Over handing, Whipstitch.
9. Frill, gather, ruffles

UNIT-2
Seams and Seam Finishes
10. **Seams:** Types of seams working of common seams
11. Plain seam, Top stitched seam Welt seam, Lapped seam, Slot seam, Flat fell seam, French seam, Mantua maker's seam, Piped seam.
12. **Seam Finishes:** Pinked, Edge stitched, Double stitched, Over cast, Herring bone stitch, Bound seam

UNIT-3
Introducing Fullness
13. **Darts:** Decorative and Functional darts
14. **Pleats:** Knife Pleats, Box Pleats, Inverted Pleats, Kick, Pleats, Fan Pleats, Cartridge Pleats, Pinch Pleats
15. **Tucks:** Pin Tucks - Piped or Corded tucks, CrossTucking, wide tucks - Blind Tucks, Spaced Tucks, Shell or Scalloped Tucks, Group Tucking with Scalloped effect
16. **Fasteners**
17. Button & Button holes
18. Hooks & Eyes
19. Snaps
20. Zip
21. Velcro
A. **Plackets and Openings :** Continuous Bound Placket, Bound and Faced Placket or Two-Piece Placket, Zipper Placket, Tailored Placket or Shirt Sleeve Placket, Bound Neck Opening , Centre Front Opening
B. **Pockets :** Patch Pockets, In seam Pockets, Cut Pockets, Flap Pocket

REFERECE BOOKS:
1. Sew it-Nancy Bruning
2. Sewing of Golden Hands-Marshal Carendish
3. Sewing -Jean Kimmod
4. Singer Sewing Book-Singing Sewing Company

Fashion Rendering-I

COURSE OUTCOME:
1. **To enable students to develop drawing skills required for designing through line and shading exercises.**

Unit 1
1. Drawing garment details:
- Pockets, Necklines & Collars
- Sleeves & sleeve finishes
- Darts, Gathers, Pleats, Yokes
- Frills, Ruffles, Cowls, Smoking, Quilting & Shirring
- Skirts- Skirt lengths (Micro Mini, Mini, Tea & Maxi)
- Pants- Pants length (Shorts, Jamaica, Bermudas, Walking shorts, Capri, Regular & stretch pants
- Blouses & tops, Shirts & Blazers, Jackets, Coats
- Lace, Shirring, Frills & Flounces, Tucks, Bows, Hemlines, Fringing, Belts

Unit 2
2. Drawing stick figures (male and female)
3. Drawing of block figure – 8 ½, 10 ½ & 12½ (male and female)
4. Fleshing of Figures

Deliverables- 15 Sketches on Drawing garment details

Unit 3
1. Stick croqui
2. Flesh out croqui
3. Drawing of block figure – 8 ½, 10 ½ & 12½ (male and female)
4. Front view
5. Back view
6. Side view
7. 3/4th view
8. Poses of the Male
9. Poses of the Female

Deliverables- 20Sketches on different view male, female figure

Mode of Display- Exhibition cum Department presentation

Essential Readings:
1. Lawson, Bryan, How Designers Think: The Design Process Demystified, Rutledge, 2006.
2. McKelvey, Kathryn, Munslow, Janine, Fashion Design: Process, Innovation and
3. Mendelsohn, L. B., Trend Forecasting with Inter market Analysis: Predicting Global Markets with Technical Analysis, John Wiley & Sons Inc., New Jersey, 2013.

References:
1. Porter, A, W., Elements of Design – Space, Davis Publications, 1987
2. Stone, Terry Lee, Managing the Design Process - Concept Development: An Essential Manual for the Working Designer, Rockport Publishers, 2010.

Textile Fibers and Yarns (theory)

COURSE OUTCOME:
- ❖ **To understand basic composition of a fabric and the science behind it.**

UNIT-1
  A. **Textile Fibers:** Meaning and Definition of Textile Fibers, History & Development of Fibers
  B. **Classification of Fibers**
  1. Natural Fibers
  2. Animal Fibers
  3. Vegetable Fibers
  4. Mineral Fibers
  C. **Manmade Fibers**
  5. Rayon
  6. Polyester

Characteristics / Properties of above mentioned fibers
UNIT-2
Uses of different Textile Fibers
  A. **Yarn Construction**
  1. Elementary processing of different types of Fiber to Yarn:
  2. Cellulosic
  3. Protein
  4. Synthetic
  B. **Characteristics of Yarn**
  5. Twist
  6. Size or Count
  7. Count measuring system
  C. **Types of Yarns**
  8. Simple
  9. Complex
  10.

UNIT-3
  D. **Construction**
  11. Elementary processing of different types of Fiber to Yarn:
  12. Cellulosic
  13. Protein
  14. Synthetic
  E. **Characteristics of Yarn :**Twist , Size or Count , Count measuring system
  F. **Types of Yarns**
  15. Simple
  16. Complex

Essential Readings:
  1. Phyllis, G. Tortora., Understanding Textile, (2nd Edition), Pearson, 1997.
  2. Joseph J. Pizzuto, Fabric science, 5th ed., Fairchild publication, New York 1987.
  3. Kadolph, Sara, J. and Anna L. Langford, Textiles, 11th Edition, Pearson Education (US) 2010.
  4. Joseph, M.L., Essential of Textiles (5th edition), Holf, Rinecharts and Winston Publication, Florida 1988.
  5. Sekhri, Seema, Text Book of Fabric Science fundamentals to Finishing, PHI Learning Pvt, Ltd, New Delhi, 2011.

References:
  1. Gioello, Debbie Ann., Understanding fabrics from fibers to finished clothes, Fairchild Publication, New York 1982
  2. Humphries, Mary. , Fabric Reference,2nd Edition, Prentice Hall, U.S.A
  3. Shenai V.A.: Chemistry of Dyes and Principles of Dyeing, Sevak Prakashan Mumbai.

BASIC OF COMPUTER (LAB)

Course Outcome:
- ❖ Inculcate basic knowledge of computers amongst the students.

UNIT I:

Introduction to Computers

Introduction to Computers (definition, characteristics & uses), Evolution of computers, System unit (memory, ALU & control unit), Input / Output devices, Storage devices Memory- primary & secondary.

UNIT II

Presentation Software

Adding header and footer, adding clip arts and auto shapes, Various presentation, Working in slide sorter view (deleting, duplicating, rearranging slides), adding transition and animations to slide show, inserting music or sound on a slide, Inserting action buttons or hyperlinks for a presentation, set and rehearse slide timings, viewing slide show, Printing slides.

Uses, Presentation tips, components of slide, templates and wizards, using template, choosing an auto layout, using outlines, adding subheadings, editing text, formatting text, using master slide; adding slides, changing color scheme, changing background and shading.

Unit III

Internet:

Internet Communication Protocols, Types of Internet Connections, Intranets, Email Concepts (receiving, sending, addressing, downloading, formatting, sending attachment), Configuring e-mail software.

1. Word Documents.
2. Excel Spreadsheets
3. Power point presentation
4.

Essential Readings:

1. Peter Norton, Introduction to Computers, TMH, 2001.
2. Ed Bott, Using Microsoft Office 2007, Pearson Education India.
3. John Walkenbach (Author), Herb Tyson (Author), Michael R. Groh (Author), Faithe Wempen (Author), Lisa A. Bucki, Microsoft Office 2010 Bible, Wiley India.

References:

1. Mahapatra & Sinha, Essentials of Information Design, Dhanpat Rai Publishing.

SEMESTER II

1. FASHION STUDIES
2. FABRIC ARTISTRY
3. FASHION RENDERING-II
4. HISTORY OF FASHION
5. COMPUTER APPLICATION IN FASHION-I
6. PATTERN MAKING & GARMENT CONSTRUCTION

Fashion Studies (THEORY)

Course Outcome:
- ❖ **Understand the dynamics of fashion.**
- ❖ **Gain knowledge of the role of fashion designers and fashion centres.**

Unit 1
1. An overview of Fashion terminology; Principle of fashion
2. Fashion components-silhouette, details, color, fabric, texture.
3. Fashion cycle
4. Social & Psychological aspects of clothing
5. Fashion adoption theories – Trickle down, Trickle across, Trickle up
6. Evolution and developing of fashion stores in India

Unit 2
7. Factors favoring and retarding fashion movement
8. Forecasting Fashion Trends
9. Seasons of Fashion
10. Scope of fashion designing
11. Fashion services and resources, Design Sources
12. Fashion centers- Milan, Tokyo, New York, Paris, Delhi, Kolkata and Mumbai
13. Role of Designers-Fashion Designers –National and international designers,

Unit 3
Classification of Apparel:
14. Women wear- Active wear, Formal wear, Bridal wear, Maternity wear
15. Men's wear-Tailored clothing, Suit separates, Sportswear, Active wear, Contemporary wear, Bridge
16. Children wear – Girls dresses, Sportswear, Outer wear, Sleep wear.
17. Silhouettes and wardrobe planning

Deliverables-Report on different National and international designers

End Term (70 Marks)
Complete Syllabus

Essential Readings:
1. Stone, E., The Dynamics of fashion, Fairchild Publication, New York, 2001.
2. Lyle, Dorothy, Contemporary Clothing, Bennett and Mc Knight Publishing Company, Peoria Illinois.
3. Castelino, Mehair, Fashion Kalidoscope (National designer), Rupa publication, New Delhi, 1994

References:
1. Ireland, Introduction to Fashion Design, B.T. Batsford Ltd., London.1992.
2. Marie Fogg, Fashion Design, Directory, firefly books Ltd. 2011.
3. Lester, John Baters: Fashion Designers, Suffolk: ACC editions. 2008.

Pattern Making & Garment Construction (Lab)

Course Outcome:
- ❖ To impart advanced technical skills in pattern making
- ❖ To acquaint students with knowledge in designing for special categories•

Unit I

1 Introduction to pattern making and clothing construction- terminology, tools and equipments.

2 Measurements for pattern design- individual and standard measurements, measuring techniques individual, dress forms, human figure, measurements for fit and pattern size.. Practical exercise on Human Anatomy

3. Practical exercise on Pattern Making Principals

4. Practical exercise on Child Bodice Block size

5. Practical exercise on Child Bodice Block size marking

6. Practical exercise on Child Basic Sleeve

7. Practical exercise on Child Skirt Block

8. Practical exercise on Necklines

Deliverables- 8 Draft & Report on Different neckline & Bodice block

Unit II

9. Collars (Children) Introduction

10. Peter pan

11. Cape

12 Shawl Collar

13. Sailors

14. Stand collar

15. Shirt collar

Unit III

20. Puff Sleeve

21. Raglan Sleeve

22. Dolman Sleeve

23. leg-o-mutton sleeve

24. Cap sleeve

25. Petal sleeve

Deliverables- 10 Draft of Different Collar & Sleeve

End Term (70 Marks)

Complete Syllabus

Mode of Display- Exhibition cum Department presentation

Essential Readings:
1. Reader's Digest, Complete Guide of Sewing & knitting, The Reader's Digest Association Ltd., London
2. Kallal, Mary. Jo, Clothing Construction, Mc Millan Publishing Company, New York 1985
3. Armstrong, Pearson., Pattern making for Fashion Design, Fair Child Publication, New York 1995
4. Jindal, Ritu., Handbook of Fashion Designing, Mittal Publication, New Delhi, 2005
5. Gale Grigg Hazen, Fantastic Fit for Every Body, 1998, Published by Rodale Press

References:
1. Pati Palmer and Susan Pletsch, Easy, Easier, Easiest Tailoring,; 2000., Published by Palmer/ Pletsch Inc.,
2. Sandra Betzina, Fast Fit – Easy Pattern Alterations for Every Figure, 2003 Taunton Pr.

Fabric artistry (LAB)
Course Outcome:
- ❖ **Introduce various techniques of fabric manufacturing.**
- ❖ **Impart skill to manipulate the basic techniques in order to enhance the fabric surface.**
- ❖ **Develop Creative Samples to work as a Surface Designer in Fashion Industry.**

Unit 1
1. Introduction to Design transfer material-1
2. Practical Exercise Design transfer material-2
3. Practical Exercise on Types of Needle floral design
4. Practical Exercise on Slip stitch
5. Practical Exercise on Stem Stitch.
6. Practical Exercise on Chain Stitch
7. Practical Exercise on Twisted Chain Stitch.
8. Practical Exercise on Lazy Dazy Stitch.
9. Practical Exercise on Fly Stitch
10. Practical Exercise on Blanket Stitch.

Deliverables- 8 Embroidery sample on Blanket, fly, lazy daisy, twisted, slip, stem stitch
Unit-II
11. Practical Exercises on Herring Bone Stitch.
12. Practical Exercise on Couching Stitch.
13. Practical Exercise on French Knots
14. Practical Exercise on Bullion Knots.
15. Practical Exercise on Cross Stitch
16. Practical Exercise on Darning Stitch.

Unit III
17. Practical Exercise on Long & short stitch.
18. Practical Exercise on Straight stitch
19. Practical Exercise on Stain Stitch
20. Practical Exercise on Outline Stitch
Deliverables- 10 Embroidery sample & 2 articles on Blanket, fly, lazy daisy, twisted, slip, stem stitch

End Term (70 Marks)
Complete Syllabus
Mode of Display- Exhibition cum Department presentation
Essential Readings:
- Reader's, Digest (1981), Complete Guide to Sewing, The Reader's Digest Associations (Canada) Ltd. Montreal, Pleasantville, New York.
- Cream, Penelope (1996), The Complete Book of Sewing - A Practical Step by Step Guide to Sewing Techniques, DK Publishing Book, New York ,.
- Chattopadhaya, K.D., (1995), Handicrafts of India, Wiley Eastern Limited, N Delhi
- Practical Exercise on Narrow Machine Stitched Hem
- Practical Exercise on Rolled or Whipped Hem
- Practical Exercise on Shell Edged Hem for Circular or Flared Skirts

REFERECES
1. Sew it Nancy Bruning
2. Sewing of Golden Hands Marshal Carendish
3. Sewing Jean Kimmod
4. Singer Sewing Book Singing Sewing Company
5. Sewing Ana Ladbury
6. Introduction to Dress Making Marshall Cavendish

HISTORY OF FASHION

COURSE OUTCOME:
1. To give an insight and input about the various aspects of the History of the Indian costumes from the ancient times onwards.

UNIT- 1
1) Origin of clothing
2) Theories of clothing
3) Costume from earlier times to present time
4) Indus Valley civilizations
5) Vedic period (1200 BC to 600 BC)
6) Early Vedic Period (1200 –900 BC)
7) Late Vedic Period (900-600 BC)
8) Past –Vedic period (600 BC-323 BC)

UNIT- 2
9) **Maurayan & Sunga period (321 BC-72 BC)**
- Mauryan (321-185 BC)
- Sunga (185-72 BC)
10) **Satavhana Andhra period (200 BC-250 AD)**
- Early period (200 BC -160 BC)
- Late period (100 BC - 250 AD)
- Kushan period (130 BC-185 AD)
11) Gupta period (4thCentryAD-Middle 8thCentury)

UNIT- 3
12) Mughal Period
13) British Period
14) Contemporary costumes
15) Costume of Northern States
16) Costume of Northern States
17) Costume of Southern States
18) Costume of Eastern States
19) Costume of Western State

ESSENTIAL READINGS:
1. Sumathi, G.J. "Elements of Fashion and Apparel Design" New Age International Publishers, New Delhi, 2002.
2. Marshall, Suzanne G., Individuality in Clothing Selection and Personal Appearance, Pearson, Prentice Hall, London 2004.
3. Naik., Traditional Embroideries of India, APH Publishing Corporation, New Delhi.
4. Bhatnagar, Parul, Traditional Indian Costumes & Textiles, Abhishek Publications, Chandigarh, 2006.
5. Fashion Costume & Culture :Clothing, Headwear, Body Decorations, and Footwear through the Ages Volume 1 Early Cultures Across the Globe, Pendergast
6. Fashion Costume & Culture :Clothing, Headwear, Body Decorations, and Footwear through the Ages Volume 3 European Culture from the Renaissance to the Modern Era, Pendergast

REFERENCES:
1. Jamila BrijBhusan Master piece of Indian jewellery, Taraporevala-Bombay, 1979.
2. Jamila BrijBhusan, The Costumes and textiles of India, Taraporevala-Bombay.1958
3. Parul Bhatnagar, Traditional Indian costumes & textiles‖, Abhishek Publication.2004
4. Jack Cassin-scott; The illustrated encyclopedia of costume and fashion (from 1600 to present); Block Hampton Press; London.
5. John Peacok, Costume 10666 to the present, 3rd edition, Thames & Hudson Ltd, London 1986.
6. Elizabeth Rouse, Understanding fashion, Blackwell science Ltd, 1989

Fashion Rendering-II (Lab)

Course Outcome:

1. Create dress library for effective designing.
2. Enhance the creative skill of fashion illustration
3. Application of rendering techniques using different mediums.

Unit 1

a. Introduction to fabric rending

b. Rendering of fabric sample with different color medium

c. Rendering technique: Designing and rendering for male and female apparel with fabric swatches for:

1. Woven **:** Satin, Denim, Crepe, Tissue, Chiffon, Georgette, Velvet, Pile, Cotton, Net, Organza, Suede
2. Knitted: Herringbone, Tweed, Jersey, Rib
3. Printed: Stripes, Check & Plaid, Dots, Floral, Geometrical
4. Others: Leather, Lace

Deliverables- 15 sketches on different kind of medium-pencil, water color, color, fabric color, different fabric rendering

Unit 2

a. Photo analysis of female garment-3 sheet

b. Development of Costumes on Croqui using elements of fashion-2 sheet

c. Draping of costumes on female using line & dots

d. Draping of costumes on female using shapes & textures

e. Draping of costumes on female using silhouettes-3 sheet

f. Draping of costumes on male using line & dots

g. Draping of costumes on male using shape & textures

h. Draping of costumes on male using silhouettes-3 sheet

Deliverables-20 sketches on different kind of silhouettes, shape & textures, Croqui using elements of fashion, Preparation of power point presentation

End Term (70 Marks)

Complete Syllabus

Mode of Display- Exhibition cum Department presentation

Essential Readings:.

- Prakash, K. (2004), Indian Fashion Designs, English Edition Publishers and Distributors Pvt Ltd, India.
- V. Kamath, (2006) "Sketching and Drawing", Jyotsna Prakashan Pune, 2nd Edition,.
- Allen, Seamen. (2005) Fashion Drawing: The Basic Principles, B.T. Batsford Ltd, London.
- Ireland, Patrick. John. (2001) Introduction to Fashion Design, B.T. Batsford Ltd, London.

COMPUTER APPLICATION IN FASHION –I

Course Outcome:
1. **Students will be able to apply knowledge through different colour mediums, layouts, repeats, placements techniques.**
2. **Illustrate garment design details on a single screen by CAD.**

UNIT –I
Lab Experiment:
1. Practical Exercise on introduction to Corel draw
2. Practical Exercise on changing Pick tool, shape tool, Zoom tool, Freehand tool, Smart tool, Rectangle, Ellipse, Graph paper, Basic shapes, Text, Interactive, Eyedropper, Outline, Fill, Interactive fill tool, Grid & Rules setup, Page setup & Background, Transformation, Order, Power clip, Bitmaps, Writing tool, color style, color patterns etc.
3. Practical Exercise on **Motif Development:** Traditional Indian (State wise)
4. Practical Exercise on **Motif Development**: Naturalized
5. Practical Exercise on **Motif Development:** Geometrical
6. Practical Exercise on **Motif Development**: Abstract

UNIT –II
Lab Experiment:
Motif Development:
- o Traditional Indian (State wise)
- o Naturalized,
- o Stylized,
- o Geometrical
- o Abstract.

Growth of Motif: Enlarging and Reducing
- o **Repeats** :
- o Straight, Drop, Brick
- o Mirrored: Vertically and horizontally
- o Directional: One way, two ways, Multi & Non-directional

Unit-III
Layout:
- o Allover
- o Ogee
- o Border
- o Stripes

 Deliverables- 20 sheets for Sheets of manual work done by the students should be included in the portfolio

Suggested Readings:
Corel draw- Software

Essential Readings:

- Corel Draw 11: The Official guide, Dream Tech Publishers.
- Schwartz & Davis (2002), CorelDraw 11 for windows; Visual Quick Start Guide, Peachpit Press

SEMESTER III

1. GARMENT MANUFACTURING TECHNIQUES
2. WEAVING AND KNITTING
3. TRADITIONAL INDIAN TEXTILE & EMBROIDERIES
4. FASHION ILLUSTRATION
5. FABRIC STYLING
6. COMPUTER APPLICATION IN FASHION –II

Garment Manufacturing Techniques (LAB)
Course Outcome:
- ❖ To impart knowledge of drafting and construction of clothing.
- ❖ To enable students to understand adaptation techniques of various style features to basic• garments.

Unit-I

1. Torso foundation
2. Construction of semi fitted
3. Construction of fitted front & back
4. Construction of Flared suits
5. Construction of Night suits
6. Construction of Night suits front & back

Deliverables-3 Garment: -Flared suit, Night suit, Bias Dress

UNIT-II

- Construction of Armhole princess line dress
- Construction of Panel Style line
- Construction of salwar /palazzo
- Construction of Churidar/ Pant
- Construction of kurta
- Construction of one piece garment

Deliverables-3 Garment: - Kurta, Pant, Churidar, Salwar

End Term (70 Marks)

Complete Syllabus

Mode of Display- Exhibition cum Department presentation

Essential Readings:
1. Reader's Digest., Complete Guide of Sewing & knitting, The Reader's Digest Association Ltd., London
2. Kallal, Mary. Jo., Clothing Construction, Mc Millan Publishing Company, New York 1985
3. H.J.Armstrong, Pearson., Pattern making for Fashion Design, Fair Child Publication, New York 1995.
References:
1. Pati Palmer and Susan Pletsch, Easy, Easier, Easiest Tailoring,; 2000., Published by Palmer/ Pletsch Inc.,
2. Aldrich, W. (1988). Metric Pattern Cutting. Unwin Hyman Ltd., London.

Fashion Illustration

Course Outcome:

1. **Imbibe the trait of analysis for future research endeavors.**

Unit-I

1. Practical exercise on Body movement Male
2. Practical exercise on Body movement Female
3. Practical exercise on Body movement Kids
4. Practical exercise on Leg movement
5. Practical exercise on Hand movement
6. Practical exercise on Face drawing and detailing
7. Practical exercise on Feature drawing
8. Practical exercise on Actions drawing
9. Practical exercise on Poses and composition (different angles- 5 with all details)

Deliverables- 15 sketches sheet on Body movement Male, Body movement Female, Body movement Kids, Leg, Hand movement, Face drawing and detailing.

Unit-II

Collect fabric swatches & Trimmings

1. Creating doodles.
2. Mood board
3. Story board
4. Fabric Development
5. Color sheet
6. Illustration sheet (At least eight Designs)
7. Spec sheet
8. Final presentation
9. Designing female apparels for any two of the following categories using inspiration board, latest trend and forecasting:

- Casual wear
- Dresses
- Evening wear
- Swimming & Lingerie
- Bridal
- Night wear

Deliverables- 15 sketches sheet Fabric color rendering, Pen rendering, oil pester Rendering, Flat sketch, preparation of spec sheet.

Preparation of power point presentation

End Term (70 Marks)

Complete Syllabus

Essential Readings:

- Abling, Bina., (2004) Fashion Sketchbook , Parson School of Design & Fashion Institutes of Design, Fairchild Publication, New York.
- Allen, Seamen., (2005) Fashion Drawing: The Basic Principles, B.T.Batsford Ltd, London.
- Kathryn, Mc Kelvey& Munslow, Janine., (2005) Illustrating Fashion, Blackwell Publishing, London.
- A. Caral Nunnelly, (2009) Fashion Illustration School, A Complete handbook for aspiring designers and illustrators, Hames & Hudson; Thames & Hudson

Traditional Indian Textiles & Embroideries (THEORY)
Course Outcome:
1. **Understand the evolution and development of traditional Indian textiles.**
2. **Foster appreciation of traditional Indian Textiles.**

Unit 1

Introduction about traditional Indian textiles and their importance

Traditional Textiles of different states regarding the fiber used, weave, motifs, colors, their significance and

descriptive terms used-

- ❖ Maharashtra,
- ❖ Gujarat,
- ❖ Saurashtra,
- ❖ Kutch,
- ❖ Rajasthan,
- ❖ Jammu &Kashmir,
- ❖ Punjab,
- ❖ Uttar Pradesh,
- ❖ Assam,
- ❖ Orissa,
- ❖ Manipur,
- ❖ West Bengal,
- ❖ Karnataka,
- ❖ Kerala,
- ❖ Tamil Nādu
- ❖ Andhra Pradesh.

Deliverables-Report on traditional Indian textiles and their importance

Unit -II

- ❖ Traditional Embroidery of different states-Fabric ,motifs, colors & their significance

- ❖ Kasuti of Karnataka Embroidery of Kutch and Kathiawar

- ❖ Kashida of Kashmir

- ❖ Kantha of Bengal

- ❖ Chikankari of Uttar Pradesh

- ❖ Phulkari of Punjab

Deliverables-Report on traditional Embroidery of different states

Traditional Indian Textiles & Embroideries (LAB)
Course Outcome:
1. **Introduce rich and glorious Textiles and Crafts of India.**
2. **Identify the technique of Textile crafts used in a region by various communities.**
3. **Foster appreciation and to study the historical perspective of traditional Indian Textiles.**

Unit-I

1. Practical Exercise on textile of Rajasthan.
2. Practical Exercise on textile of Gujarat
3. Practical Exercise on textile of Uttar Pradesh
Deliverables- 8 Sheet on different state of textile
Unit -II
4. Practical Exercise on Kasuti of Karnataka.
5. Practical Exercise on Embroidery of Kutch and Kathiawar
6. Practical Exercise on Kashida of Kashmir.
7. Practical Exercise on Kantha of Bengal.
8. Practical Exercise on Chikankari of Uttar Pradesh.
9. Practical Exercise on Phulkari of Punjab.
10. Practical Exercise on Chamba rumal.

Deliverables-1 article by using any embroidery technique & 8 Sheet embroidery sample on different state

End Term (50 Marks)

Complete Syllabus

Mode of Display- Exhibition cum Department presentation

Essential Readings:

- Karolia, A. (2019). Traditional Indian Handcrafted Textiles: History, Techniques, Processes, Design Vol I & II (First Edition). New Delhi: Niyogi Books Pvt. Ltd.
- Naik, S.D. (2012). Traditional Embroideries of India New Delhi: APH Publishing Corporation.
- Crill, R. (1999). Indian Embroidery New Delhi: Prakash Book Depot.
- Bhatnagar, P. (2006). Traditional Indian Costumes & Textiles Chandigarh: Abhishek Publications.
- Rai, I. (2008). Indian Embroidery and Textiles Jodhpur: Books Treasure.
- Shenai, V. A. (1992). History of Textile Design Sevak Publication.
- Naik, S.D. (1997). Folk Embroidery and Traditional Handloom Weaving New Delhi: APH Publishing Corporation.

Weaving and Knitting (Theory)
Course Outcome:
1. **Learn and understand hand crafted textiles of India**
2. **Familiarize with textiles of various states of India.**

Unit I
1. Introduction to weave
2. Looms and its types- Shuttle less looms- Rapier, Gripper, Multiphase, Air jet, Water jet, Jacquard and Dobby
3. Different types of weaves/ weaving designs – plain, satin, sateen, twill, bird's eye, basket, ribbed, crepe, pile, lappet,
4. Properties and uses of each of the weaves.
5. Comparative studies of the woven, non-woven and knitted fabrics - construction and advantages of each.
6. Classification knits- Warp knit and weft knit
7. Types of knitting machines:
- Flat-bed knitting machine
- Circular knitting machine
- Rachel knitting machine
- Tricot knitting machine
8. Elementary idea of machinery used in woven, knitted and non woven fabrics.

Unit-II

1. Method of production of non woven- web formation, bonding the web, needle punching the web, finishes.
2. Characteristics of non woven fabrics
3. Uses of non-woven. Decorative fabric construction-
    1. Braided fabrics
    2. Laces
    3. Laminated fabrics
    4. Nets
    5. Stitch bonded fabrics
    6. Tufting
4. Need for fabric processing
5. Detailed study of few finishes like bleaching mercerization, calendaring, tendering shrinking etc.
6. Elementary knowledge of different finishes applicable to different fabrics
7. Fabric Finishes
8. Fabric Defects and identification (Woven & Knitted)
9. Non - woven - classification

Weaving and Knitting (LAB)

Course Outcome:
1. **Learn and understand hand crafted textiles of India**
2. **Familiarize with textiles of various states of India.**

Unit I

1. **(**Identification of fabric samples (warp and weft direction)

2. Prepared a article using knitting technique

3. Prepared a article using weaving technique:

   Different types of weaves/ weaving designs – plain, satin, sateen, twill, bird's eye, basket, ribbed, crepe,

   pile, lappet

Unit-II

4. Fabric Finishes
5. Fabric Defects and identification (Woven & Knitted)
6. Uses of non-woven. Decorative fabric construction-
- Braided fabrics
- Laces
- Laminated fabrics
- Nets
- Stitch bonded fabrics
- Tufting

Deliverables-Report on Fabric weaves, knitting, Non -Woven Fabric and fabric finishes

End Term (70 Marks)

Complete Syllabus

Fabric styling (lab)

Course Outcome:

1. **Develop skills for research and presentation**
2. **Train for self-study and preparation of report**

Unit-I

1. Practical exercise on different fabrics and related materials for the research purpose

2. Practical exercise on collect sheer fabrics, coarse fabrics, prints, embroidery materials, threads, ribbons etc

3 Practical exercises on smocking

4. Practical exercise on tucking

5. Practical exercise on cording

6. Practical exercise on patchwork

7. Practical exercise on quilting

8. Practical Exercise on Button Work

9. Practical Exercise on Stone Work

Deliverables-2 article based on above techniques. Report on Fabric styling

End Term (70 Marks)

Complete Syllabus

Essential Readings:

- Moody & Hilary (1997), Beads, Buttons and Bows, Quantum Books Ltd.1997
- Denner.L. (1995), Creative Quilting for Home Decor, Crown Publications.
- Dorothy .G. & Lucinda (1998), The Encyclopedia of needle crafts, Publishers Hermes House
- Stone. P. (1997), The oriental rug lexicon, Thames and Hudson, 1997
- Marchen Art (2013), Macramé Pattern Book: Includes Over 70 Knots and Small Repeat Patterns plus Projects, Published by St. Martin's Griffin

References:
Joshnson. Henry., Introduction to Knitting Design, Abhishek Publication, 2006.
Books Lyric, The Harmony Guide to Knitting Stitches, Lyric Books Publication, London, 1985

1. A.J Hall, The Standard Handbook of Textiles, 8th edition, Woodhead Publication ltd, Cambridge England, 1975

Computer Application in Fashion –II

Course Outcome:

1. **Acquaint students with Computer Aided Designing.**
2. **Impart the skills of fashion designing through in designing software & editing software**

UNIT –I

Lab Experiment:

1. Practical Exercise on tool

2. Drawing 10½ male & female croqui with grids and guidelines

3. Stylization of male & female croquis- front, back and side. Grouping of Croquis (male and female)

4. Designing male and female apparel using appropriate theme incorporating the following:
- Mood board
- Story board
- Fabric Development
- Color sheet
- Illustration sheet (At least eight Designs)
- Spec sheet
- Final presentation

UNIT –II

5. Designing Souvenir, Catalogue, Stationary & Design Promotion.
6. Designing of Professional catalogue for fashion show (Atleast10 pages), Letter Head, Visiting cards and Invitation Cards & Envelope, Posters, Fliers and Pamphlet Table runner with Table mats

Drawing garment details:
- Pockets, Necklines & Collars
- Sleeves & sleeve finishes
- Darts, Gathers, Pleats, Yokes, Frills, Ruffles, Cowls
- Smocking, Quilting & Shirring,
- Skirts- Skirt lengths (Micro Mini, Mini, Tea & Maxi)
- Pants- Shorts, Jamaica, Bermudas, Walking shorts, Capri, Regular & stretch pants
- Blouses, Shirts & Blazers, Jackets, Coats

Scanning, Importing, saving and exporting images

(Sheets of manual work done by the students should be included in the portfolio)

15 sheets for wallpaper, Create theme based background, fabric effect, logo design, brochure & poster

Essential Readings:
1. CorelDraw 11: The Official guide, Dream Tech Publishers.
2. Abhay Upadhyay, Elementary of Computers. Altman, R., Corel Draw X5, BPB Publications.
3. Bangia, R. , Corel Draw, Khanna Book Publishing, Delhi, 2003.
4. Groover MP and E.W.Zinimmers, CAD/CAM computer aided design and manufacture, prentice hall, India 1984.

References:
1. CorelDraw 11 for windows; Visual Quick Start Guide.
2. Corel draw Tutorials.

SEMESTER IV

1. FASHION MERCHANDISING
2. FASHION ACCESSORIES & TRIMS
3. FASHION FORECASTING
4. GARMENT CONSTRUCTION
5. TEXTILE THEORY &TESTING
6. COMPUTER APPLICATION IN FASHION –III

Fashion Merchandising (THEORY)

Course Outcome:

1. To impart knowledge of merchandising in apparel industry.
2. To develop an insight into the fashion market among the students.
3. To provide comprehensive knowledge about marketing mix.

UNIT I
INTRODUCTION TO MERCHANDISING

- Introduction to fashion industry
- Fashion environment :Demographic& Psychographic, Economic, Sociological and psychological factors
- Fashion business
- Designer's role, manufacturer's role and retailer's role.
- Leaders of fashion
- Importance of merchandise planning and sourcing
- Importance of seasons in merchandising with respect of fabric sampling, packaging, tech pack and product development
- Selection of merchandise assortment

UNIT II
FASHION BUSINESS

- Evolution of merchandising in apparel industry
- Merchandising- definition and terms
- Role and responsibilities of fashion buyer and merchandiser
- Scope of fashion business -Primary level, secondary level and retail level
- Principles of merchandising
- Types of merchandising
- Role of merchandiser
- Consumer behavior
- Types of consumers behavior

Unit -III
FASHION MARKET

- Market research:
- Types of market – Retail & wholesale market
- Domestic & international market
- Supply Chain management
- Type of Supply Chain management
- Process of Supply Chain management
- Pricing: Pricing methods
- Factor influencing price
- Price policies
- Marketing mix

Essential Readings:
1. Stephens, Frings Gini, Fashion Concept to Consumer, 3rd ed., Prentice Hall International, New Jersey. 2008.
2. Stone, Elanie & Samples, Jean. A., Fashion Merchandising, McGraw Hill, New York.1985.
3. Nirupama, Pundir, Fashion Design-Today and Tommorow, Mittal publications, New Delhi, 2007.
4. Stone, E., In Fashion, Fairchild Publication, Second Edition, New York ,2012.
5. Jackson, Tim & Shaw, David, Fashion buying & merchandising management, Palgrave Macmillan publisher, London, 2008.
6. Donnellan, John, Merchandise buying & management, Fairchild publication, New York, 1999.
7. Rosenau, J. A., Wilson David L. David., Apparel Merchandising-The line starts here, Fairchild publications, New York.2006.
8. Kumar, M. Krishan, Apparel Merchandising, Abhishek Publication, Chandigarh, 2010.

References:
1. Chatley, Pooja., Fashion Marketing and Merchandising, Kalyani Publishers.
2. Gowerk, Helen., Fashion Buying, Blackwell Science Ltd, London.
3. Burns, Leslie. Davis & Bryant., Nancy. O., The Business of Fashion, Fairchild Publication, New York 2005.
4. Nosenav, Jeremy. A., Apparel Merchandising: The line starts here, Fair Child, New York.
5. Grren wood, Fashion marketing communication, John wiley and sons Pvt Ltd, 2013.

Fashion Accessories & Trims (LAB)

Course Outcome:

1. To encourage the pursuit of innovation, achieved through application and development of practical skills.
2. To familiarize the students with various materials used in accessories
3. To introduce basic design concepts, visualization techniques, manipulation of materials and techniques of interpretation, leading to creation of costume jewelry and accessories in various materials and traditional craft styles**.**

Unit-I

- Market survey and documentation of accessories based on different themes: - tribal, ethnic, contemporary, traditional, and fusion.

- Introduction to Fashion Accessories, Ladies headgears and scarf types designing

Lab Experiment:

1. Practical Exercise on Purse and its variations

2. Practical Exercise on Clutches

3. Practical Exercise on Handbags

4. Practical Exercise on Sling Bags

5. Practical Exercise on Scarfs

 6. Practical Exercise on Neck Accessories-I

7. Practical Exercise on Neck Accessories-II

8. Practical Exercise on Earrings-I

9. Practical Exercise on Earrings-II

Deliverables- 5Bags (Purse, clutches, handbags, sling Bags, Scarfs,) 2 Neck Accessories,   2 Earings

Unit -II

10. Practical Exercise on Head accessories

11. Practical Exercise on Footwear

12. Practical Exercise on Hand Accessories

Deliverables-All above mentioned articles with design sheet

End Term (70 Marks)

Complete Syllabus

References:

1. The Encyclopedia of needle crafts, Gandenton Lucinda R.
2. Stone, Peter, The oriental rug lexicon, Thames and Hudson, 1997
3. Jill, Blake, Cushion & Covers, Graficomo, S.
4. .Macramé Pattern Book: Includes Over 70 Knots and Small Repeat Patterns plus Projects

Fashion Forecasting (LAB)

Course Outcome:

1. To sensitize /orient the textile and clothing SME's to the concept of visual Merchandising
2. To explore the components of display and skills to make proper arrangement in such a way to increase the sale of unsought goods

Unit-I

1) Demand forecasting - Search any 5 types of present latest garment style
2) Observe & study future forecasting any one garment with detailing of silhouette, color, texture, fabric etc.
3) Selection theme-based forecasting
4) Research theme
5) Market Research (casual, formal, party, leisure) 2 board each
6) Inspiration board
7) Mood board
8) Work on textures
9) Collect swatches & making the detailing board
10) Design development sheets –10 Final sheets

Unit -II

1) Costume Designing evaluation
2) small costume collection with your class examine ,your family, neighbors, markets
3) Examine them for construction methods and design details
4) These designs can be used as inspiration for forecasting project
5) Costing range
6) Make final sketches
7) Color forecasting - Make Pantone color chart using color schemes
8) Make unique color combination with prints sample
9) Analyzes long term forecasting color
10) Create display for theme using mannequins and backdrop

Deliverables-10 Design sheet

Essential Readings:

1. Lawson, Bryan, How Designers Think: The Design Process Demystified, Rutledge, 2006.
2. McKelvey, Kathryn, Munslow, Janine, Fashion Design: Process, Innovation and
3. Mendelsohn, L. B., Trend Forecasting with Inter market Analysis: Predicting Global Markets with Technical Analysis, John Wiley & Sons Inc., New Jersey, 2013.

References:

1. Porter, A, W., Elements of Design – Space, Davis Publications, 1987.
2. Stone, Terry Lee, Managing the Design Process - Concept Development: An Essential Manual for the Working Designer, Rockport Publishers, 2010.

Garment construction-II (Lab)

Course Outcome::
1. To impart knowledge of drafting and construction of clothing.
2. To enable students to understand adaptation techniques of various style features to basic• garments.

Unit 1
 Development of basic blocks: men's bodice, women "bodice

 Unit 2
Dart manipulation techniques on women's wear.

 Unit 3

 2 Style features-Yoke, pocket design and its variations for women's clothing.

 Unit 4

Designing and stitching of jackets with style variations (1 garments).

Unit 5

Designing and stitching of women's clothing using dart manipulation techniques and yoke   design (2 garments)

Deliverables- 3 Garments Women Jacket, Men'd Bodice Block, Yoke garments
End Term (70 Marks) garment with the help of dart manipulation techniques

Complete Syllabus

Mode of Display- Jv E- Bazaar

Essential Readings:

- Reader's, Digest, (1997) Complete Guide to Sewing, The Reader's Digest Associations (Canada) Ltd. Montreal, Pleasantville, New York.
- Relis. Nurie& Strauss Gail, (1997), Sewing for Fashion Design, IInd Edition, Published by Prentichile Hall.
- Janace E. Bubonia. (2012) Apparel production terms and processes, Fairchild Books, New York.
- Kallal, Mary Jo, (1985) Clothing Construction, Mc Millan Publishing Company, New   York.

Textile Theory &Testing (theory)
Course Outcome:

1. **To enable the students to design and create dyed & printed material**
2. **2. To make students understand an in depth study of the role of designer in tune with industry as well as market requirement**

Unit -I

1. Introduction to Dyeing & Printing
2. Principal classes of natural and synthetic dyes.
3. Study of Resist Dyed Textiles with reference to: Historical significance, Centers of production, styles, color, dyes, motifs and Techniques:
- Resist dyed yarns – Patola of Gujarat, Ikat of Orrisa and Pochampalli of Andhra Pradesh
- Resist dyed fabrics – Bandhani of Rajasthan and Gujarat.
4. Study of Hand Printed Textile with reference to: Historical significance, Centers of production, styles, color, dyes, motifs and techniques:
- Dabu &Sanganeri printing of Rajasthan
- Bagh Printing of Madhya Pradesh
- Ajrakh of Gujarat

Unit -II

5. Difference between Dyeing and Printing
6. Introduction to different colour fastness and their testing methods.
7. Introduction to Textile finishes and its classification
8. Various defects in Printing and their remedies.
9. Bleaching ,Calendaring, embossing, Singening, Napping, Stiffening, Tentering, Shrinkage Control, Mercerization, Crease Resistant

Textile Theory &Testing (Lab)
Unit -I
1. Practical Exercise on Block Printing
2. Practical Exercise on Stencil Printing
3. Practical Exercise on Screen Printing
4. Practical Exercise on natural Dyeing
5. Practical Exercise on Tie & Dye
6. Practical Exercise on Batik
7. Practical Exercise on spray printing

Deliverables- 1 home furnishing range /2 garments based on different dyeing techniques Report on Printing, Difference in Dyeing and Printing sheet and final work, Development of desired products

End Term (70 Marks)
Complete Syllabus
Essential Readings:

- Das, S. (2010). Performance of Home Textiles. Cambridge: Woodhead Publishing India Pvt. Ltd.
- Fishburn, A. (1988). Soft Furnishings for the Bed Room. London: BT Batsford Ltd.
- Parikh, A., Robertson, D., Lane, T., Hilliard, E. & Paine, M. (1998). The Ultimate Home Design Source Book. London: Conran Octopus Ltd.
- Meller (2003). Textile Designs. London: Thames and Hudson

Computer Application in Fashion –III

Course Outcome:

1. **To acquaint students with Computer Aided Designing.**
2. **To impart the skills of fashion designing through Corel Draw & Photoshop**

UNIT –I
Lab Experiment:
1. Practical Exercise on introduction to corel draw
2. Practical Exercise on changing canvas size.
3. Practical Exercise on Freehand Pen Tool
4. Practical Exercise on **Motif Development:** Traditional Indian (State wise)
5. Practical Exercise on **Motif Development**: Naturalized
6. Practical Exercise on **Motif Development:** Geometrical
7. Practical Exercise on **Motif Development**: Abstract

Growth of Motif: Enlarging and Reducing
  o **Repeats** :
  o Straight, Drop, Brick
  o Mirrored: Vertically and horizontally
  o Directional: One way, two ways, Multi & Non-directional
Layout:
  o Allover
  o Ogee
  o Border
  o Stripes
UNIT –II
Lab Experiment: (Practical 1.5Credit) (Practice 0.7Credit) (D&T 0.4Credits)
1. Practical exercise on 10 ½ female croqui (Front, back, side, 3/4)
 (0.2 Practical) (0.1 Practice)
2. Practical exercise on 12 ½ female croqui (Front, back, side, 3/4)
 (0.2 Practical) (0.1 Practice)
(0.2 Practical) (0.1 Practice)
3. Practical exercise on Stylization of nude figures (0.2 Practical) (0.1 Practice)
4. Practical exercise on different print (0.2 Practical)
5. Practical exercise on fabric effect (0.2 Practical) (0.1 Practice)
6. Practical exercise on silhouette (0.2 Practical) (0.1 Practice)
7. Practical exercise on dress draping on croqui (0.2 Practical) (0.1 Practice)
Deliverables- 20 sheets for female croqui, Stylized figure (silhouette, color, texture and prints), dress draping
Suggested Readings::
Photoshop- Software
Essential Readings:

- Dayley & Dayley B. (2012), Adobe Photoshope CS6 Bible: The comprehensive tutorial resource, Eiley India.
- Hurue, R. (2016), Fashion and Textile Design with Photoshop and Illustrator.London: Bloomsburry Publishing.
- Lazear. S.M. (2010), Adobe Photoshope for Fashion Design. New Jersey: Pearson Prentice Hall

SEMESTER V

1. OCCUPATIONAL APPARELS
2. MEN'S WEAR RANGE DEVELOPMENT
3. DRAPING TECHNIQUES
4. VISUAL MERCHANDISING
5. TEXTILE & GARMENT QUALITY ANALYSIS ASSURANCE (THEORY)
6. COMPUTER APPLICATION IN FASHION –IV

Occupational Apparels (lab)

Course Outcome:
The course aims to understand required features in clothes for specific end uses which impart knowledge about ways to incorporate desired features in a garment and to know special garment construction procedures for functional clothing.

Unit-I   (15 Marks)
Students will work on three products and will design their two variations of each product
1. Medical staff (Physician, surgeon, Physiotherapists & Nursing staff/ Compounder/ I.P.D Patient's uniform)
2. Para Medical staff (lab technician, Medicine dispenser)
3. Chef
4. Engineer (Civil & Mechanical) w
5. Civil uniform (Military & Army)
6. Fire extinguisher costume.
7. Biblical costume
Deliverables-7 Design sheet & 2 garment on occupation wise (Engineer, Para Medical staff, Civil uniform, Fire extinguisher costume

Unit-II   (15 Marks)
8. Hairdresser Gown Cape Cloth
9. Yoga costume
10. Pregnant lady dress
11. Obese (waist coat, trouser, skirt)
12. Sports & gym wear
13. Hospital accessories (Mattress, curtain, Bed-sheet & pillows, Patient's examination table cover)

Deliverables-6 Design sheet & 2 garment on occupation wise (Hairdresser Gown Cape Cloth, Yoga costume, Pregnant lady dress, Sports & gym wear
End Term (70 Marks)

Complete Syllabus

1. Reader's, Digest., Complete Guide to Sewing, The Reader's Digest Associations (Canada) Ltd. Montreal, Pleasantville, New York.
2. Kallal, Mary Jo, Clothing Construction, Mc Millan Publishing Company, New York 1985
3. Relis, Nurie& Jaffe, Hilde., Draping for Fashion Design, Prentice Hall, Carerrand Design, New Jersy,1993

References:

1. Penelope, Cream., The Complete Book of Sewing - A Practical Step by Step Guide to Sewing Techniques, ADK Publishing Book, New York ,1996
2. Jacob, Thomas Anna., The Art of Sewing UBSPD Publishers Distributors Ltd. New Delhi
3. Armstrong, J., Draping for Fashion Design, Fairchild Publication , New York, 2004

Men's Wear Range Development (lab)

1. To Understand different types of Accessories Board types of trims for men's wear.
2. To understand the technicalities involved in creating   men's wear.
 3. To enhance their skills related to stitching and develop understanding related to different men garments.

Unit-I   (15 Marks)

Introduction to Men's Wear Range Development, Types of Garment for Men's, Process of Designing Formal, Casual, Traditional, Indo-western wear & Western Men's wear, Types of Trims uses in Men's wear, Types of Accessories uses with different types of men's wear garment.

Lab Experiment
1. Practical exercise on Designing Traditional design types of fabric sample board for Men's wear garment
2. Practical exercise on designing Indo-western design types of fabric sample board for Men's wear garment.
3. Practical exercise on Designing Western design types of fabric sample board for Men's wear garment.
4. Practical exercise on Designing Traditional design types of fabric sample board for Men's wear garment.
5. Practical exercise on Designing different types of trims sample board for Men's wear garment.
6. Practical exercise on Designing different types of accessories board for Men's wear garment.
7. Practical exercise on Designing Mood board for Traditional wear garment for men's
8. Practical exercise on Designing Mood board for Indo western wear garment for men's.
9. Practical exercise on Range development of Formal garment for men's wear by sketch.
10. Practical exercise on Range development of Casual garment for men's wear by sketch.
11. Practical exercise on Range development of Traditional garment for men's wear by sketch.

   Deliverables-2 design sheet ,2 Drafting & 2 Garment of casual & Formal wear for men

   ### Unit-II

1. Practical exercise on Range development of Indo western garment for men's wear by sketch.
2. Practical exercise on Range development of Western garment for men's wear by sketch.
3. Practical exercise on Drafting of Formal and Casual men's wear garment
4. Practical exercise on Drafting of Traditional wears for men's wear garment.
5. Practical exercise on Drafting of Indo-western & Western for men's wear garment.
6. Practical exercise on construction of Formal wear men's garment
7. Practical exercise on construction of Casual wear garment
8. Practical exercise on construction of Traditional wear men's garment
9. Practical exercise on construction of Indo-western wear men's garment
10. Practical exercise on construction of western wear men's garment.

   Deliverables-2 design sheet ,2 Drafting & 2 Garment of Traditional & party Wear for men

 End Term (70 Marks)

Complete Syllabus

1. Reader's, Digest., Complete Guide to Sewing, The Reader's Digest Associations (Canada) Ltd. Montreal, Pleasantville, New York.
2. Kallal, Mary Jo, Clothing Construction, Mc Millan Publishing Company, New York 1985
3. Relis, Nurie& Jaffe, Hilde., Draping for Fashion Design, Prentice Hall, Carerr and Design, New Jersy,1993

References:

1. Penelope, Cream., The Complete Book of Sewing - A Practical Step by Step Guide to Sewing Techniques, ADK Publishing Book, New York ,1996
2. Jacob, Thomas Anna., The Art of Sewing UBSPD Publishers Distributors Ltd. New Delhi
3. Armstrong, J., Draping for Fashion Design, Fairchild Publication , New York, 2004

Draping Techniques (Lab)

Course Outcome::

1. To acquaint students with the techniques of draping of fabrics.
2. To design and construct garments using the principles of draping.

Unit-1
Lab Experiment:
1. Practical Exercise on Introduction to draping
2. Practical Exercise on draping Terminology
3. Practical Exercise on Dummy preparation
4. Practical Exercise on Muslin preparation
6. Practical Exercise on Front Bodice Block
7. Practical Exercise on back Bodice Block
8. Practical exercise on Dart Manipulation
9. Practical Exercise on Single dart series
10. Practical Exercise on construction all pattern
Deliverables- 5 Draping sample with stitching Front, Back, single dart, double dart,
Unit II   (15 Marks)
11. Practical Exercise on Skirt & its variations
12. Practical Exercise on single dart skirt
13. Practical Exercise on double dart skirt
14. Practical Exercise on dart manipulation
15. Practical Exercise on Gathered skirt
16. Practical Exercise on Flared
17. Practical exercise on Skirts with yokes
Deliverables- Draping sample with stitching Skirt, Single, Double dart, Gathered, Flared and drap garment using above technique.
End Term (70 Marks)
Complete Syllabus
Mode of Display- Jv E Bazaar

Readings:

1. Jaffe. Draping for Fashion Design, Prentice Hall Ltd., London.
2. Armstrong, H Joseph., (2000). Draping for Apparel Design, Fairchild, New York
3. Cooklin, Gerry. Pattern grading for children's, women's, men's clothes Design of   sizing, Oxford B.S.P. Professional Book, London.
4. Goulboum, M. (1971) Introducing pattern cutting, grading and modeling. Batsford publication.

References:

1. Crawford, C.A., The Art of Fashion Draping, Fairchild Publications, New York.
2. Hillhouse, M.S. and Mansfield, E.A., Dress Design- Draping and Flat Pattern, London.
3. Sheldon, Maratha Gene., Design through draping, USA Burgers Publishing Company.
4. Minott, J., (1978). Fitting Commercial patterns, Minnesota Burgess, Minneapolis.
5. Mee, J. and Prudy, M. (1987) Modelling on the stand. Oxford: BPS Professional Books.

Visual Merchandising (Theory)
Course Outcome:

1. **To impart knowledge of merchandising in apparel industry.**
2. **To develop an insight into the fashion market among the students.**

UNIT I
❖ **Visual merchandising and Display Basics**
1. Visual merchandising – meaning, concept
2. Functions of Visual Merchandising
3. Components of Visual Merchandising
4. Colour and Texture
5. Line and Composition
6. Shape and forms
❖ Elements of Visual Merchandising
1. Storefront
2. Store layout
3. Store interior
4. Interior displays
Deliverables-Report on Visual merchandising, Store Layout, Evaluation aDepartment Layout

UNIT II
Display Equipments/ Components
- Themes and schemes
- Mannequins
- Alternative to the Mannequins
- Dressing the three dimensional form
- Fixtures
- Visual Merchandising and Dressing Fixtures
- Furniture as props
- Lighting
- Sound Usage
- Graphics and Signage
- Flooring & Ceiling & Lighting
Merchandise Planning
1. Visual Merchandising & Planning:
2. Visual Merchandising and the Changing Face of Retail
3. Trends in Visual Merchandising in India

Deliverables-Report on Importance of Store Design, Visual Communication
End Term (70 Marks)
Complete Syllabus

Essential Reads
1. Martin M. Pegler, Visual Merchandising and Display , Edition 5, Fairchild Publication.
2. Diamond, Jay &Ellen, Contemporary Visual Merchandising and Environmental, Pearson Prentice Hall, Fourth Edition
3. Greg M. Gorman – ST, Visual Merchandising and Store Design Workbook, Publications (1996)
4. Tony Morgan, Visual Merchandising, Laurence King Publishing, 2008
References:
1. Nirupama, Pundir, Fashion Design-Today and Tomorrow, Mittal publications, New Delhi, 2007.
2. CrossCulturalManagement,ShobanaMadhavan,OxfordUniPress,2014

Textile & Garment Quality Analysis Assurance (Theory)
Course Outcome:

1. **Carry out inspection and grading of fabric.**
2. **Apply requisite test for ensuring fabric quality.**
3. **Measuring garments and identifying finishing defects.**

Unit-I   (15 Marks)
1. Introduction -Quality Analysis Assurance
2. What is quality? Why quality is important?
3. Inspection -Raw material inspection, In process inspection, Final inspection
4. How much to inspect
5. Definitions of fabric defects.
6. British standards of interest to garment manufacturers.
7. ISO standards of interests to garment manufacturers.

Deliverables- Report on Quality, ISO standards, British standards
Unit-II   (15 Marks)
1. Textile Testing & Product Evaluation,
2. Care labelling of Apparel and textiles.
3. Washing, Rubbing, Ironing, Properties
4. Course Outcome: evaluation of fabric hand
5. Quality cost,
6. cost sheet
7. Quality management

Deliverables- Report on Textile Testing & Product Evaluation, Quality cost,
End Term (70 Marks)
Complete Syllabus

1. Kincade, Doris, H., Sewn Product Quality- A Management Perspective, Pearson Prentice Hall, New Jersey, London, 2008
2. Mehta,P, Bhardwaj, S.K., Managing Quality in the Apparel Industry, New Age International Ltd. Publisher, New Delhi
3. Das S., Quality Characterization of Apparel, Wood Head Publishing Ltd., 2009
4. Singh A.K. Quality Evaluation of Textiles, NITRA, Ghaziabad
5. Sara. J. Kadolph, Quality Assurance for Textiles and Apparel, Fairchild Publication, 1998
6. Booth, J.E, Principle of Textile Testing, Butterworth's. 1986

References:

1. Janace, E., Bubonia, Apparel Quality: A guide to evaluating sewn products, Bloomsbury Publishing Inc. 2014
2. Chuter, A.J., Introduction to Clothing Management, Blackwell Science, London. 1995

Computer Application in Fashion –IV
Course Outcome:

1. **To acquaint students with Computer Aided Designing.**
2. **To impart the skills of fashion designing through Corel Draw**

UNIT –I

Lab Experiment:

1. Practical Exercise on introduction to CorelDraw

2. Practical Exercise on changing canvas size.

3. Practical Exercise on Freehand Pen Tool

4. Practical Exercise on handbags

5. Practical Exercise on footwear

6. Practical Exercise on Jewellery

7. Practical Exercise on headgears.

UNIT –II

Lab Experiment:

1. Practical exercise on CD covers of fashion shows, music CD's

2. Practical exercise on Visiting cards

3. Practical exercise on Posters

4. Practical exercise on brochures for different occupation: Business, designer, caterers, photographer

5. Practical exercise on Thematic backgrounds like corporate/ Board meeting room, hotel lounge, teller desk,

party hall, beach, classroom etc.

6. Practical exercise on handbags

Deliverables- 15 sheets for creating fashion accessories like handbags, footwear, Jewelry, headgears, cd cover, Visiting cards and brochures, Posters andThematic backgrounds

Photoshop- Software
Essential Readings:

- Dayley & Dayley B. (2012), Adobe Photoshope CS6 Bible: The comprehensive tutorial resource, Eiley India.
- Hurue, R. (2016), Fashion and Textile Design with Photoshop and Illustrator. London: Blooms burry Publishing.

SEMESTER VI

1. GARMENT PRICING AND TRADE DOCUMENTATION
2. APPAREL PRODUCTION MANAGEMENT
3. DIGITAL PORTFOLIO DESIGN
4. FASHION RESEARCH METHODOLOGY
5. COMPUTER APPLICATION IN FASHION –V

Garment Pricing and Trade documentation (THEORY)

1. To acquaint students with different markets and their strategies

2. To give knowledge about Retail and financial strategy of merchandising management.3

. To give knowledge about documentation about export/trading

UNIT -I   (15 Marks)

Merchandise management-introduction, Course Outcome:, role of product management in retail business, fashion merchandising, merchandising planning Merchandising pricing- concept of pricing, pricing strategies Managing store operations-introduction, the retail personnel management process, financial strategy of merchandise management, setting financial Course Outcome:s Merchandise purchasing system-purchasing system for staple merchandise, merchandise for single store retailer, chain retailer, Retail promotion Contemporary issues in retail merchandising.

Deliverables- Merchandise management & fashion merchandising

UNIT II   (15 Marks)

Introduction to International Trade, Introduction to Apparel Industry**,** The business of international trade, Trade barriers, Trade Policy, WTO International Marketing, International Marketing Environment , International marketing channels, Export Business, Import Business, Export Import Procedure, Import Documentation.

Sample coasting, Export Documentation, Import Documentation, Methods of International Payments**,** Export Finance, Export Incentives, Export Promotion Measures, Foreign Trade Policy of India-2015-2020

Deliverables-Report on Export Documentation, Import Documentation
End Term (70 Marks)

Complete Syllabus

References:

1. International trade and Export management Cherunilam, Francis Himalaya Publication, Mumbai (1998) ISBN: 978-8184883060

2. Exim Policy input Output norms – Duty exemption Scheme Jain, R.K. Centax publication pvt. Ltd. New Delhi(April 2003 Fourth Edition.)

3. Hand Book Of Import And Export Procedures Govt. Of India Govt. Of India

Apparel Production management (THEORY)

Course Outcome:

1. To impart knowledge about clothing industry , Department of clothing Industry ,Manufacturing Techniques, Quality control's

2. To enable students to understand Retail Management

UNIT -I   (15 Marks)

The clothing industry-structure of the clothing industry, Sectors of clothing industry, Product types and organization, Principle of management

The organization of a clothing factory-

-Design department, -Marketing department, -Finance Department, Purchase Department, Production Department, -Operations Department

Manufacturing Design

-Cutting Room-Fusing Design, Sewing Design, Pressing Design, Production Design, Warehousing

Production Engineering, Principle of Quality control

Deliverables- Manufacturing Design, Engineering & Quality control

UNIT -II   (15 Marks)

Introduction to Retailing-Course Outcome:, meaning of retailing, definition of retailing, importance of retailing, challenges facing Indian retail, classification of retailers.

Retailing environment & consumer buying behavior,

retail segmentation, meaning and benefits of market segmentation, criteria of evaluating market segments, types of market, market targeting, customer profile Retail-introduction, Course Outcome's, retail mix environment, forces in micro environment, forces in macro environment. Retail strategy- introduction, Course Outcome:

definition, Strategies for the retailers, Retail strategic planning process,

visual merchandising Retail organization & management-introduction, Course Outcome:, principles of Retail organization, retail organization structure

Deliverables- Report on Retailing environment & consumer buying behavior, Retail strategic

End Term (70 Marks)

References:
1.Rajesh Bheda "Managing Productivity in the Apparel Industry" CBS Publishers & Distributors (2006)
2.Helen Joseph Armstrong "Pattern Making for Fashion Design", Dorling Kindersley India Pvt.Ltd.(2009)
3.Mary Mathews, "Practical clothing construction" Thomson & co., madras, 1974.
4. Jacob Solinger., "Apparel Manufacturing Handbook", Vann strand Reinhold Company(1980).
5.Herold Carr and Barbara Iatham "The Design of clothing

Digital Portfolio Design (lab)

Course Outcome:

1. **To provide exposure towards various craft and textiles.**
2. **To enhance the skill of students in designing and product development.**

UNIT -I
  Selection of themes for the collection- Development of storyboard, Client's board,
  Presentation sheet, Specs sheet, Cost sheet for the same.

Lab Experiment:
1. Practical Exercise on story board.
2. Practical Exercise on Client's board.
3. Practical Exercise on Presentation sheet.
4. Practical Exercise on spec sheet.
5. Practical Exercise on cost sheet
6. Practical Exercise on theme presentation.
Deliverables- Compilation of work and upload it on Behance.
UNIT -I I
Selection of one theme for the execution of the collection (selection by internal mentors). Making of toils
(muslin pattern) for the selected collection.
Execution of collection.

Lab Experiment:
1. Practical Exercise on Selection of one theme
2. Practical Exercise on Making of toils
3. Practical Exercise on execution of the collection
4. Practical Exercise on presentation of theme.
Presentation & Feed backs.
-Co-ordinate accessories
-Final collection
-Client Presentation using CAD
5. Practical Exercise on presentation & feedbacks
6. Practical Exercise on prepare co-ordinate accessories
7. Practical Exercise on final collection.
8. Practical Exercise on prepare co-ordinate accessories
9. Practical Exercise on Client Presentation using CAD
Deliverables- 2 Dress4sheet of client Board, theme, 1 Making of toils, 1 prepare co-ordinate accessories
End Term (70 Marks)

Complete Syllabus

References:
1. Creating Your Digital Portfolio: The Essential Guide to Showcasing Your Design Work
2. The Graphic Designer's Guide to Portfolio Design, 3rd Edition

Fashion Research Methodology (THEORY)

Course Outcome:
- **To help students develop the skills needed in conducting a research.**

UNIT -I

Research Methodology: An Introduction

1. Meaning of Research,

2. Course Outcome: of Research in fashion industry,

3. Motivation in Research,

4. Types of Research process in fashion industry,

5. Research Approaches followed by the designers,

6. Significant of Research in the field of fashion,

7. Difference between research methods and methodology in the area of designing fashion,

8. Research and Scientific methods,

UNIT II

9. Importance of knowing how research is done,

10. Research Process, Criteria of Good research,

11. Problems encountered by researchers in Indian fashion industry and designers .

12. Defining the Research Problem

13. What is research problem in fashion merchandising, selecting the problem and necessities of defining the research problem in fashion industry, Techniques involving in defining the problem.

14. Methods of Data Collection in fashion research

15. Define Primary data and secondary data collection process in fashion industry , define observation method and interview method .

Deliverables:- Report on Research process in fashion industry

Research Methodology (Practical)

Course Outcome:

- **To help students develop the skills needed in conducting a research.**
- **To introduce students to the skills in report writing.**

UNIT I:

The following topics will be covered:

1. Research theory
2. Measurement of information
3. Defining the research
4. Review of literature
5. Methods and procedures of conducting research: sample
6. Methodology procedure
7. Quantitative design: experimental and survey research
8. Method of analysis
9. Results
10. Conclusions, implications & recommendations for further study
11. Writing and communicating research

The report would consist of:

12. Title of the research
13. Introduction
14. Methodology
15. Result and discussion
16. Recommendations
17. Summary and conclusions

Essential Readings:

1. Ahuja ,Ram., Research methods, Rawat Publications, Jaipur, 2001, 2003
2. Kothari, C.R., Research methodology-methods & techniques. New age International Publishers, New Delhi 2007, 2015
3. Gupta S.P., Statistical Methods, Sultan Chand & Sons, New Delhi 1997, 2003, 2004

References:

1. Sancheti & Kapoor., Statistics, Sultan Chand and Sons, New Delhi.
2. Badarkar, P.L. and Wilkinson T.S. (2000), Methodology and Techniques of Social Research, Himalaya Publishing House, Mumbai

COMPUTER APPLICATION IN FASHION –V

Course Outcome:
- To acquaint students with Computer Aided Designing.
- To impart the skills of fashion designing through Corel Draw.

UNIT – I

1. Introduction to Computer aided design softwares for design, Illustration and patternmaking.
2. Introduction to design softwares (adobe Illustrator) and their interface and tools.
3. Introduction to FONTS and their usage.
4. Use and function of various editing/effects tools of Photoshop.

UNIT – II

5. Introduce students to CAD softwares for pattern making, maker making, Grading, Digitizing.
6. Introduction to digitizing and grading on the software.
7. Lay out of pattern for cutting and marker making for efficient fabric consumption.

End Term (70 Marks)
Complete Syllabus
References:
1. Groover MP and E.W.Zinimmers, CAD/CAM computer aided design and manufacture, prentice hall, India 1984.

SEMESTER VII

1. GREEN FASHION
2. FASHION MARKETING
3. TEXTILE DESIGN
4. WORLD TEXTILE AND CONSERVATION
5. APPAREL COSTING
6. FASHION EVOLUTION

GREEN FASHION (THEORY)

Course Outcome::

1. To enable students awareness of importance of designing for sustainability
2. To provide knowledge of current sustainable technologies, materials and design innovation

UNIT I:
Green Fashion- Introduction
1. Origin of Green Fashion movement
2. Definition of Green Fashion & Related Terminologies (Organic Fashion, Up cycle, Eco- Fashion, Ethical Fashion, Sustainable Fashion, Fast Fashion, Slow Fashion) green conduct
3. Organizations and Forums working for Green Fashion

Green Fashion- Materials
1. Fibers used for Green Clothing- Organic Cotton, Wool, Soy, Hemp, Pina, Nettle, Tencel
2. Fabrics used for Green Clothing- Natural, Synthetic and Regenerated

UNIT II:
Green Fashion- Processes
o Processes used for production of Green Clothing:
o Low chemical bleach and dye, color without dyeing, natural dyes, enzyme Design
o Minimum waste in cut and sew
o Disposal of Clothing (Refashion and RecyCouture)

UNIT II:
Designer's, Celebrities and Brands working for Green Fashion
o International Designers(Mark Morris, Andrew Sorensen, Elena Gracia) and Brands (Ethitcus, Hidesign)of Green Fashion
o National Designers(Swati Argade, Anita Dongre, Samant Chouhan) and Brands(Bhu:Sattva, Do u speak green, Fab India, Mother Earth, Samatana) of Green Fashion
Green Fashion and Carbon Footprints
o Effect of Green Fashion on Consumers: fair labour issues
o Emerging ethical issues due to change in fashion
o Effect of Green Fashion on environment (Resources/energy conservation and Green house gases)

Essential Readings:
1. Kate Fletcher & Lynda Grose, Fashion and Sustainability, Design for change, Laurence king publishing Ltd, London, 2011.
2. Safia Minney, Naked Fashion: The New Sustainable Fashion Revolution, Published by New internationalist, 2011.
3. Thames & Hudson, The Sustainable Fashion Handbook, Sandy black published 2012.

4. Janet Hethorn& Connie Ulasewicz, Sustainable fashion: Why Now? A Conversation exploring Issues, Practices and Possibilities, Bloomsbury Academic 2012.

References:

1. Sustainable Fashion and Textiles: Design Journeys by Kate Fletcher, 2012.
2. Eco Fashion by Sass Brown, Laurence King Publishing, 2013.
3. Future Fashion White Papers by Earth Pledge, 2013.
4. The Eco-chick Guide To Life by Starre Vartan, 2012.
5. Eco-Chic, The Fashion Paradox by Sandy Black, Black dog Publishers.
6. Green Is The New Black-How To Change The World With Style by Tamsin Blanchard, 2013.

FASHION MARKETING (THEORY)
Course Outcome::
- **To develop an insight into the fashion market among the students.**
- **To provide comprehensive knowledge about marketing mix.**

UNIT I:
Introduction to marketing
1. Marketing: Introduction to marketing, overview of marketing process
2. Introduction, development of fashion market,
3. Fashion market environment and trends in marketing environment.
4. Market research: Understanding Consumer market trend,
5. Overview of market research process and research design

UNIT II:
Introduction to Product
1. Product Decision
2. Concept of product, clarification of product development,
3. Product positioning, segmentation and targeting
4. Product line and product mix
5. Branding, packaging and labeling

UNIT III:
Introduction to Pricing
1. Price decision
2. Factor affecting price determination
   Promotion decision
3. Promotion decision
4. 4Ps of Promotion mix
5. Advertising
6. Personal selling

UNIT IV
RETAIL MARKETING
Retailing: Introduction to Retailing-Course Outcome:, Meaning of retailing,Definition of retailing,Importance of retailing, challenges facing Indian retail,Classification of retailers.Principles of Retail organization, Retail organization structure, Planning and role of Buyer. Retailing environment & consumer buying behavior,

READINGS:
1. Easey, Mike, Fashion Marketing, Blackwell Science Ltd, London 1995.
2. Kotler,P., Marketing Management: Analysis, Planning, Implementation and Control(9th Ed), Prentice Hall, New Delhi 1998.
3. Donnellan, John, Merchandise buying & management, Fairchild publication, New York, 1999.
4. Stone, Elanie & Samples, Jean. A., Fashion Merchandising, McGraw Hill, New York.1985.
REFERENCES:

1. Costantino, Maria, Fashion Marketing and PR, Fashion files, Batsford Ltd., London, 1998.
2. Posner, Marketing Fashion, lavrence K. London 2011

TEXTILE DESIGN (LAB)

Course Outcome::

1. **To learn the process of designing through motif development.**
2. **To foster an understanding of design for developing a product**

UNIT I:

COURSE CONTENT

1. Conversion of shapes from natural to stylized, geometric &abstract

2. Natural shape to be converted to (at least 5) different forms of stylized, geometrical and abstract.

3. Organizing these shapes in a given area to create "Motif"

4. Product development: Conceptualizing theme board/mood board, interpreting theme board in line with element and principle of design

5. Develop one product range on selected theme for each of the following:

- Furnishing for office purpose (sheer, curtain, carpet, upholstery, cushion cover, mats etc.)

- Home Furnishing (curtain, bed sheet, pillow cover, floor covering, quilt etc.

ESSENTIAL READINGS:

1. Phyllis, G. Tortora., Understanding Textile, (2nd Edition), Mc Millan Co. USA 1987.

2. Gul Rajani M.L. and Gupta D: Natural dyes and their application to textiles, IIT Delhi.

3. Yates, M., Textiles: A Handbook of Designers, WW Norton Publishing Company.

4. Prakash., Traditional Indian Motifs, The Design Point, Bombay.

5. Sumathi, G.J. "Elements of Fashion and Apparel Design" New Age International Publishers, New Delhi, 2002.

REFERENCES:

1. Rubin, L.G.,(1976) The World of Fashion, Canfield press publication, Sans Francisco.

2. Meller., Textile Designs, Thames and Hunson Ltd., London.

World textile and conservation (theory)

Course Outcome::

1. **To study the textile traditions of the world.**
2. **To study the important textile arts in their historical perspective.**
3. **To appraise the role of Indian textiles vis-à-vis developments in the world textiles.**
4. **To create awareness and foster appreciation of textile masterpiece of the world.**

UNIT I:
Beginning of the textile industry in ancient civilizations
- Mesopotamia
- Egypt
- Persia
- Greece
- Rome
- China
- India

UNIT II:
Study of masterpieces of world textiles Part I: Structural Designs (With respect to history, construction techniques, styles colors, motifs and centers of production)
- Brocades(China, India, Persia, Byzantium, Spain, Italy and France)
- Tapestries(Greece, Coptic, Europe and Peru)
- Carpets and floor coverings (Middle and Far East)
- Shawls (India, England and France)
- Laces (Europe)
- Linen damasks (Ireland and Belgium)

Study of masterpieces of world textiles Part I: Applies Designs (With respect to history, construction techniques, style colors, motifs and center of production)
- Resist dyed fabrics (India, Indonesia and Japan)
- Printed Textiles (India, France and England)
- Embroidery (China, Persia and England)

UNIT III:
Basic of Conservation
- Principles
- Types-Preventing and Curative
- Factors deteriorating textiles- Light, temperature, humidity, pest and pollution and micro organism
- Restoration

Collection Maintenance
- Work space and Equipment, housekeeping, Checking and Monitoring, material and supplies, handling, packing, unpacking, moving, rolling, labeling and cleaning

Storage and display
- General requirement for storage
- Types- Flat, rolled, Framed and Mounted for Textiles
- Garments-Boxes, hanged
- General requirements for display
- Showcases and galleries
- Frames

o Mannequins
o Hangers and other supports
o Accessories

ESSENTIAL READINGS:
1. Ginsburg, Illustrated History of Textiles, Studio Editions Ltd. London 1995
2. Lennard Frances, Ewer, Patricia, Textile Conservator's Manual on advance practices Alsevie, N.D, 2011
3. Harris, Jennifer (ED),(1993) Textiles-5000 Years of Textiles, London, British Museum Press
4. Gillow John and Sentence Bryan (1993) World Textiles, A Bulfinch Press Book, London
5. Shenai V.A. History of Textile Design, Sevak Publication, Mumbai, 1992

REFERENCES:
1. Kadolph S., Quality Assurance of Textile & Apparel, Fairchild Publications, New York, 1998
2. Ames, The Kashmiri Shawls, Wood Bridge, Suffolk Antique Collector's Club Ltd.
3. Harvey J.B. Traditional Textile of Central Asia, Thames & Hudson Ltd. London, 1997
4. Coss, Making Rugs, Diamond Books, London

Apparel Costing
Course Outcome:
- Outline the elements of a basic cost sheet of a garment.
- Describe cost plus method of pricing the garments.
- Describe marginal cost pricing method.
- Describe Standard costing, Pricing method, backward and target pricing method.

Unit 1
Cost accounting: Classification of cost elements- direct and indirect. Determination of factory cost, administration cost and sales cost of an apparel product. Manufacturing cost account statement - preparation and analysis, cost behavior patterns – fixed, variable, semi variable. Calculations related to job order costing and process costing. **Accounting for factory overhead:** Capacity level concepts, production and service departments, indirect costs, over and under applied overhead.

Unit 2
Cost volume profit analysis: Break-even analysis, Contribution margin, variable, cost ratio, marginal income. Sales mix by garment style, effect of volume change, price/volume analysis.
Standard Costing:
Variance analysis, setting cost standards, price variance analysis for material, labor and overheads. Determination of standard cost for weaving, knitting and processing cost of woven/knitted fabrics. Fabric cost – stripe/ checked, printed and embroidery and special finished goods.
Determining pricing of apparels: Price elasticity of demand and supply, Sample costing-marginal revenue and marginal cost. Assortment order planning -cost determination, size and color wise men's, women's and children's wears.

Unit 3
Pricing methods: Cost plus pricing methods / full cost pricing, conversion cost pricing, differential cost pricing; variable cost pricing, direct cost pricing. Derivation of cost of apparel products – woven / knits. CM, CMT cost analysis for various styles. Activity based costing, Cost analysis for various styles of garments. FOB/CIF/C&F pricing of apparels.
Budgeting process: Budgeting principles for the apparel industry, fixed vs. flexible budget, master budget, limitations of budgets. Project proposal for setting up a new garment unit.

References
1. Bhabatosh Banerjee, "Cost Accounting", Word Press, 11th Revised Edition, 2001.
2. Blocher, Edward, "Cost Management: A strategic Emphasis", McGraw Hill, London,
Reference Book
   1. Apparel Costing By M. Krishan Kumar
   2. Apparel Costing: Andrea Kennedy (Author), Andrea Reyes (Author), Francesco Venezia (Author)

FASHION EVOLUTION (PRACTICAL)

Course Outcome :-

1. To introduce the major fashion capitals and analyse the consumer market and buying habits that affect styles and trends.
2. To define the major elements, historical, cultural, social and economic, which influence changes in fashion.
3. To trace the history of mass production and ready-to-wear
4. To recognize the influence of historic dress on contemporary fashion

Unit 1

- Beginning of Couture
- Bell Époque: (1900-1913)
- World War I : (1914- 1919)
- Between the Wars: (1920-1939)
- Roaring twenties (1920-1929)

Unit 2

- Glamour Years (1930-1939)
- War time Utility look: (1940-1946)
- New Look (1947 -1956)
- Mini and Mod (1957 – 1966)
- Anti - fashion (1967 – 1978)

Unit 3

- Power - dressing: (1979 – 1987)
- End of century (1988 – 2000)
- Looks and Designers of 21st Century.

Deliverables: - Sketching of the men and women dresses on croqui according to time period

- Designing men and women dresses according to the current trends taking inspiration from the above mentioned periods
Essential Readings:

1. Black J.A. and Garland M. (1978) A History of Fashion, London, Orbis Publishing Ltd.
2. Blanche P. (1975) History of Costume, New York, Harper and Row
3. Boucher F. (1966) A History of Costume in the West, London, Thames and Hudson
4. Bradley C.(1970) History of World Costume, London, Peter Owen Ltd.

References:

1. Cumming, Valeric (2004) Understanding Fashion History, London, Batsford.
2. Cunnington P. (1970) Costume, Pennsylvania, Dufour Editions Inc.
3. Laver J. (1969) A Conscise History of Costume, London, Thames and Hudson.
4. Lester K. M. (1956) Historic Costume, Chas A Bennett Co. Inc. Illinois.
5. Sara, P. Tomp and Srah H. Fashion Costume and Culture (vol 1) The Ancient World, Thomas Gale.

SEMESTER VIII

Course Outcome:

1. It will enhance student's personal and professional development through hands on skill in the apparel industry.
2. It aims to integrate different skills required for participating in planned, supervised work with a reflection and evaluation process at the end of the internship.
3. It will provide students the opportunity to relate theory holistically to practice and gain valuable experiences for future career.

Industrial Training

- Synopsis work presentation
- Portfolio Presentation (lab)

Course Outcome:s: To develop analytical and problem solving approach among the students. The project work will be research based and the products design in this will be innovative and industry oriented. Student will select their project work by the guide or by mentor according their synopsis.

Deliverables:

The findings of the project work to be submitted in the form of as arrange collection presentation as a exhibition or Fashion Show, PowerPoint presentation, One Article writing based on selected project that saved in a CD, along with project Report   (colored print outs in A4 size)and A3 size Designer Portfolio.

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

Faculty of Education and Methodology
Department of Journalism & Mass Communication

BACHELOR OF JOURNALISM (BA- JOURNALISM)

SESSION – 2022-23

DURATION – 3 YEARS (6 SEMESTERS)

SYLLABUS FOR:
1-3 YEARS

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

PROGRAM DETAIL

Name of Program	-	Bachelor of arts Journalism
Program Code	-	BA. Journalism
Mode of Program	-	Semester
Duration of Program	-	3yrs/ 6 Semester
Total Credits of Program	-	168
Curriculum Type and Medium Choice	-	English

SYLLABUS DETAILS
I SEMESTER

S. No.	Credit	Name of Course
1	10	CONCEPTS OF MASS COMMUNICATION
2	10	INTRODUCTION TO JOURNALISM
3	08	HISTORY OF MEDIA
4	06	ENGLISH COMMUNICATION & SOFT ENGLISH
5	06	COMMUNICATIVE HINDI
6	08	COMPUTER APPLICATION FOR MEDIA
Total	48	

II SEMESTER

S. No.	Credit	Name of Course
1	10	REPORTING AND WRITING FOR MEDIA
2	08	PHOTOGRAPHY AND VIDEOGRAPHY
3	10	ART OF PRINT MEDIA & SOFTWARE SKILLS
4	08	DIGITAL VIDEO & SOUND EDITING
Total	36	

III SEMESTER

S. No.	Credit	Name of Course
1	8	TRADITIONAL MEDIA OF COMMUNICATION
2	8	RADIO JOURNALISM
3	6	PUBLIC RELATION / CORPORATE COMMUNICATION
4	8	WOMEN'S RIGHT AND LAW
5	6	RADIO PRODUTCTION
	6	4 WEEKS INTERNSHIP IN PRINT AND RADIO
Total	42	

IV SEMESTER

S. No.	Credit	Name of Course
1	10	GLOBAL MEDIA
2	8	NEW MEDIA JOURNALISM (WEB JOURNALISM)
3	10	ADVERTISING
4	8	INTRODUCTION TELEVISION JOURNALISM
5	6	TV PRODUCATION
Total	42	

V SEMESTER

S. No.	Credit	Name of Course
1	10	MEDIA LAW AND ETHICS
2	8	FILM APPRECIATION AND STUDIES
3	10	RESEARCH METHODOLOGY
4	8	ADVANCED MEDIA
5	6	8 WEEKS INTERNSHIP
Total	42	

VI SEMESTER

S. No.	Credit	Name of Course
1	10	CONTEMPRORY ISSUES
2	10	TELEVISION PRODUCTION
3	8	DISSERTATION
Total	28	

SYLLABUS DETAILS
PROGRAMME OBJECTIVES

The Bachelor program designed for student desirous of taking up careers in mass media. A thorough grounding will be provided in communication and journalism theories and mass media industry. The syllabus is designed in such a way that the latest developments in the ever-changing media sector can be easily incorporated in classroom teaching.

The objectives of the course are:

1) To hone the journalistic and research skills through practical work, assignments, project reports, seminars, and workshops and to acquaint student with advanced journalism and media practices.
2) To fully acquaint students with the need to maintain an even balance between practical, theoretical and conceptual aspects of media professions and lend them a critical understanding of the communication package as a whole.
3) To offer appropriate grounding in the issues, ideas and challenges of 21st century. There by, broadening the world view of the future media practitioners.
4) To develop multi-tasking skills required in the dynamic multi-media and convergent environment

PROGRAMME OUTCOMES

1. Students will gain in depth knowledge of Reporting, Writing and Multi Media Skills
2. They will be able to develop Critical understanding of debates and discourse about Mass Media, Indian Society, History, Polity, Economy and International Relations
3. They will earn professional skills required for Communication, Promotion, Media Industry and Psychology and Political Campaigning.
4. Students will have a comprehensive understanding of Media Laws and Ethics.
5. Students will have a strong academic orientation for higher studies in the discipline of Journalism and Mass Communication.

I SEMESTER

Objective: Communication forms an integral part of our day to day life. The course deals with features of communication with emphasis on mastering it to achieve effective communication and therefore providing a combined understanding of Mass Communication

1. To introduce the concept of communication to the students.

2. To teach them forms and models of communication.

3. To make them understand the concept and theories of mass communication.

Learning Outcomes

1. Students will learn the concept of communication.

2. They will understand the forms and models of communication.

3. They will understand the concept and theories of mass communication

1. CONCEPTS OF MASS COMMUNICATION

UNIT 1 Understanding Communication: Definitions of communication. Nature, process, functions of communication. Importance of effective communication. Elements. Levels. Communication Models

UNIT 2 Verbal and non-verbal communication Verbal Communication. Barriers in Verbal Communication; Language Non-Verbal behavior as communication; Body communication-Body movement, Facial Communication.

UNIT 3. Mass media: Characteristics and functions of mass communication. Importance of mass communication Mass media – press, radio, TV, web and traditional media
Theories of Communication: Defining theory, Critical theory Normative theory, Evaluating theory Mass communication theory, Marxist theory and neo- Marxism Marshall McLuhan : the Medium is the message

References Books
1. Trenholm, Sarah, Thinking through communication, Allyn and Bacon, Boston.Warren K Agee, Ault, Emery, Introduction to Mass Communication
2. Beebe, Steven A. et al (1996) Interpersonal Communication –Relating to others. Allyn & Bacon.
3. Guffey, Mary Ellen (1998). Essentials of Business Communication. (4th ed.) South Western College Publishers. Ohio.

2. Introduction to Journalism

Course Objectives

1. To introduce the concept and theory of journalism to students.

2. To apprise them of the various ethical concerns in journalism.

3. To make them understand the role of journalism in society.

Learning Outcomes

1. Students will learn the concept and theoretical aspects of journalism.

2. They will understand the relevance of ethics in journalism.

3. It will develop their understanding about the role of journalism in democracy

4. It will also provide an insight into the present issues related to media.

5. The students will get knowledge about the different traditional and modern sources of news.

UNIT- I

Key Concepts of Journalism: Meaning and definitions of news, Elements of news: Proximity, Prominence, Timeliness, Conflict, Progress, Human Interest ,News Values: Accuracy, credibility, Impact
The news process: From event to the audience.
Different sources of news, News agencies in India and abroad: Press Trust of India, UNI,IANS, ANI, United Press International, Associated Press, AFP, Reuters.

UNIT- II
Press Theories: Authoritarian Theory; Libertarian Theory, Social Responsibility Theory; Soviet Media Theory, Development Communication Theory, Democratic Participant Theory

UNIT- III
Types of Journalism: Sports journalism; Business journalism, Investigative journalism; Development journalism, Science and Technology journalism; Film and Lifestyle journalism, Data journalism

UNIT- IV
Journalism and Society: Relation between Journalism and Society, Media as fourth pillar of democracy Role of journalism in democracy, Concept of Journalism: From mission to profession
Ethical Issues in Journalism; Yellow Journalism Contemporary debates and issues relating to media

Suggested Readings:
1. Professional Journalism, MV Kamath, Vikas Publishing House
2. Mass Communication India, Keval J Kumar, Jaico Publishing
3. Journalism - Who, What, When, Where, Why and How, James Glen Stovall, PHI Learning
4. भारत में पत्रकारिता, आलोक मेहता , नेशनल बक ट्रस्ट
5. स्मार्ट रिपोर्टर, शैलेश , डॉ ब्रजमोहन, वाणी प्रकाशन
6. पत्रकारिता- आधार, प्रकार और व्यवहार, ○नेश उपाध्याय, राजस्थान हिन्दी ग्रन्थ अकादमी

3. HISTORY OF MEDIA

Course Objectives: : To provide students a broad view of the evolution of mass media with special emphasis on development of mass media in India.

1 To impart knowledge about role of press in freedom struggle

2 To make students aware about freedom fighter journalists

3 To know about history of Television in India

Learning Outcomes:

1 Students will be able to understand role of press in freedom struggle

 2 Will be able to know glorious past of India press

3 Develop understanding of growth of Television industry

UNIT 1 Pre-Print Era &Print Media: & Radio
Characteristics of oral cultures and communication. Brief history of printing; Growth and development of press in India. Newspaper-types of newspaper-contents. Magazines- characteristics and types. Book as a medium of communication.
Radio as a medium of mass communication- Early years of sound recording industry, telegraphy and wireless. AIR, FM radio, community radio. Contemporary trends in broadcasting. Difference between commercial radio and community radio community radio process.

UNIT 2.Television:
History and development of television in India, Education TV channel in India. Emergence of foreign satellite channels and cable network. Current issues of autonomy, deregulation and DTH. Beats types of news for television ,drama for television ,importance of television , formats, television Journalism .

UNIT 3. Internet & Media Organizations:
The internet and future of mass media. Historical background ,Issues of convergence and new media. Introduction of Press Commission, Press Council, DAVP, INS, ABC, PIB, RNI, Prasar Bharti, Central Board for Certification. Importance of internet

References/Text Books:

1. Joshi Uma, Mass Communication and Media, Anmol Prakashan, 1997.
2. Melvin L, Theories of Mass Communication, Rokeach Longman publication, 1997.
3. Rajan Nalin, 21st Century Journalism in India, Sage publisher, New Delhi, 2011.
Keval J Kumar, Mass communication in India. Mumbai, Jaico publishing, 2002

4. ENGLISH COMMUNICATION & SOFT ENGLISH

Course Objectives

1. To teach and improve the English Grammar of students.

2. To improve their reading and listening skills.

3. To enhance their speaking and writing skills.

Learning Outcomes

1. Students will be able to understand the appropriate use of English Grammar while reading, writing and speaking.

2. Their reading and listening skills will be improved.

3. They will be able to speak and write correctly

UNIT 1. Verb agreement, Tenses, Active and Passive voice, Reported speech, Preposition, Conjunction, Effective sentence conjunction, Synthesis, The sub skills of reading: scanning, skimming, intensive and extensive reading, Answering question on comprehension passage involving all the sub skills of readings, Vocabulary with special emphasis on vocabulary used in journalistic writings; phrasal verbs and idioms.

UNIT 2. Composing and effective paragraph using cohesive devices[Single idea], Persuasive writing, Letter writing [specially business correspondence relevant for media professionals], Applications, official memo and minute book.

UNIT 3 Making an abstract/precise [identifying key ideas], Writing a report [using facts/data/details], Summarizing a report/article/editorial, Letters to the editor, Writing a review [of a book, cultural event] Analyses of language of print, radio and television, Experimentation in written language of media, Changing idiom of spoken language, Five-minute presentation on a given topic, Use of charts, flip charts, flash cards, transparencies permitted, The exercise should be repeated, Final presentation is to be made before external examiner.

References Books :
1. English Communication: Theory and Practice By Dr. Manoj Kumar Garg
2. Sawhney, Panja and Verma eds. English At the Workplace. Macmillan, 2003.
3. Singh R.P., Professional Communication. OUP, 2004.
4. V. Sasikumar, Dutta and Rajeevan, A Course in Listening and Speaking –I Foundation Books, 2005.

5. COMMUNICATIVE HINDI

भाषा,हिन्दी की लिपि एव बोलियों का संक्षिप्त परिचय

शब्दकोष: उपयोग एवं महत्त्व

प्रशासनिक शब्दावली

शब्द एवंवाक्य संरचना

हिन्दी में शब्द संरचना एव प्रयोग: संधि समास उपसर्ग प्रत्यय पर्यायवाची विलोमार्थी अनेकार्थक समूहार्थक शब्द

(केवल व्यावहारिकव्याकरणकेवल परिचयात्मक)

प्रमुख मुहावरों एवं लोकोक्तियों का प्रयोग

प्रिन्ट मिडिया में अनुवाद एवं अनुवाद का महत्व अध्ययन एव सामुहिक चर्चा-हिन्दी समाचार पत्र

सम्पादन एवं सम्पादनकला

References Books :

1. ARIHANT
2. HETU BHARDWAJ
3. RAGHAV PRAKASH

6. COMPUTER APPLICATIONS FOR MEDIA

Course Objectives: The course objective is to acquaint the students with fundamental aspects of computer technology. To explain meaning, uses and characteristics of MS-word, MS-Excel and MS-Power Point. Introduce video editing software's to students.

1. Learn about the major parts of Computer.

2. Student will be able to get Knowledge of major Operating system

3. Understand the theoretical aspect of MS word, Excel and PowerPint. 4. Student will be able to use MS Word

5. Students will be able to use MS Excel and Prepare Power Point Presentation

Learning Outcomes

1. Enhance the knowledge of student's fundamentals of computer and its various applications

2. Explain the functioning of Computer and its various Parts

3. Use windows operating system and create files and folders.

4. Create page in MS word, mail merge documents.

5. To develop expertise in word processing, spreadsheet and presentation skills.

UNIT 1 Word Processing: Word Basics. Menu, commands & Toolbar Advance commands

UNIT 2. Spreadsheet Package: Excel Basics, Menu, commands & Toolbar Advance commands

UNIT 3. Presentation Package: PowerPoint Basics, Menu, commands & Toolbar Advance commands

Introduction to Editing software: Adobe In Design. Adobe Premiere Pro brief introduction of some software related to media field.

References Books:

1. V Rajaraman, Fundamentals of Computers II ed., Prentice-Hall of India (P) Ltd. New Delhi. 1998.
2. Kaye, K Barbaka, J Norman, Medoff, The World Wide Web – A mass communication perspective, Mc Graw Hill Higher Education, New York, 2001.
3. Minasi, Expert guide to Windows 98, BPB publications, 1999.

II SEMESTER

1.–REPORTING AND WRITING FOR MEDIA

Course Objectives: The course seeks to equip students with the skills of writing news reports and introduce them to other types of content in the media, focusing primarily on the print medium. The students will be taken through a series of structured lectures on various aspects of writing for the media and practical sessions where they will be trained to write real news stories based on the events/issues around Jayoti vidyapeeth women's university.

1. To impart understanding of news and reporting
2. To develop skills of reporting
3. To let students know different types of writing
Learning Outcomes:
1. They will know about skills of reporting
2. Students will be able to understand News concepts
3. They will be able to write reports and conduct interview

UNIT 1 Journalism and News: Concept & Definition, Elements, hard and soft news. News values and factors affecting selection of news. Journalistic Values. Reporter and Reporting: Various forms of reporters/Journalist. Function, qualities and responsibilities of a reporter.

UNIT 2. Principles of reporting, structure of news and news-lead. Newsgathering and sources, off the record, embargo, pool reporting and follow up. Reporting Beats: Crime, courts, elections, parliamentary reporting. Civic, rural, cultural and business reporting.

UNIT 3. Importance of reporting other sector like Health, science and technology Reporting. Environmental, travel and tourism, war and development reporting.
News Bureau and special beat ,Functions of news bureau Special beats like embassies and ministries Public sector undertakings reporting Investigative reporting.

REPORTING PRACTICAL

Exercises: Discussion and analysis of news in newspapers, Practical assignment on various reporting beats, Field Visit. The students will be required to submit the work at the end of semester for the assessment.

Refrences Books :
1. Ambrish Saxena, Fundamentals of Reporting and Editing.
2. Any English/Hindi Daily Newspaper reading (**Compulsory**).
3. K M Shrivastava, News Reporting and Editing (English), 2nd Edition.
4. Aggarwal Vir Bala, Essentials of Practical Journalism, Concept Publishing Company, 2006.
5. Inside Reporting: A Practical Guide to the Craft of Journalism (English) 1st Edition by Tim Harrower

2. PHOTOGRAPHY AND VIDEOGRAPHY

Course objective: The course aims at providing students with a broad outlook of the fascinating world of photography, taking them through the birth and development of the medium. The course also introduces key

elements and principle of photography & Videography , photography equipment, visual language and image editing.

1. Introduce the students with process of visual communication and its analysis techniques
2. Make them familiar with various basics of Photography & Videograpgy
3. To introduce the students with technical aspects of the Photography, cameras lens and lighting

Learning Outcomes

1. 1 Understand the Concept of Visual Communication
2. 2 Exercise and practice photography techniques and skills
3. 3 Demonstrate a broad knowledge of Digital Photography

UNIT 1 . Aperture,. Shutter, View finder, Memory (Internal & External) Camera formats – 35mm, medium format, large format, Camera design & its working – simple camera, compact camera, view camera, range, finder & reflex camera TLR &SLR

UNIT 2. Basic Editing with Photoshop Photo essays-photo features Digital Photography & the Web.

UNIT3.1.Lenses – controlling the image.(i) Photographic lenses – prime & zoom lens, angle of view Narrow & Wide Angle Lens),(ii) Aperture, Focal No. & Focal Length, (iii) Depth of focus, Depth of Field and How they work (iv) Lens care, 2 Lens perspective, film speed, flash gun, light meter   3. Exposure(i) Measurement of light – exposure metering system, (ii) Exposure control – relationship between shutter speed and aperture. Camera accessories: Tripod, monopod, filters, Lens hood

References Books :

1. Barnbaum, B., The Art of Photography, 2010. Rocky Nook Inc,
2. Dirck, H. Moments in time, 2004. Focal Press.
3. Hartwig R.L., Basic TV Technology Digital and Analog, 2005, Focal Press.
4. The International Photojournalism Industry: Cultural Production and the Making and Selling of News Pictures by Jonathan Ilan

3. ART OF PRINT MEDIA & SOFTWARE SKILLS

Course Objectives: This course is intended to take the students through the various processes of editing, online editing and editing of various forms of Media contents (edits and middle, special article, column & letter to editor) in a newspaper.

UNIT 1 Introduction to major international and national news paper ,newspapers in Asia, Introduction to main international newspapers in Europe and other countries in India too .

UNIT 2. Introduction of all software related to print media production, Corel draw, what is Photography, difference between still photography and dynamic photos , Importance of photography in print media.

UNIT 3 Present media scenario in Asia, Special reference to SAARC countries, role of media in promoting humanity and peace, Market forces and media and International news flow. Use of Quark express and coral draw latest, Making news, article and feature writing, editorial, advertorial.

REFERENCES
1. Belavadi V., Video production, 2008, Oxford University Press, New Delhi.
2. Lanier, T. and Nichols, C. Filmmaking for Teens: Pulling Off Your Shorts. 2010. Michael Wiese
3. Keval J Kumar, Mass communication in India. Mumbai, Jaico publishing, 2002
4. Print Journalism Charanjit Ahuja Bharat Hiteshi
5. Writing and Editing for print by KV

4. Digital Video & Sound Editing

Objectives: In the course you will find guides for creating, editing and publishing media, as well as links to examples of how to use audio and video in different ways. At the end of each module, we suggest you practice creating audio and video using the methods described. Learning software for print and video. Designing software. They can learn about important of editing.

Learning Outcomes

1. Understand the Using audio and video in teaching
2. : Understand the Producing audio and video
3. Understand the concepts
4. Exercise and practice Audio and video in assessment

UNIT 1. Concept & Objectives of Editing, Software & tools, Continuity & Jerk Enter &Exit in Frame, Title, Credits & Sounds. Sound editing, mixing sound, laying sound tracks, syncing sound and picture. Capturing video. Editing techniques for News, Documentary and Fiction & Ad Film and

UNIT 2. What is video lecture, Types of video lecture, importance of video lecture, how to record video lecture, Editing of video lecture What is interview, types of interview, importance of interview, how to take a good interview, quality of interviewer, editing of interview.

UNIT 3. Picture transitions and their use, Elements of the edit: motivation, information, shot composition sound, camera angle, continuity. Types of the edit, Voice over and sound bytes, dubbing and mixing of so: action edit, screen position edit, form edit, dynamic edit. Dos and don'ts of editing and . Computer hardware for editing, Editing software's: Adobe Premiere Pro.

References/Text Books:
1. Belavadi V., Video production, 2008, Oxford University Press, New Delhi.
2. Lanier, T. and Nichols, C. Filmmaking for Teens: Pulling Off Your Shorts. 2010. Michael Wiese Productions
3. Owens, J. and Millerson, G. Video Production Handbook. 2011. Focal Press

III SEMESTER

1. TRADITIONAL MEDIA OF COMMUNICATION

Course Objectives: Traditional media are an effective and important part of communication system. These are unique in nature, as they resemble the day-to-day life pattern of the rural masses. These media are a source of popular entertainment for the rural audience, in addition to providing instruction and information. Our country has a rich heritage of folk arts, folk dances, folk tales, epics, ballads and plays that can be used for development work. The course will elaborate the Indian traditional media and its social concerns in colonial and post-colonial era of the country.

Learning Outcomes

Students will understand Traditional media

They can learn about Indian folk art, folk dances folk tales

Students will understand source of popular entertainment for the rural audience

UNIT 1 . Definition of Traditional Media
Folk Theatre and Folk Songs, Narrative Form, Religious Discourse, Puppetry, Different forms of traditional media Nature and Scope of Traditional Folk Media,

UNIT 2. The Problem and Advantage of Folk Media, Folk Media and Modern Mass Media, Folk Media and Ritual Communication Traditional Media vs. Digital Media Traditional Media vs Television Social Communication Through Folk Media,

UNIT 3. Traditional Media and Development Issues, Traditional Media and Non-Formal Education, Traditional Media and Socio-Cultural Awareness, Government Policies, Role of NGO's, Role of Voluntary Organizations, Political Environment and Traditional Media Traditional Media vs. new media.

References/Text Books:
1. Chatterji, Roma Speaking with Pictures: Folk Art and the Narrative Tradition in India (Critical Asian Studies); Routledge India, 2012
2. ParmarShyam; Traditional Folk Media in India; Routledge India, 1994
3. Malik, Madhu; Traditional forms of communication and the mass media in India, The University of Michigan, 2008
   Kumar, Keval J; Mass Communication in India, Jaico Publishing House, Mumbai 2000

2. PUBLIC RELATION / CORPORATE COMMUNICATION

Course Objectives: A basic course designed to sensitize students with the creative and management aspects of public relations and Corporate Communication.

1. To introduce the concept of Public Relations to the students.
2. To make them understand the concept of corporate communication and crisis communication. Learning

Outcomes

1. Students will understand the fundamentals of PR .
2. Students will learn the concept of Public Relations and management.
3. They will be apprised of the concepts of corporate communication and crisis communication.

UNIT 1 Public Relations – definition – PR as a communication function – history of PR – growth of PR in India, PR, publicity, propaganda and public opinion – PR as a management function. PR (PRSI code of ethics).
Interface of PR with various management disciplines (human resources and
Development, finance, marketing, management services, planning and development, etc.)– PR in industry (Public Sector, Private Sector and MNCs)-PR in Central and State Governments.

UNIT 2. Stages of PR – planning – implementation – research – evaluation – PR practitioners and media relations – press conference – press releases – other PR tools .Communication with publics – internal and external – community relations – employee relations; PR in India – public and private sectors; PR counseling. PR agencies; PR and advertising – PR for media institutions, Share holder relations – dealer relations; PR for hospitals – PR for charitable institutions; defense PR; PR for NGOs; PR for political parties; crisis management – Case studies.

UNIT 3. PR research – techniques – PR and law – PR and new technology – Code of ethics for PR– international PR – professional organizations of PR – emerging trends in PR. Public Relation and Corporate Communication Evolution and history of public relations –PR and allied disciplines (Publicity, propaganda, public affairs, lobbying, opinion building etc.).Symmetrical and Asymmetrical theories of PR. Writing for PR: Internal and External Publics. Writing for media

References/Text Books:

1. Cutlip, Scott M. and allen H. Center, Effective Public Relation. Prentice-Hall, New Jersey, 2003.
2. Broom, Glen and David Dozier, Using Research in Public Relations. Prentice-Hall, New Jersey, 2005.
3. Oxley, Harold, The Principle of Public Relation. Kogan Page, London, 2006.
4. Black, Sam, Practical Public Relation, Universal Book Stall, New Delhi, 1998.

3. **WOMEN'S RIGHT AND LAW**

UNIT 1. Meaning of law ,Constitutional Safeguards for Women, Right to Equality (Art-14),Life & Personal Liberty, Right to Education (Art-21,21-A), Right against Sexual Exploitation (Art-23,24), Constitutional Remedies (Writs-Art-32-35), Participation in Panchayat and Municipalities, Marriage : Conditions, Ceremonies, Registration, Restitution of Conjugal Rights, Judicial Separation, Void & Voidable Marriages, Legitimacy of Children of Void & Voidable Marriages, Punishment of Bigamy, Divorce Common Grounds for Divorce, No Petition for divorce within 1year of marriage, Divorced Person when may marry again,

UNIT 2. Maintenance: Wife, widowed daughter-in-law, Children, Amount of Maintenance , Interim Maintenance, Maintenance Provisions under Cr.IPC, Adoption: Requisites of a valid adoption, Capacity of a male Hindu to take in adoption, Capacity of a female Hindu to take in adoption, Persons capable of giving in adoption, Persons who may be adopted, Effects of Adoption,.

UNIT 3 Indian Penal Code, 1860 Right of Private Defence, Dowry Death, Abetment of Suicide, Cruelty by Husband or Relatives of Husband, Sex Selection & Causing Miscarriage, Hurt & Grievous Hurt, Wrongful Restraint & Confinement, Outraging the modesty of a woman, Kidnapping and Abduction, Offences regarding Prostitution, Rape, Bigamy, Adultery, Domestic Violence, Sex Determination Test -The Medical Termination of Pregnancy Act, 1971, The Pre-Conception and Pre-Natal Diagnostic Techniques Act, 1994, Reproductive Technologies: Meaning, Concept & Challenges of A.I, IVF & Surrogacy, Right of HIV/ AIDS Victims, Introduction to Consumer Protection Act , Tenancy Act, Right to Information Act, Motor Vehicles Act, Intellectual Property Rights, Act & Rules Maternity Benefits Act 1961.

4. RADIO JOURNALISM

Course Objectives:

This course is an exploration of the art of audio journalism. It is an opportunity to explore some of the possibilities of audio as a stand-alone medium and also audio as a combination with other media.

1. To introduce the concept and theory of radio journalism
2. To introduce the importance of radio
3. To introduce the Radio broadcasting

Learning Outcomes:

1. Students will learn the concept and theory of radio journalism
2. Students will learn introduce the importance of radio journalism
3. Students will learn about what news should be on air
4. Students will learn about wave voice modulation
5. It will develop their understanding about radio history

UNIT 1. Introduction to Radio Medium, History and evolution of radio
Organizational structure of radio station Broadcasting guidelines and code of ethics in radio in India
Basic concepts of Audio production, Model of Radio In India, Radio Formats,

UNIT 2. Functionaries of Radio, Audio editing, Broadcast News.
Writing for radio programmes', Legal Regulations & Ethics for Radio In India. Writing for the ear Discussions on formats Voice modulation Presentation skills

UNIT 3 Importance of radio FM Revolution in India, Radio Drama, Docudrama, Radio News, Phone-in, Radio Feature, Radio Talk, Radio Magazine and Researching For Radio ,Difference between commercial and community radio .

References/Text Books:

1. Michael H. Adams, and Kimberly K. Massey, Introduction to Radio: Production and Programming.
2. U.L Baruah, This is All India Radio, Publications Division, Government of India.
3. Annual reports of All India Radio.
4. Richard Aspinall, Radio Programme Production: A Manual for Training.

5. RADIO PRODUCTION PRACTICAL

Course Objectives:

1. To introduce the concept and theory of radio production to students.
2. To apprise them of the various formats used in radio.
3. To make them understand the techniques of radio production.

Learning Outcomes:

1. Students will learn the concept and theory of radio production.
2. They will understand various formats used in radio.
3. It will develop their understanding about techniques of radio production

UNIT 1. Announcement, Radio Interview, Special Audience Programmes, Radio Vox-pop, Outdoor Broadcasting, Radio Jingles, Talk-based Programmes, Radio for Development, Educational Broadcasting, Radio for Entertainment & Radio Reporting Radio Formats: Radio Interview, Special Audience Programmes, Radio Vox-pop, Outdoor Broadcasting, and Radio for Development, Educational Broadcasting, and Radio for Entertainment, Radio Reporting.

UNIT 2.Broadcast Production: Learn techniques in identifying potential radio news stories; and conduct research for news reporting. Conduct research for news reports; plan, carry out, record and edit news interviews for radio.

UNIT 3.Radio News Story Production: Gain the skills required to write radio news scripts, edit audio and voice pre-recorded news stories to a broadcast-quality standard. Learn how to compile radio news stories, and produce podcasts.Radio News Voice Presentation: Develop the ability to carry out live radio crosses from outside of the studio. Students will learn to develop voice for radio to achieve broadcast quality reports.

UNIT 4 Radio News Package Production and Broadcasting: Students gain an understanding of the production techniques and audio editing processes needed to produce three to four-minute news items for radio broadcast. Students also have the option to complete a documentary style feature item of at least 10 minutes in length.

References/Text Books:

1. Richard Aspinall, Radio Programme Production: A Manual for Training.
2. Bob Gilmurray, the Media Student's Guide to Radio Production.
3. K.M. Shrivastava, News Writing for Radio and T.V., Sterling

6. WEEKS INTERNSHIP valuations:
In this semester the student has to undertake 4 weeks

IV SEMESTER

1. GLOBAL MEDIA

Course Objective

1. To learn about the developmental role of global media.
2. To understand the important aspects of development global media theory.
3. To differentiate between the types of communication and understand the role they play in development.

Learning Outcome

1. Students will be able to know about the concept of global media
2. They will learn the importance of communication in development process.
3. Students will know about the various approaches to development
4. Students will know about major international television channels Students will know Concept of media imperialism, Globalization, Global Music, Digital Globalization, Global Sports,

UNIT 1. Introduction to main international newspapers, Major international television channels: BBC, CNN, Major International radio channels:, BBC, Voice of America, Concept of media imperialism, Globalization, Global Music, Digital Globalization, Global Sports,

UNIT 2. Role of media in promoting humanity and peace, The global news agencies, Growing global monopolies and their impact on news Concept of media imperialism,

UNIT 3 Globalization, Global Music, Digital Globalization, Media Moguls and Political Economy, Introduction to major global media companies, The global news agencies, Growing global monopolies and their impact on news, Non-aligned news agencies and their downfall, Challenges to international journalism

References/Text Books:

1. Global Journalism: Understanding World Media Systems
2. Global Media Ethics: Problems and Perspectives
3. Global Journalism: A Survey of the World's Mass Media
4. Global Media and Communication Policy

2. NEW MEDIA JOURNALISM

Course Objectives: This course intends to expose students to the basic features and functionality of internet. How internet incorporates other forms of media, the concept of convergence and Social implications. The course involves only the applications of the new media excluding the technology and programming skills of any nature.

1. To make students aware about NewMedia
2. To improve their understanding about Social Media Platforms
3. To let students know about Web Journalism

Learning Outcomes:

1. They will know about New Media concepts
2. This will understand the forms of Web Journalism .
3. They will learn about different social Media Platform

UNIT 1 What is internet? Salient features and advantage over traditional media; History of internet in India, reach and problem of access; Internet and Knowledge Society; Convergence and Multi-media: Print, radio, TV, internet and Mobile, what is online journalism? :Earlier websites of newspapers, E-books and E-publishing, Status of online journalism today digitalStory telling.

UNIT 2. New Social Media: Dynamics of social media networks, novelty, strength and weakness; New business model: advertisements, marketing and online revenue; Future trends.
Open source journalism: Responding to the audience, Annotative reporting Citizen Journalists
Problem of verification, accuracy and fairness Use of blogs, tweets, etc. for story generation and development protecting copyright Alternative Journalism,

UNIT 3. Ethics of web journalism: Security and privacy concerns; Nature of Cyber crimes and Cyber laws; Need for a national ICT policy. Tools of multimedia journalists; Learn to report, Feature writing for online media: Story idea.

References/Text Books:

1. Rajaraman V, Fundamentals of Computers II ed., Prentice-Hall of India (P) Ltd. New Delhi. 1998.
2. Kaye, Barbaka K.Norman J Medoff, The World Wide Web – A mass communication perspective, Mc Graw Hill Higher Education, New York, 2001.
3. Clemente, Peter, The state of the net – the new frontier. Mc Graw Hill, London, 1998.
4. Tvede et al, Data Broadcasting – the technology and the business. John Wiley and sons Ltd., Singapore, 2012.

3. ADVERTISING

UNIT 1 Nature and scope, Advertising in marketing mix – classification of advertising, various media for advertising, national and global advertising scene, socio-economic effects of advertising. Target audience and audiences for advertising,

UNIT 2. Classification of advertising, Advertising as a tool of marketing, The Marketing Plan, Situation Analysis to The Marketing Mix, Introduction to the concepts ,Market Share, Target Segment, Positioning, Relationship of advertising to the marketing process. Creative Strategy and Brief, Communication Plan,Understanding advertising agencies,

UNIT 3. Types of advertising agencies, Advertising agency structure, Functions of various departments, Market Segmentation, Markets, market segments and niches, Basis for segmenting consumer markets, Targeting strategies, Undifferentiated targeting, Differentiating targeting, Niche targeting, Various positioning strategies. Ad agency management, various specialist departments in an ad agency: (account, planning, account servicing, creative, media planning, HRD, etc.),

REFERENCES
1. Sandage, Fryburger and Rotzoll (l996) Advertising Theory and Practice. AAITBS Publishers
2. Stansfied, Richard: Advertising Managers Handbook. UBBSPD Publications. Third Edition
3. Advertising Handbook: A Reference Annuakon Press TV , Radio and Outdoor Advertising. Different Years ATLANTIS Publications

4. ELECTRONIC MEDIA- TV JOURNALISM

Course Objectives

1. Student will be able to learn to write for television news
2. Introduce the students with basics concepts television reporting
3. Make them familiar with various stages of TV reporting.
4. Make them familiar with reporting techniques.
5. Introduce the students with basics of audio-video editing.

Learning Outcomes
1. Student will be trained in writing for television news
2. Student will be able to understand the basics of Video Camera
3. Understand the process of TV Newsroom.
4. Exercise and practice TV News techniques and skills.
5. Demonstrate a basics of audio-video editing

UNIT 1. Television production: meaning and scope, Various formats of television programs, Types of programmers, Fictional programmers: soap operas, sitcoms, series, films etc. Non-fictional programmers: news, talk show, documentary, reality show etc.

UNIT 2. Video production process, pre production, production, post production, Duties and responsibilities of crew members, Components of video camera, Basic shots and their composition, Lighting equipment and control, Introduction to make up techniques Broadcast Journalism

UNIT 3. News Story Different types of news stories Elements of a news story Single Camera Production Editing News Packaging Planning long format programmers Ideation and Research, Budgeting and ,Crew sizing and Implementation Introduction to the Television Studio Important roles and responsibilities Key personal required for producing a studio based show. Type's studio based shows.

References/Text Books:

1. Zettl. H. (2000).Television Production Handbook. 7thed. New York: Wadsworth.
2. Gerald Millerson (1992). Video Production Handbook. 2nd ed. Oxford: Focal Press
3. Gerald Millerson (1993). Effective TV Production. 3rd ed. Oxford: Focal Press
4. Jarvis, Peter (1998).The Essential TV Director's Handbook. Oxford: Focal Press

5. ELECTRONIC MEDIA – TV PRODUCTION

Course Objectives

1. Introduce the students with basics concepts and principles of Production
2. Student will be able to learn to write for television
3. Make them familiar with various stages of TV Production..
4. Make them familiar with production techniques.
5. Introduce the students with various types of audio-video editing.

Learning Outcomes

1. Student will be trained in writing for television
2. . Student will be able to understand the technical aspect of Video Camera
3. Understand the process of audio-video recording.
4. Exercise and practice TV production techniques and skills.
5. Demonstrate a broad knowledge of audio-video editing.sa

UNIT 1 Television Formats, What is Pre Production and Post Production, People behind TV Production. Equipments for TV Productions, Types of Camera, Vision Mixer, Multi Camera Set Up, Teleprompter,
UNIT 2 Types of Television Programs: News Programs, Social Outreach Programs, Current Affairs Programs, Entertainment Programs, TRP based TV Programs, Marketing of a TV Program, How On Air Talent is hired? Qualities of a TV Presenter

UNIT 3 Video Editing Software's. (Final Cut Pro, Adobe Premiere, Avid, Sony Vegas) Video Special Effects, Terminologies used in Video Editing, How to render files suitable for broadcast, Archiving a Programs, the needs and steps to archive a program for future reference, Program Library.

V SEMESTER

1. MEDIA LAW AND ETHICS

Course Objectives:
 1. To make students aware about laws related to media
2. To improve their understanding about need for free press and challenges.
3. To let students know about media ethics
 Learning Outcomes:
 1. They will know about laws related to Media
2. Will understand about basics of Media Ethics
3. They will learn about current ethical issues and challenges.

UNIT1. Indian constitution - Introduction of Indian Constitution,Fundamental Rights, Fundamental duties, Directive principles, RTI and its importance in print media, Freedom of the press and parliamentary privileges,
UNIT 2. The Indian Penal Code and CrPC. Prasar Bharti Act.,Press Council and Press Commission Sensational and yellow journalism,
UNIT 3. Contempt of Court and its importance in media, Law of defamation and its role in news writing and gathering facts, Intellectual property right, Right to privacy and limitations during news gathering and writing.
Script writing on WRL for JVWU Comics-Jhalki **(झलकी)**

Case Study:
1. PUCL vs. Union of India (Telephone Tapping case) SC AIR 1997.
2. MurliDeora vs. Union of India SC AIR 2002
3. Association for Democratic Reforms vs. U of I SC AIR 2002
4. RomeshThaper vs. State of Madras SC AIR 1959

References/Text Books:
1. BasuDurga Das, Constitutional Law of India, Lexis Nexis, Nagpur, 2008.
2. Brenard Rubin, Questioning Media Ethics, (ed.), New York Prager, 1978.
3. Fink, C. Conrad, Media Ethics, Boston: Allyn& Bacon, 1995.
4. Kashyap C, Subhash, Constitution of India: Review and Reassessment, Universal Law Publishers, 2006.

2. FILM APPRECIATION AND STUDIES

Course objective:
1. To introduce the concept of film studies and documentary.

2. To apprise the students about contemporary trends and debates in films.
3. To teach film and documentary appreciation.
 4. To teach the process of creating a documentary film.

Learning Outcomes:
1. Students will understand the basics of cinema and documentary.
2. Students will learn and understand recent trends in films.
3. They will develop critical understanding of film and documentary.
4. Students will learn to create documentary film

UNIT 1. Introduction to film studies, Modes of film studies, what is film making all about? Evolution of art forms in cinema, Montages vs. misc in scene, New wave cinema, Extension theory, Methods of film production, Corporatization of Indian cinema industry, Ideology of filmmaker, Film analysis.

UNIT 2. Indian cinema history, Current trends, Film Production Various Stages, Scripting, Casting, Rehearsing, Shooting,, Sound Track, Editing, Various types of editing, Production, Publicity, Dubbing, Playback, Re-recording, Cinematography, National Film Policy, FFC, NFDC, Commercial Films, Documentaries, Film Division. DOCUMENTARY FILM

UNIT 3.

Origin of Cinema:
   a. Idea of Moving Image
   b. Lumiere Brothers and Innovation of Cinema
   c. Invention and Advancement of Camera
   d. Film Movement
Film as Art:
   a. Form and Frames
   b. Other Arts and Cinema - Theatre, Painting, Other Traditional Arts
   c. Film Genre
   d. Fiction Films, Short Films, etc.
Indian Cinema:
   a. Early Indian Cinema
   b. Pre-Independence Period and Cinema
   c. Golden Period
   d. Main Stream and Parallel Cinema

References/Text Books: (Latest Publications)
   1. Film History: An Introduction; Kristin Thompson & David Bordwell; McGraw-Hill, London.
   2. Film history: theory and practice; Robert Clyde Allen, Douglas Gomery; the University of California.
   3. Encyclopedia of Indian Cinema; Ashish Rajyadhyaksh; Routledge, London.
   4. Indian Popular Cinema: A Narrative of Cultural Change; K. MotiGokulsing, WimalDissanayake; Trentham Books

3. RESEARCH METHODOLOGY

Course Objectives

1 To introduce students with the basics of media research.

2 Develop a scientific temperament as well as train them to analyze data.

3 To provide students knowledge about essential market research.

Learning Outcomes

1 Students will become able to design and execute a research plan for digital media.

2 Develop their perception on media research.

3 Acquire the knowledge about recent trends in research methodology

UNIT 1. What is Communication Research, Research Methodology. Introduction: Scope of communication research, Types of Research- Survey Research, Content Analysis, historical Research, Experimental Research, Ratings Research, Non-Ratings Research, Field Study,

UNIT 2. Defining the research problem. Data Tabulation, Data analysis-use of various statistical techniques for data analysis ,Data Interpretation Data Analysis - Statistical Analysis – Choosing an appropriate Research Approach**:** Basic & applied, quantitative & qualitative, longitudinal & cross sectional, exploratory, descriptive, analytical & experimental research.

UNIT3. Use of Pre-Programmes Computer packages for Analysis - SPSS, Reporting and presentation; Writing Research Reports, Organization, Use of Graphics & Visual Material. Graphic and tabular representation of data using Word Excel/SPSS; Hypothesis testing: using SPSS for elementary descriptive and inferential statistical analysis; overview of CAQDAS.

Report writing: types and process; bibliography and citation style; plagiarism check

References/Text Books: (Latest Publications)

1. Research Methodology BY Vijay Upagade
2. Research Methodology BY Ranijt singh
3. Media and Communication Research By Klaus Bruhn Jensen
4. Innovative Methods in Media and Communication Research

4. ADVANCED NEW MEDIA

Course Objective
1. This course introduces a student to the basic concepts involved in the use of new media technologies.

2. An overview of internet-based content production and publishing.
3. To enhance their blogging skills.
4. To introduce them about new media and ethics.
5. To help to develop the students their creative kills required in new media.

Learning Outcomes

1. The course will provide a better understanding of new media technologies.
2. A broader view to ethical issues related to new media technology will be gained.
3. The students will be in a better position to work with new media after knowing its ethical concerns.
4. The students will learn how to create a blog and importance of blogging. 5. The students will learn the concept of web writing

Unit-1 KEY CONCEPTS AND THEORY: Defining new media, terminologies and their meanings – Digital media, New media, onlinemediaet.al. Information society and new media; Information society and new media; Computer-mediated-communication (CMC), Networked Society

Unit-2 UNDERSTANDINGVIRTUALCULTURESAND DIGITAL JOURNALISM: Internet and its beginnings; Online communities; User generated content and Web 2.0; Networked Journalism; Alternative Journalism.

Unit-3 DIGITIZATION OF JOURNALISM: Digital archives; New media and ethics; Activism and New Media; Social media in the above context.

Unit-4 OVERVIEW OF WEB WRITING AND DESIGN: Linear and Non-linear writing; Writing Techniques: Linking, using multimedia, storytelling structures. Content strategy and audience analysis; Brief history of Blogging; Creating and promoting a blog.

Texts and References:
• Vincent Miller. Understanding digital culture.SagePublications,2011.
• Siapera,Eugenia.Understandingnewmedia.Sage,2011.Introduction.
• Baym,NancyK.PersonalConnectionsintheDigitalAge.Polity,2010.
• Goldsmith,Jack,andTimWu.2006.WhoControlstheInternet?Illusionsof Borderless World. Oxford University Press US.

VI SEMESTER

1. CONTEMPRORY ISSUES

Course Objectives:
1. To make students know about the architecture of Global Politics.
2. To make them understand the issues and debates of contemporary world order.
3. To let students understand the evolution, features and dynamics of India's Foreign Policy.

Learning Outcomes:
1. Students will be able to imbibe the complexities of New World Order and resistance thereof.
2. Understand how the processesof contemporary issues affect their lives.
3. Would be knowing the architecture and dynamics of India's Foreign Policy

India's Foreign Policy, India's relations with its neighbors especially Pakistan, Sri Lanka, Bangladesh and Nepal, India and NAM, India and SAARC, India and UN, Global Issues: Terrorism and anti-terror measures, Human Rights Issues, Gender Issues, Consumerism

India and Major Concerns: Rapid Urbanization, Major poverty alleviation programs, Food Self-Sufficiency, Indian Industry: An Overview: Disinvestment and BPOs, Indian Sports Scenario, Security Concerns: India as a Nuclear Power, India's Defense, Criminalization of Politics and Naxalites

References/Text Books:

1. Important Contemporary Issue by Mehrishi Rajiv
2. CONTEMPORARY SOCIAL ISSUES IN INDIA Dr. Gajanan S. Futane
3. Reflection on Contemporary Issues by Mr. Paramananda

2. CULTURE AND MEDIA

Course Objective
1. To introduce the basic concepts of Culture and its Identity.

2. To develop an awareness about the cultural variations in communication styles.
3. To make students aware about the cultural shock and become more adaptable in intercultural interactions.

Learning Outcomes
1. Students will learn about the basic components of culture and will become aware about their own cultural identity.
2. Students will be aware about the relationship between culture and communication.
3. Students will understand how categories of cultural values might underlie different behaviours.

UNIT- I Communication and Culture: Communication and Culture, Evolution of Media, Mass media in socialization, Folk Media, Media Content and the real world

UNIT-II Popular Culture: Defining Culture, Media and popular culture-Commodities, Culture and Sub-culture, Popular Texts, Popular Culture Vs People's Culture, Celebrity Industry, Concept of Multicultural society, Pluralism, Minorities

UNIT-III Culture and Power: Culture and Power, Culture and the Image, Culture and TV, Media as Text, Approaches to Media Analysis—Marxist, Semiotics, Sociology, Psychoanalysis, Media and Realism (Class, Caste, Gender, Race, Age)

UNIT-IV Culture and Media: Relationship between Culture and Media, Cultural Reporting, Art and Culture of Rajasthan, Impact of Media on culture. Traditional Media of Rajasthan.

Suggested Readings –
1. Communication and Culture, Tony Schirato, Susan Yell, Sage Publication, New York
2. Culture and Society, Raymond Williams, Columbia University Press
3. Media, Culture and Society: An Introduction, Paul Hodkinson, Sage Publishing, London

3. DESSERTATION

8 WEEKS INTERNSHIP valuations:
In this semester the student has to undertake 12 week Industrial Internship with mid-term progress report after 4 weeks in personal interview.

The end term evaluation will be done through presentation and report submitted by student at the end of Internship in presence of members from industry and academia.

Faculty of Agriculture and Veterinary Science

Department of Food and Biotechnology

SYLLABUS

DURATION –3 YEARS/6 SEMESTER

BACHELOR OF SCIENCE - FOOD NUTRITION & DIETETICS(B. SC. F N & D)

SYLLABUS FOR:

1-3 YEARS

PROGRAM DETAIL

Name of Program	-	Bachelor of Science (B.Sc.)
Program Code	-	B. Sc. FN&D
Mode of Program	-	Semester
Duration of Program	-	3 yrs/ 6 Semester
Total Credits of Program	-	155
Curriculum Type and Medium Choice	-	English

Program Outcomes

Graduates will gain and apply knowledge of Food nutrition and Dietetics concepts to solve problems related to field of Food nutrition and Dietetics. Graduates will be able to decide and apply appropriate tools of Food nutrition and Dietetics for making new food products specific to diets.

Specific Program Outcomes

Apply the knowledge of New emerging Food nutrition and Dietetics world. Student will recognize the importance of Nutrition through life cycles, Public Health nutrition, Community Nutrition and Clinical Nutrition skills so they can be next generation of Indian Food nutrition and Dietetics.

I SEMESTER

S. No.	Credit	Name of Course
1	4	Food & Nutrition
2	3	Fundamentals of nutrition
3	1	Fundamentals of nutrition Lab
4	3	Basics of Biosciences
5	1	Basics of Biosciences Lab
6	3	Introduction to food technology
7	3	Fundamentals of Biological Chemistry
8	1	Fundamentals of Biological Chemistry Lab
9	3	Biomolecules
10	1	Biomolecules Lab
Total	23	

II SEMESTER

S. No.	Credit	Name of Course
1	3	Fundamentals of microbiology
2	1	Fundamentals of microbiology Lab
3	3	Public Health nutrition(T)
4	3	Cell biology
5	1	Cell biology Lab
6	2	Unit operations in Food Industry
7	1	Unit operations in Food Industry Lab
8	3	Nutrition through life cycles
9	1	Nutrition through life cycles Lab
10	3	Fundamentals of Food Science & Technology
11	1	Fundamentals of Food Science & Technology Lab
12	1	Industrial Visit
Total	23	

III SEMESTER

S. No.	Credit	Name of Course
1	3	Metabolism and Bioenergetics
2	1	Metabolism and Bioenergetics Lab
3	3	Basic Dietics
4	1	Basic Dietics**Lab**
5	3	Technology of Milk & Milk Products
6	1	Technology of Milk & Milk Products lab
7	3	Principles of Food Preservation
8	1	Principles of Food Preservation **lab**
9	2	Biostatistics
10	1	Biostatistics **lab**
11	3	Food Microbiology & Safety
12	1	Food Microbiology & Safety **lab**
13	10	Industrial Training (60 Days, after II Sem, during Summer vacation)
Total	33	

IV SEMESTER

S. No.	Credit	Name of Course
1	3	Food Packaging Technology
2	1	Food Packaging Technology Lab
3	3	Food service management
4	3	Human physiology(T)
5	3	Nutritional Biochemistry(T)
6	3	Fruits and Vegetable Processing Technology
7	1	Fruits and Vegetable Processing Technology**lab**
8	4	Minor Project
9	1	Industrial Visit
Total	22	

V SEMESTER

S. No.	Credit	Name of Course
1	3	Food additives and ingredients
2	1	Food additives and ingredients Lab
3	3	Cereal, Pulse & oilseed Technology
4	1	Cereal, Pulse & oilseed Technology **lab**
5	3	Community Nutrition
6	1	Community Nutrition Lab
7	2	Food Storage and Transport
8	3	Food Laws. Standards & Regulations
9	3	Modern Baking & Confectionary Technology
10	1	Modern Baking & Confectionary Technology **lab**
11	10	Industrial Training **(**60 Days, after IV Sem, during Summer vacation**)**
Total	31	

VI SEMESTER

S. No.	Credit	Name of Course
1	3	Food Process Technology
2	1	Food Process Technology Lab
3	3	Sensory Evaluation
4	3	Dietetics and Counseling
5	3	Research Methodology
6	3	Food Business Management
7	3	Food Project Planning and Entrepreneurship
8	3	Clinical Nutrition
9	1	Clinical Nutrition Lab
Total	23	

I SEMESTER

Foods & Nutrition

Credits-4

Objective: To enable students to 1. Understand the importance of food and meaning of nutrition 2. Understand the role of nutrition in human life 3. Increase the ability to overcome deficiency.

UNIT – I Relationship of Food, Nutrition &Health Definitions of food, nutrition and health and inter-relationship between them.Description of basic terms and concepts.Functions of Nutrients, Guidelines for Good Health, RDA, Reference Man and Woman, Factors affecting RDA, Methods for Deriving RDA, Uses of RDA, BMR, Factors affecting BMR.

(1.3 Credit)

UNIT –II Functions of Foods, Nutrient & Source Functions of food. Nutritional aspects of carbohydrates (including glycemic index and load), proteins and fats. Functions of energy and minerals and vitamins and water. Food sources of nutrients. Concept of a balanced diet. Dietaryfibre, its sources and importance.

(1.3 Credit)

UNIT – III RDA & Enhancement of Nutritional Quality Overview of human nutrition requirements (RDA) through the life cycle. Factors affecting bio-availability of nutrients example, nutrient interactions, food components like antinutrients etc. Principles of meal planning. Ways to increase nutritional quality of food such as enrichment, fortification, fermentation and mutual supplementation. Best cooking and processing procedures to reduce cooking losses of nutrients. Common nutritional deficiencies such as PEM, iron, vitamin A, iodine, calcium and vitamin D, zinc etc. Emerging common degenerated disorders.

(1.3 Credit)

Reference Books:

1. Food Science N N. Potter & J Hotchkiss
2. Food Processing and Preservation G Subbalakshmi
3. Food Packaging Technology Handbook NIIR
4. A practical Guide for Implementation of ISO HACCP Sohrab

Fundamentals of Nutrition

Credits-4

Objective: The enable the students to 1. Gain knowledge about basics in nutrition. 2. Acquire knowledge about their functions, RDA, food sources of nutrients.

UNIT-I Introduction to Nutrition Nutritional Status: The relation of good nutrition to normal physical development and sound health. Definitions of the terms –Nutrition, Health, Nutrients, Nutritional status, Malnutrition, RDA, Food Groups, Methods of assessing nutritional status –Population sampling, collection of data on the nutritional adequacy of diet consumes, anthropometric measurements, clinical examination, biochemical assessment. Diet surveysmethods
Energy -Definition of health and nutrition, Definition of calorie and joule, Measurement of calorific values of foods. Basal Metabolic Rate(BMR), Energy needs of the body, Measurement of energy balance of the body. Direct and indirect calorimetry. Calculation of energy requirements. The ideal proportion of calories from protein, carbohydrates and fats.

(1 Credit)

Practical (0.4 Credits)

Sr. no.	Name of practical	Nature
1	Controlling techniques - Weights and measures standard, household measures for raw and cooked food	Practical
2	To develop the concept of portion sizes	Practical
3	To impart basic cooking skills and healthy cooking practices	Practical

UNIT-II Introduction to Nutrients (1-0.3) Functions, dietary sources and clinical manifestations of deficiency/ excess of the following nutrients- Carbohydrates, lipids and proteins, Fat soluble vitamins-A, D, E and K, Water soluble vitamins –thiamin, riboflavin, niacin, pyridoxine, folate, vitamin B12 and vitamin C, Minerals –calcium, iron and iodineMethod of Cooking and Prevent Nutrient Loss-Dry, moist, frying and microwave cooking, Advantages, disadvantages and the effect of various methods of cooking on nutrients, Minimizing nutrient losses.

(1 Credit)

Practical (0.4 credits)

Sr. no.	Name of practical	Nature
1	Food preparation and classifying recipes as good, moderate or poor, sources of specific nutrients	Practical
2	Estimation of calorific value of food	Practical
3	Introduction to meal planning	Practical
4	Use of food exchange list	Practical

UNIT-III Overview of Food Groups Selection, nutritional contribution and changes during cooking of the following food groups- Cereals, Pulses, Fruits and vegetables, Milk & milk products, Eggs, Meat, poultry and fish, Fats and Oils, Processed supplementary foods, Food sanitation in hygiene.

(1 Credit)

Practical (0.2 credits)

Sr. no.	Name of practical	Nature
1	Survey of Amount of Ingredients and Portion Size of the standard Beverages and Milk Based products available in the market	Practical
2	Survey of Amount of Ingredients and Portion Size of the standard cereals and meat preparations available in the market	Practical

Reference Books:

1. PassmoneR.and Eastwood M.A,(1986), "Human Nutrition and Dietetics",English language book Society/Churchill Livingstone,Eigth edition, Hong Kong.
2. Neiman N. Catherine, (1990), "Nutrition",Wm.C. Brown Publishers. USA.

References/Correlation with Ancient Indian Literature:
1. Chhandogya Upanishad (VII. 9)
2. Maitrayani Upanishad (VI. 9)

Basics of Biosciences

Credits-4

Objective: Student will learn concept wise knowledge about diversity in biological systems. This course will describe student about classification, morphology and physiology of Plant and Animal Kingdom. This course helps to buildup concept wise knowledge to understand advanced courses of Food and Biotechnology.

UNIT-I Introduction to biology (1.0-0.4) Diversity in biological systems, Cell biology and cell structure, difference between Prokaryotes & Eukaryotes systems, Five-kingdom classification and General characters, Brief account on Ecology, Morphology, Nutrition, osmosis, Locomotion and Reproduction, useful and harmful effects of Bacteria, Viruses, Algae, Fungi and Protozoans.

(1 Credit)

Practical (0.4 credit)

Sr. no.	Name of practical	Nature
1	To perform gram staining. (i) To prepare gram stain (ii) Staining and observation of bacteria	Practical
2	To study different types of Algae by making their slides. (i) To prepare slide of Algae (ii) Observation of slide	Practical
4	To study slides of Protozoans. (i) To set up of microscope and collection of slides (ii) Observation of protozoan slides -	Practical
5	Study of osmosis by potato osmoscope. (i) Setting up of potato osmoscope (ii) Observation of osmosis -	Practical

UNIT-II Classification and Physiology of Plants (1-0.4) Classification of Plant Kingdom, Concepts of Growth, Meristems, Plant growth regulators, Bacterial & Plant photosynthesis; oxygenic and anoxygenic

photosynthesis; chlorophyll as trapper of solar energy, photosynthetic reaction centres, Hill reaction, PS I & PS II, Photophosphorylation - cyclic & non-cyclic; Dark reaction & CO2 fixation.

(1 Credit)

Practical (0.4 credits)

Sr. no.	Name of practical	Nature
1	To isolate chloroplast from plants.	Practical
	(i) Preparation of reagents	Practical
	(ii) Isolation of chloroplast	Practical
2	Separation of plant pigments through paper chromatography.	Practical
	(i) Preparation of solvents	Practical
	(ii) Separation of pigments	Practical
3	Demonstration of O_2 evolution during photosynthesis.	Practical
	(i) Set up of apparatus	Practical
	(ii) Demonstration of O_2 evolution	Practical
4	Study of distribution of stomata in the upper and lower surface of leaves.	Practical

UNIT-III Classification and Physiology of Animals(1-0.2) Classification of Animal Kingdom, Functions, morphology, growth and Reproduction, economic importance.Phylogeny of Invertebrate & Vertebrate Phyla, Concepts of Species & Ecosystem. Introduction of cell cycle, cell division, Electrolytes, Body fluids.

(1 Credit)

Practical (0.2 credits)

Sr. no.	Name of practical	Nature
1	To study mitosis in onion root tip. (i) Squash preparation (ii) Observation of chromosomes	Practical
2	To study meiosis in grasshopper testis (i) Separation of testis (ii) Making slide and observation	Practical
3	To test the presence of urea in urine. (i) Reagents preparation (ii) Perform test	Practical
4	To detect the presence of sugar in urine/blood sample (i) Reagents preparation (ii) Perform test	Practical
5	To detect the presence of albumin in urine. (i) Reagents preparation (ii) Perform test	Practical

Recommended Text Books:

1. NCERT Textbook for Class 11 Biology
2. NCERT Textbook for Class 12 Biology

Reference Books:

1. Cell and Molecular biology – P.K. Gupta
2. Plant Physiology- H.S. Srivastav
3. Animal Physiology- A.K. Berry

Introduction to Food Technology

Credits-3

Objective: Students will understand about origin of life, unicellular organisms' development, biomolecule structure, molecular interaction and electrophilic reaction. Students will also learn about structure of carbohydrates, classification of carbohydrates, lipid's structure, lipids classification and role of lipids in biological composition.

Unit- I Introduction to food composition Introduction , Food composition & Food group, Introduction Introduction to food science and technology, Food composition Food composition – Carbohydrates, protein, fat, vitamins and minerals water, Food groups Composition and nutritive value of Cereals, Pulses, Legumes, Oil seeds, Fruits, Vegetables, Meat, Fish, Poultry and Milk.

(1 Credit)

Unit –IIIntroduction to food preservation Food preservation -High temperature, low temperature and chemical preservations. Concept of nutrition, Digestion and absorption of nutrients, balanced diet, malnutrition, Packaging-Functions of packaging, types of food packaging materials.

(1 Credit)

Unit III Introduction to role of microbes in food technology Microbiology- Microorganisms important in foods, food contamination, food spoilage, food born diseases, Engineering -Unit operation, principles of heat exchangers, Pasteurizer, refrigerator, freezer and drier.

(1 Credit)

References:

1. Food Science N N. Potter & J Hotchkiss
2. Food Processing and Preservation G Subbalakshmi
3. Food Packaging Technology Handbook NIIR
4. A practical Guide for Implementation of ISO HACCP Sohrab

Fundamentals of Biological Chemistry

Credits-4

Objective: Students will understand about origin of life, unicellular organisms' development, biomolecule structure, molecular interaction and electrophilic reaction. Students will also learn about structure of carbohydrates, classification of carbohydrates, lipid's structure, lipids classification and role of lipids in biological composition.

UNIT-I Origin of life, Origin of amino acids, nucleotides, Urey Miller's expt., Unicellular organism, multicellular organisms. Concept of biomolecules, polymerisation, formation of polymers i.e. proteins, nucleic acids, Molecular interactions, biological functions.Chiral interactions, pH, pK, buffers.Reactionmechanism.Nucleophile, electrophile, Acid base reaction, nucleophilic addition, nucleophilic substitution, electrophilic addition, electrophilic substitution reaction.

(1 Credit)

UNIT-II Carbohydrates: Introduction, biological importance. Definition, Classification, {glyceraldehydes, Simple Aldose, Simple Ketose, D-glucose, Conformation of D glucose], Monosaccharides other than glucose, glyocosidic, bond, disaccharides, polysaccharides [starch, glycogen, peptidoglycan, proteoglycan matrix.

(1 Credit)

Practical (1 credits)

Sr. no.	Name of practical	Nature
1	Test for Carbohydrates	Practical
2	Test for proteins	Practical
3	Test for Lipids	Practical

UNIT-III Lipids: Introduction, Classes, Fatty acids [Physical prop. Chemical prop, Sap value, acid value, iodine number,rancidity. Glycerolipid, Sphingolipid, Lipid derived from isoprene, Behavior of lipid in water, Bile acids, bile salts, plasma lipoproteins, Vesicles, membrane transport.

(1 Credit)

Recommended Text books:
   1. Outlines of Biochemistry: Conn and Stumpf
   2. Principles of Biochemistry: JefforyZubey

Suggested Readings:
   1. Biochemistry: Stryer

Bio-molecules

Credits-4

Objective: Student will learn general account of the chemical nature of living cells including Carbohydrates, Lipids, Protein and Vitamins. These are basic concept wise knowledge from this course will make student able to learn advance knowledge related to Food and Biotechnology.

Unit-I Carbohydrates General account of the chemical nature of living cells. Carbohydrates: Classification (Monosachharides, Di- sachharides and Polysachharides), configurations and conformations, sugar derivatives, structural and storage polysaccharides.

(1 Credit)

Practical (0.3credit)

Sr. no.	Name of practical	Nature
1	To perform Molish test for the qualitative estimation of carbohydrate. (i) Preparation of Molish reagent (ii) Estimation and observation of carbohydrate	Practical
2	To perform Benedict test for the qualitative estimation of carbohydrate. (i) Preparation of Benedict's reagent (ii) Estimation and observation of carbohydrate	Practical
3	To perform Fehling's test for the qualitative estimation of reducing sugar's (i) Preparation of Fehling's reagent (ii) Estimation and observation of carbohydrate	Practical
3	To perform Fehling's test for the qualitative estimation of reducing sugar's (i) Preparation of Fehling's reagent (ii) Estimation and observation of carbohydrate	Practical
4	To perform Barfoed's test for the qualitative estimation of reducing sugar's (i) Preparation of Barfoed's reagent (ii) Estimation and observation of carbohydrate	Practical
5	To perform Inversion of Sucrose: (i) Preparation of reagents for inversion (ii) Estimation of converted sugar by Fehling's reagent.	Practical

Unit-II Proteins Amino acids: General properties, peptide bond, essential and non-essential amino acids. Classification, different levels of protein structure, forces stabilizing protein structure, protein folding, protein modification.

(1 Credit)

Practical (0.3 Credit)

Sr. no.	Name of practical	Nature
1	To perform Ninhydrin test for the qualitative estimation of amino acids. (i) Preparation of Ninhydrin reagent (ii) Estimation and observation of amino acids.	Practical
2	To perform Xanthoproteic test for the qualitative estimation of amino acids. (i) Preparation of Xanthoproteic reagent (ii) Estimation and observation of amino acids.	Practical

3	To perform Millon'stestfor the qualitative estimation of amino acids (Tyrosine, Phenylalanine & Glycine). (i) Preparation of Millon's reagent (ii) Estimation and observation of amino acids.	Practical
4	To perform Lead-Sulfide test for the qualitative estimation of Cysteine and Cystine. (i) Preparation of Lead sulfite reagent (ii) Estimation and observation of amino acids.	Practical
5	To perform Sakaguchitestfor the qualitative estimation of Arginine. (i) Preparation of Sakaguchi reagent (ii) Estimation and observation of amino acids	Practical

Unit- III Lipids and Vitamins Lipids: Classification, properties of lipid aggregates and biological significance. Vitamins: Water and fat soluble vitamins and their deficiency diseases.

(1 Credit)

Practicals (0.4 credit)

Sr. no.	Name of practical	Nature
1	To Estimate the Saponification value of oils. (i) Preparation of reagents. (ii) Determination of Saponification number.	Practical
2	To Estimate the acid value of oils. (i) Preparation of reagents. (ii) Determination of acid value by titration	Practical
3	Determination of Total Lipid Concentration. (i) The preparation of a sample for solvent extraction (ii) Extraction of lipids and its determination.	Practical

Recommended Text Books:

1. Fundamentals of Biochemistry - J.L. Jain , S. Chand publication
2. Fundamentals of Biochemistry - Dr A C Deb

Reference Books:
- Biochemistry- U. Satyanarayana, U. Chakrapani , BOOKS AND ALLIED (P) LTD. (2008)

II SEMESTER

Fundamentals of Microbiology   **Credits-4**

Objective: Student will learn about the basics of microbes; physiology of microbes and their role in agriculture, public health, medicine and industry. With the help of this course, student will able to think and apply microbes with new innovative ideas for betterment in Food and Biotechnology.

Unit- I Introduction-aims and scope Introduction-aims and scope, Role of microbes in agriculture, public health, medicine and industry, Organization of prokaryotic and eukaryotic cells: Structure and function of cell organelles and surface structure and cellular reserve materials; Distinguishing features of various groups of microorganisms: actinomycetes, bacteria, molds, yeasts and algae and their broad classification.

(1 Credit)

Practicals (0.4 credit)

Sr. no.	Name of practical	Nature
1	Purify the given bacterial sample by serial dilution method (iii) To prepare culture media for microorganisms (iv) Growth study of Microorganisms	practical
2	Perform Gram's staining in given bacterial sample (i) Preparation of staining solutions (ii) Microscopic observation and identification	Practical
3	Identify the fungal flora of soil and their microscopic view (i) To prepare culture media for microorganisms (ii) Microscopic examination and identification	Practical
4	Preparation of culture media for algae (i) Media preparation and standard stock preparation (ii) Autoclaving and finalization of media for inoculation	Practical
5	Perform antagonistic activity of micro organisms (i) Culture media preparation, inoculation of 2 different organisms (ii) Observation of result	Practical

Unit-II Characteristics of micro-organisms Characteristics of selected groups of microorganisms including microorganisms of extreme environment, Microbial nutrition and growth-principles of nutrition, growth measurement techniques, effect of environmental and culture parameters on growth, assimilation of nitrogen and sulphur, Isolation and preservation of cultures.

(1 Credit)

Practicals (0.4 credit)

Sr. no.	Name of practical	Nature
1	Isolate the microorganism of extreme environmental condition (i) To prepare culture media for microorganisms (ii) Streaking	practical
2	Study the bacterial growth curve with complete phases (i) Preparation of culture media for microorganisms (ii) Microscopic observation and identification of density of MO	Practical

3	Isolate nitrogen fixating bacteria and their identification
	    (i) To prepare culture media for microorganisms
	    (ii) Staining, Microscopic examination and identification
		Practical

4	Effect of environmental conditions on bacterial growth
	    (i) Media preparation and standard stock preparation
	    (ii) Effect of unusual condition on MO
		Practical

5	Perform the preservation process for bacterial culture
	    (i) Culture media preparation, inoculation
	    (ii) Observation of result after complete duration
		Practical

Unit-III Energy transduction in microbial systems Energy transduction in microbial systems: fermentation, aerobic and anaerobic respiration. Phototrophic microorganisms, Phosphoketolase, Entner-Doudoroff and glyoxalate pathways, Control of microbial growth effect of heat, disinfectants and therapeutic agents, Microbial pathogenicity, Bioassays.

(1 Credit)

Practicals(0.2 credit)

Sr. no.	Name of practical	Nature

1	Study the batch and fed batch culture condition on bacterial growth
	    (i) To prepare culture media for microorganisms
	    (ii) Observation of different density and growth of MO
		practical

2	Isolate the bacterial pigments form cyanobacteria
	    (i) Preparation of culture media for microorganisms
	    (ii) Microscopic observation and identification and isolation of Chl pigment
		Practical

3	Chromatographic evaluation of bacterial pigments
	    (i) To prepare culture media for microorganisms
	    (ii) Chromatographic identification of pigment
		Practical

4	To determine the ability of Microorganisms to degrade and ferment carbohydrates with the production of acid or acid and gas
	    (i) Media preparation and standard stock preparation
	    (ii) Microbial production
		Practical

5	To detect the antibiotic sensitivity on the given culture sample (Antibiotic Sensitivity Test)
	    (i) Culture media preparation, inoculation
	    (ii) Observation of result after complete antimicrobial activity
		Practical

Recommended Text Books:

1. Microbiology – L. M. Prescott
2. A Textbook Of Basic And Applied Microbiology - Aneja K.R.

Recommended Reference Books:

1. Pelczar Microbiology
2. Practical microbiology by SatishGupte
3. Basic practical microbiology a manual – Cuteri

Public Health Nutrition

Credits-3

Objective: To enable students to 1. Understand the causes and consequences of nutrition problems in the society. Be familiar with various approaches nutrition and health. 2. Interventions, programmes and policies.

UNIT – I Introduction to Nutritional deficiency diseases (1-0-0) Etiology, prevalence, clinical features and preventive strategies of—Under-nutrition, Protein energy malnutrition, nutritional anaemias, vitamin A deficiency, iodine deficiency disorders-Over-nutrition –obesity, coronary heart disease, diabetes, Zinc Deficiency, Flurosis.

National Nutrition Policy and Programme -Integrated Child Development Services (ICDS) Scheme, Mid-day Meal Programme (MDMP), National program for prevention of Anaemia, Vitamin A deficiency, Iodine Deficiency Disorders.

(1 Credit)

UNIT – II Assessment of Nutritional Status (1-0-0) Assessment of Nutritional Status- Objectives and importance, Methods of Assessment-a. Direct –clinical signs, nutritional anthropometry, biochemical tests, biophysical tests b. Indirect –Diet surveys, vital statistics.

Nutrition Education- Objectives, principles and scope of nutrition and health education and promotion,Behavior Change Communication.

(1 Credit)

UNIT – III Nutrition for Special Condition (1.0) -Introduction to Nutrition for physical fitness and sport, Feeding problems in children with special needs, Considerations during natural and man-made disasters e.g.- floods, war.-basic guidelines in disaster management

Food Security- Key terms, factors affecting food security, recent concerns Technologies for food and nutrition security.

(1 Credit)

TEXT BOOKS

1. Agarval, A.N.1981: Indian Economy problems of development and planning
2. Shukla, P.K.(1982): Nutritional Problems in India
3.

REFERENCE BOOKS

- Jelliffle, D.B(1968): Child Health in the tropics.
- Ghosh, S(1989): You and your child.
- Misra, S.K. and puri, V.K(1992): Indian Economy
- Thankamma Jacob (1976): Food Adulteration.
- Park, J.E. and Park, K(1994): Text book of Preventive and Social Medicine. 6.Prevention of Food Adulteration Act (1994): Govt of India.

Cell Biology

Credits-4

Objective: This course develops the concepts of Cell biology is about the cell, cell division and its functions. Every living species are composed of a cell. The human body comprises around a billion to trillion cells, which are mainly involved in different specialized functions.

Unit-I Ultra-structure of Plant and animal cell Cell – Shapes, morphology, Cell theory, Cells , Structure-function relationship including organelles and their Biogenesis (e.g., Endoplasmic reticulum, Mitochondria, Chloroplast, Golgi body, nucleus, lysosomes, vacuoles), Membrane structure , Membrane transport, Cytoskeleton, Extracellular matrix , Cell junctions.

(1 Credit)

Practicals (0.5 credit)

Sr. no.	Name of practical	Nature
1	Study of Microscopy: - Simple, Compound, & Phase Contrast Microscope (i) Learn about simple microscope (ii) Learn about compound microscope (iii) Learn about phase contrast microscope	Practical
2	Study of cell organelles by using Models, Charts and Slides. (i) Study of models (ii) Study of charts (iii)Study of slides	Practical
3	To demonstrate osmosis by using potato osmoscope. (i) Setting up of potato osmoscope (ii) Demonstration of osmosis	Practical

Unit-II Brief Idea about cell cycle Cell cycle: different phases of cell cycle (G_1, S- phase, G_2 and M-phase). Regulation of cell cycle: role of cyclins and CDKs, Check points. Mitosis: phases of mitosis (prophase, metaphase, anaphase, telophase and cytokinesis). Significance of mitosis. Meiosis: phases of meiosis and gametogenesis.

(1 Credit)

Practicals(0.5 credit)

Sr. no.	Name of practical	Nature
1	Squash preparation of Onion root tip to study Mitosis. (i) Squash preparation (ii) Making slide (iii) Observation of mitosis	Practical
2	Preparation of polytene chromosome in chironomous larva/fruit fly. (i) Separation of chromosome (ii) Making slide (iii) Observation of chromosomes	Practical
3	Study of meiosis in Grasshopper testis. (i) Separation of testis (ii) Making slide (iii) Observation of meiosis	Practical
4	Learn about cell cycle and Gametogenesis through charts and models	Practice

Unit- III Cell signaling Cell Signaling: different pathways (G-protein mediated, cAMP mediated and tyrosine kinase mediated), secondary messengers. Cell differentiation, program cell death, techniques in Cell biology (microscopy, chromatography, centrifugation and spectroscopy).

(1 Credit)

Recommended Books:
1. Cell and molecular biology by P.K. Gupta
2. Cell biology by C. B. Panwar, Rastogi publication.

Reference books:
1. Molecular Biology of the Cell- Bruce Alberts, Alexander Johnson, Julian Lewis and Martin Raff.
2. The Cell: A Molecular Approach, Sixth Edition by Geoffrey M. Cooper and Robert E. Hausman

Unit Operations in food Industry

Credits-3

Objective: Upon successful completion of this course, students should be able to:
1. Explain basic principles of unit operations and also waste treatment in food industry.
2. Explain the methods and effects of preservation and processing on food product quality.
3. Apply numerical solution to solve problems involved in unit operations of food processing.

UNIT – I Flow, Heat Transfer Principles of fluid flow, heat transfer, heat exchanger, EMC & Water activity, Evaporation, Distillation, Drying, Dehydration; Types of dryers, Material handling equipment; Size reduction, Energy requirement in Size Reduction.

(1 Credit)

Practical (1 Credit)

S. No.	Name of practical	Nature
1	Solvent Extraction (Extraction)	Practice
2	Distilled Water Preparation (Distillation)	Practice
3	Study & Demonstration of Spiral & Planetary Mixers (Mixing)	Practice
4	Sieve Analysis (Sieving)	Practice
5	Study & Demonstration of Ball Mill (Size Reduction)	Practice
6.	Study & Demonstration of Refrigeration System (Refrigeration)	Practice

UNIT – II Separation, Mixing Sieve analysis, Mixing, Kneading, Blending, Homogenization, Size Separation, Sedimentation, Extraction, Leaching, Crystallization, Thermal Processing, Refrigeration principles, Cooling, freezing, thawing of food materials.

(1 Credit)

UNIT – III Mechanical Separation, Grading & Emulsification Absorption and adsorption, Mechanical Cleaning, Grading, Sorting, Filtration, Membranic Separation, Emulsification

(1 Credit)

Recommended Books:
1. Albert Ibarz, Gustavo V. Barbosa-Canovas, Unit Operations in Food Engineering, CRC Press 2010
2. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998
3. R.L. Earle and M.D. Earle, Food Engineering, 1978

Nutrition through Life Cycles

Credits-4

Objective: To enable students to 1.Gain better understanding on the physiological changes and nutrient demands during life cycle. 2. Understand the nutritional requirements and adaptations by the human body through various stages of life cycle. 3. Gain knowledge on the nutritional requirements and planning diets for vulnerable group and special group in the society

Unit- I Basic Concept of Meal Planning Nutrition - Fitness, Athletics & Sports, Food guide - Basic five food groups How to use food guide (according to R.D.A.), Interrelationship between nutrition &health Visible symptoms of goods health, Use of food in body - Digestion, Absorption, transport & utilization. Food groups and concept of balanced diet, Food exchange list, Concept of Dietary Reference Intakes, Factors effecting meal planning and food related behavior, Dietary guidelines for Indians and food pyramid.

(1 Credit)

Unit- II Nutrition during the Adult Years Meal planning for the family, Indian meal patterns - vegetarian & non-vegetarian, Food faddism & the faulty food habits, Nutritive value of common Indian recipes
Nutrition in Pregnancy- Physiological stages of pregnancy, nutritional requirements. food selection, complication of pregnancy, Nutrition during Lactation - Physiology of lactation, nutritional requirements, Nutrition during Adulthood - Nutritional requirements, feeding pattern, Geriatric Nutrition : Factors affecting food intake and nutrient use, nutrient needs, nutrition related problems.

(1 Credit)

Practical (0.5credit)

Sr. no.	Name of practical	Nature
1	Planning and Preparation of One Time Meal for Young adult	Practical
2	Planning and Preparation of One Time Meal for Pregnant and Lactating Women	Practical
3	Planning and Preparation of One Time Meal for Elderly and Old People	Practical

Unit-III Nutrition during Childhood (1.0-0.5) Growth & development, nutritional requirements, breastfeeding, infant formula, introduction of supplementary foods, Nutrition during Early Childhood (Toddler/Preschool)- Growth & nutrient need, nutrition related problems, feeding patterns, Nutrition of School Children- Nutritional requirement, importance of snacks, school lunch, Nutrition during Adolescence - Growth & nutrient needs, food choices, eating habits, factor influencing needs.

(1 Credit)

Practical (0.5credit)

Sr. no.	Name of practical	Nature
1	Planning and Preparation of One Time Meal for Pre-School Child	Practical
2	Planning and Preparation of One Time Meal for School age child	Practical
3	Planning and Preparation of One Time Meal for adolescents	Practical

TEXTBOOKS-

1. Shubangini A Joshi, (1998): Nutrition and Dietetics, Tata McGraw Hill Pub. Co. Ltd., New Delhi.
2. National Institute of Nutrition, (2005): Dietary Guidelines for Indians – A Manual, Hyderabad.
3. Srilakshmi. B, (2005): Dietetics, V Edition, New Age International (P) Ltd, Publishers, Chennai.

REFERENCE BOOKS-

1. Mahan, L.K. and Escott-Stump, S. (2000) Krause's Food, Nutrition and Diet Therapy, 10th Ed.W.B.Saunders Company, London.
2. Williams S.R. (1993): Nutrition and Diet Therapy, 7th Ed. Times Mirror / Mosby College Publishing, St. Louis.
3. Antia F.P, Clinical Dietetics and Nutrition, Oxford University Press.
4. Shills, M.E, Oslon, J.A, Shike, M and Ross, A.C. (1999): Modern Nutrition in Health and Disease, 9th Edition.

Fundamentals of Food Science & Technology

Credits-4

Objective: Students would be able to understand Scope of food processing in India and different areas of food processing. They would be able to understand the processing of different food products like meat and meat products, Fruit and vegetable, milk and milk products and marine products.

UNIT I Food Processing & Packaging and Food Industries Scope of food processing in India; Introduction to food processing, food preservation, food packaging, food drying and dehydration. Important food industries in India; role of Food Science & Technology in national economy.

(1 Credit)

Practical (0.4Credit)

S. No.	Name of practical	Nature
1	Study of Various Processed foods available in the market	Practical
2	Study of Different Methods of Food Preservation	Practical
3	Study of Different types of Drying Techniques	Practical
4	Study of Different types of Packaging Materials	Practical
5	Study of Different Food Industries in India	Practical

UNIT – II Processing of food products Fruit and vegetable processing, processing of meat and meat products, processing of milk and milk products, processing of marine products.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	Processing of Fruits	Practical
2	Processing of Vegetables	Practical
3	Processing of Milk & Milk Products	Practical
4	Processing of Meat Products	Practical
5	Processing of Marine Products	Practical

UNIT – III Unit operations and Food Engineering Unit operations in food industry. Rheology of food.Basic principles of food engineering.Introduction to various food processing equipments.

(1 Credit)

Practical (0.2 Credits)

S. No.	Name of practical	Nature
1	Study of Various Food Processing Equipments	Practical
2	Study of Unit operations in Food Industry	Practical
3	Study of Food Rheology	Practical

Recommended Books:
1. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998
2. Vickie A. Vaclavik, Elizabeth W. Christian, Essentials of Food Science, Springer, 2008
3. B. Srilakshmi, Food Science, New Age International, 2007

III SEMESTER

Metabolism and Bioenergetics

Credits-4

Objective: This course deals with characteristics, properties and biological significance of the biomolecules of life. In depth knowledge of the energetic and regulation of different metabolic processes in microorganisms.

UNIT – I Bioenergetics and Carbohydrate metabolism Molecular basis of life, proteins, classification, structure, function, dynamics, specificity and techniques; Protein configuration, conformation, conformational analysis, Ramachandran's map and energy calculations; Helix to coil transition of proteins. Carbohydrates and lipids,classification, structure and function, membrane fluidity. Structural proteins, actin, myosin and muscle contraction.

(1 Credit)

Practicals (0.4 credits)

Sr. no.	Name of practical	Nature
1.	To understand the principle and operation of Spectrophotometer	Practical
2.	Determination of reducing sugars by Nelson- Somogyi's method 1. Preparation of reagents 2. To perform the assay 3. Observation and Calculations	practical
3.	Determination of starch in plant Tissue 1. Preparation of reagents 2. To perform the assay 3. Observation and Calculations	Practical
4.	Determination of Glycogen in Liver 1. Preparation of reagents 2. To perform the assay **3.** Observation and calculations	Practical

UNIT – II Lipid Metabolism Nucleic acids, nomenclature, properties and techniques, backbone torsional angle and sugar conformation. Enzymes, introduction, classification, kinetics and Catalysis.Metabolism, basic concepts and design.

(1 Credit)

Practical (0.4 credit)

Sr. no.	Name of practical	Nature
1	Extraction and estimation of total lipid content in the given sample of oilseed 1. Preparation of reagents and extraction of total lipids 2. Estimation of total lipids	Practical
2	Separation and identification of various lipids by Column Chromatography 1. Preparation of reagents 2. Separation of Lipids 3. Identification of lipids	Practical
3	Separation of various Components in different lipid fractions by thin layer chromatography 1. Preparation of reagents 2. Separation of various components	Practical

| 4 | Estimation of Cholesterol content by Liebermann- Burchard method
   1. Preparation of reagents
   2. To perform the assay
   3. Observation and Calculations | Practical |

UNIT – III Protein and Nucleic acid metabolism Carbohydrates and lipids,classification, structure and function.Metabolism of carbohydrates, glycolysis, citric acid cycle and oxidative phosphorylation, lipid, amino acid and nucleotide metabolism..Integration of metabolism, coordinated control and regulation.Photosynthesis, chloroplast, dark and light reactions.

(1 Credit)

Practical (0.2 credit)

Sr. no.	Name of practical	Nature
1.	Estimation of protein by Lowry's method 1. Preparation of reagents 2. To Perform the assay 3. Observation and Calculations	Practical
2.	Determination of Protein by Bradford method 1. Preparation of reagents 2. To perform the assay and calculation for the concentration of protein	Practical

Recommended text Books:
1. A.L. Lehninger, D.L. Nelson, M.M. Cox, " Principles of Boichemistry", 3rd Edn., Worth Publishers.

Reference Books:
1. Biochemistry by Voet and Voet
2. Biochemistry by U. Staynarayan
3. Biochemistry by LubertStryer. W. H. Freeman & Company, NY.
4. G. Zubay, "Biochemistry", 4th Edn.,McGrawhill Publishers.

References/Correlation with Ancient Indian Literature:

- AsvalayanaGrhya Sutra II 7
  https://www.australiancouncilofhinduclergy.com/uploads/5/5/4/9/5549439/asvalayana-eng.pdf
- Atharveda http://www.sacred-texts.com/hin/av.htm
- Yajurveda http://vedicheritage.gov.in/science/

Basic Dietetics

Credits-4

Objective: To enables the students to 1. Know the metabolic condition of the life style related diseases. 2. Explain the risk factors for degenerative diseases and toward the management of the several disease conditions.

UNIT I Introduction to Dietetics (1 -0.5) Role of dietician-The hospital & community, Basic concepts of diet therapy, Principles of diet therapy & therapeutic nutrition for changing needs, Adaptation of normal diet for changing needs, Routine Hospital Diets - Regular diet, light diet, full liquid and tube feeding, Modification of Diet - Febrile conditions, infections and surgical conditions, Feeding the Patients - Psychology of feeding the patient, assessment of patient needs, Feeding Infants & children - problems in feeding children in hospitals. (1 Credit)

Practical (0.5credit)

S. No.	Name of Practical	Nature
1	Standardization of common food preparations	Practical
2	Planning and Calculation of Normal Diet	Practical
3	Preparation of Normal Diet	Practical
4	Planning and Calculation of Liquid Diet	Practical
5	Preparation of Liquid Diet	Practical
6	Planning and Calculation of Soft Diet	Practical
7	Preparation of Soft Diet	Practical
8	High and low Calorie Diet	Practical

UNIT II Nutritional Management for Disorders (1-0.5) Diets for Gastro - Intestinal Disorders- Constipation, Diarrhoea, Peptic ulcer, Diet for Renal Diseases - Nephritis, Nephrotic Syndrome and Renal Failure, Diet for Obesity and Cardiovascular Disorders, Diet for Diabetes Mellitus, Diet & Nutrition in Kidney Diseases, Nutrition in Cancer. (1 Credit)

Practical (0.5 Credits)

S. No.	Name of practical	Nature
1.	Bland diet for peptic ulcer	Practical
2.	Diet for Diabetes mellitus	Practical
3.	Diet for Hypertension and Atherosclerosis	Practical
4.	Diet for Nephritis and Nephrotic syndrome	Practical
5.	Low and medium cost diets for P.E.M., Anemia & vitamin A	Practical

UNIT III Nutritional Management for Disorders Nutrition in Immune system Dysfunction- AIDS & Allergy, Nutrition Support in Metabolic Disorders, Nutrition in Burns and Surgery, Nutrition - Addictive Behavior in Annorexia Nervosa, Bulimia and alcoholism, Nutrient drug interaction, Nutrition & Diet Clinics - Patients Checkup and Dietary Counseling, Educating the Patient and follow up . (1 Credit)

Recommended Text Books:
1. Mahan LK, Escott-Stump S (2000). Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd.
2. Shils ME, Olson, JA, Shike, M, Ross, AC (1999). Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins.

Reference Books:
1. Escott-Stump S (1998). Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
2. Garrow JS, James WPT, Ralph A (2000). Human Nutrition and Dietetics, 10th, Edition, Churchill Livingstone.
3. Williams SR (1993). Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.

Technology of Milk & Milk Products

Credits-4

Objective: Students would be able to understand the basics of milk and milk processing. Understand the importance of dairy, the techniques that can be used for preservation and manufacturing of various value added milk products. Understand the processing of various milk products like butter, ghee, flavored milk, yoghurt and shrikhand, ice cream, cheese, channa, paneer, condensed milk and milk powder.

UNIT – I Composition of Milk Milk: Definition, composition, and Present milk industry scenario and its future, Physical and chemical properties, Nutritive value of milk and milk products and its national and international standards. Practices related to procurement and transportation of milk, soy milk manufacturing and processing, Types of Milk- standardized milk, recombined milk, toned milk and double toned milk.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	To determine the titratable acidity of milk	Practical
2	Determination of Physico- chemical properties of Milk	Practical
3	To test the quality of milk using COB test	Practical

UNIT – II Testing & Microbiology of Milk Testing the authenticity of Milk & Milk Products: Detection of foreign fats, milk of other species, microbiology of milk, Spoilage of Milk, Good Hygeine Practices in Milk Processing: Principal Hazards, cleaning and disinfection agents and processes. Reception, cream separation.

(1 Credit)

Practical (0.4Credit)

S. No.	Name of practical	Nature
1	To conduct the platform test of milk sampling of dairy products	Practical
2	Detection of common adulterants in Milk	Practical
3	Separation and standardization of Milk	Practical

UNIT – III Processing of Milk & Milk Products Milk Processing: Clarification,Homogenization, Pasteurization, Sterilization of Milk, UHT Milk, Aseptic Packaging and Storage. Technology of Traditional Indian Dairy products, Technology of fat rich dairy products like Cream, Butter, ghee and margarine, Technology of fermented milk and probiotic milk based products, flavored milk.

(1 Credit)

Practical (0.2 Credits)

S. No.	Name of practical	Nature
1	Preparation of Flavored Milk	Practical
2	Preparation of traditional Indian dairy products	Practical
3	Preparation of white and salted butter and ghee	Practical

Recommended Text Books:
1. Many N.S. Shadakshasawamy M, Food Facts and Principles, New Age International, 2004.

Reference Books:
1. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998
2. Vickie A. Vaclavik, Elizabeth W. Christian, Essentials of Food Science, Springer, 2008

References/Correlation with Ancient Indian Literature:
- Prasna Upanishad 1-5https://esamskriti.com/Prasnopanishad-TNS-Complete.pdf
- Brihadaranyaka Upanishad (V.12)https://www.swami-krishnananda.org/brdup-audio.html
- Chhandogya Upanishad (VII. 26)https://www.chinfo.org/images/userupload/Reflections/16_Bhumaiva_Sukham_Chand_7.pdf

Principles of Food Preservation

Credits-4

Objective: This course deals with the techniques and principles involved in processing and preserving the various food products. The student will be able to apply the principles and methods involved in the processing of different foods and discuss their processing. They would understand important application of various preservation methods in food industries.

UNIT – I Water Activity & Moisture Removal Principles of food preservation, Asepsis, removal of microorganisms, Maintenance of anaerobic conditions, Methods of food preservation. Water Activity and Food Preservation, Free and Bound water, Effect of water activity on quality of food constituents during storage (proteins, lipids and carbohydrates) Effect on physical and nutritional quality, Water activity and food stability, Effect of packaging material on water activity.

(1 Credit)

Practical (0.4Credit)

S. No.	Name of practical	Nature
1	Measurement of water activity in Fresh fruits	Practical
2	Measurement of water activity in dehydrated fruits - Raisins, figs (dry), dried vegetable	Practical
3	Measurement of water activity in milk powder/instant coffee powder	Practical
4	Effect of packaging material on water activity	Practical
5	To see Osmosis in Raisins	Practical

UNIT – II Controlled Atmospheric Storage & Freezing (1-0.7) Preservation through temperature reduction, Storage of food at chilling temperature - behaviour, Refrigeration Controlled Atmosphere Storage (CAS), Modified Atmosphere Storage (MAS), Chilling defects Freezing-principles, fundamental aspects of freezing Freezing process-technological spects Freezing damage-osmotic damage, solute Structural damage Preservation by use of High Temperatures, Concentration of food Evaporation Freeze concentration, Membrane process for concentration.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	Low Temperature processing (i) Processed food / fruits / vegetables Banana, Sapota, Potato, Leafy Vegetables (ii) Processing of fruits and vegetables and storage at low temperature using various packaging material (after giving appropriate pre-treatment)	Practical
2	Frozen food Processing (i) Fruit pulp processing, packaging and freezing (using various packaging material and methods)	Practical
3	High Temperature processing (i) Experiments on Blanching of vegetables (ii) Experiments on sterilization	Practical
4	Experiments on concentration	Practical
5	Quality analysis of the products during storage, storage studies	Practical

UNIT – III Dehydration of foods & Preservation Techniques Dehydration of food (Food Preservation through water removal), Transport of water in foods, Different methods of dehydration, Cabinet drying, sun / solar drying, Osmo drying, Osmo-vac drying, micro-vac drying, vacuum drying,. Recent advances in dehydration of food. Freeze drying: Introduction, principles, process and preservation. Preservation using high Sugar-Jam, Jellies, Squashes, syrups, marmalades, cordials, concentrate etc. Salting preservation Use of common salt,

principle, process Fish salting Pickling Pickle salting (sauerkraut, cucumber, Kim chi) Vegetable salting Acidified - brined pickles (vegetables-onion, garlic).

(1 Credit)

Practical (0.2 Credit)

S. No.	Name of practical	Nature
1	Dehydration : Cereal/Pulse based products (including comparative studies on packaging) Banana powder, Potato and Sweet Potato powder appropriate pre-treatment)	Practical
2	Sugar based products: Jam making	Practical
3	Sugar based products – Jelly making	Practical
4	Salting: Salting of vegetables, Brining / preservation of vegetables in brine using variouscontainers	Practical
5	Effect of chemical preservatives (Benzoate, So2, salts (KMS, NaMs)	Practical

Recommended Text Books:

1. GiridhariLal, G.S. Siddappa and G.L. Tondon Preservation of Fruits and Vegetables, CFTRI, ICAR, New Delhi -12.
2. Diane M. Barrett, LaszloSomogyi, HoshahalliRamaswamyProcessingFruits,lledition,ScienceandTechnology,CRCPress

Reference Books:

1. B. Sivasankar, Food Processing & Preservation, PHI Learning Private Limited, 2002
2. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998

References/Correlation with Ancient Indian Literature:

- Maitrayani Upanishad (VI. 9)https://www.yousigma.com/religionandphilosophy/maitrayani.html
- Arunika Upanishad (Taitt. Up. II. 2)https://archive.org/stream/EssentialsOfUpanishadsKashyapR.L.SAKSI/Essentials%20of%20Upanishads%20%20Kashyap%20R.L.%20SAKSI_djvu.txt
- (MahabharathaAnu.65-46)https://sanskritdocuments.org/mirrors/mahabharata/mbhK/mahabharata-k-01-sa.html
- Atharva Veda (2-13-1).http://www.sacred-texts.com/hin/av/index.htm

Biostatistics

Credits-4

Objective: Students will learn about basic of biostatistics, classification of data, tabulatin of data, correlation coefficient, regression, measures of dispersion and measures of central tendancy. This course will give students knowledge about vital statistics, life tables, sampling techniques, hypothesis testing, large sample test, small sample test and analysis of variance.

UNIT-I Classification and Tabulation of Data Classification and tabulation of data ,Frequency distribution Histogram , Frequency polygon and frequency curve ,Cumulative frequency curves, Measures of central tendency: arithmetic mean geometric mean harmonic mean median, mode; Measures of dispersion :range, quartile deviation, mean deviation, variance and standard deviation; Correlation: karl Pearson's correlation coefficient, Spearman's rank correlation coefficient, Spearman's rank correlation coefficient, Regression: Lines of regression and regression coefficient.

(1 Credit)

Practical (0.5 Credit)

Sr. no.	Name of practical	Nature
1.	To find out Mean	Practical
2.	To find out Median	Practical
3.	To find out Mode	Practical
4.	To draw Bar Graph	Practical
5.	To draw Pie diagram	Practical

UNIT-II Vital Statistics Vital statistics: Concept, importance, Vitalindex, Birthrates: CBR, GFR, SFR, TFR, Deathrates: CDR, SDR, STDR, Life tables: introduction, Description and uses, Sampling: concept of population and sample, Sampling distribution and standard error of sample mean and sample proportion, Hypothesis testing, type I& II errors, Level of significance, Critical region, acceptance region, p-values of the statistics, confidence limits.

(1 Credit)

Practical (0.5 Credit)

Sr. no.	Name of practical	Nature
1.	To draw Histogram	Practical
2.	To draw line graph	Practical
3.	To find out correlation	Practical
4.	To find out rank correlation	Practical
5.	To draw Histogram	Practical

UNIT-III ANOVA and Sampling Large sample tests (normal test): Test for one sample proportion and two sample proportion test, Small sample tests : t-test (test for one and two sample means): F-test, Chi square test (goodness of fit test, test of independence, homogeneity of samples), Analysis of variance (ANOVA);One way and two way analysis of variance, Application of these tests to analyze the biological data.

(0.5 Credit)

Recommended Text Books:

1. Elements of Biostatistics; S. Prasad; Rastogi Publications, Merrut
2. Elements of Mathematical Statistics; S.C.Gupta and V.K. Kapur; Sulatanchand& Sons, New Delhi

Reference books:
1. Statical methods in Biology; T.I. Norman; Bailey,3rd edition
2. Fundamentals of Mathematics; S.C. Gupta and V.k. kapur; Sultan Chand& sons , New Delhi

Food Microbiology & Safety

Credits-4

Objective: Students would be able to acquaint the knowledge of the important genera of microorganisms associated with food and their characteristics. They would be able to explain the role of microbes in fermentation, spoilage and food borne diseases. Gain Knowledge of Food safety and hygiene, types of hazards associated with food and understand the current Food Regulations**.**

UNIT – I Introduction to food microbiology & food Borne Diseases Introduction to Food Microbiology, History of food Microbiology, Scope of Food Microbiology, and Types of organisms associated with food: Bacteria, Fungi, Yeast, and Mold. Growth Kinetics and factors affecting growth of microorganisms.Sources of Microbial contamination on foods, Sources of Microbial contamination in food and its control .Food Microbiology and Public Health- Food Poisoning, Food Poisonings due to pathogens, important features. Bacterial Agents of food borne illness- a brief account of various organisms related with food poisoning. Food Borne Diseases.

(1 Credit)

UNIT – IIRole of Microorganisms & Techniques in Microbiology Beneficial Role of microorganisms in foods. Introduction to Biotics& Probiotics. Screening, Detection and enumeration techniques including rapid detection techniques for food micro flora including pathogens, Requirement of Microbiology laboratory for food analysis, preparation & maintenance of cultures, media, sterilization techniques, disposal of used cultures and media detection and detection techniques of microorganisms in foods: culture, microscopic examinations, physical, chemical and immunological methods of microbial detection.

(1 Credit)

Practical (0.5Credits)

S. No.	Name of practical	Nature
1	Preparation of common laboratory & Special media for cultivation of bacteria, yeast & molds	Practical
2	Staining of bacteria: Gram's Staining, Acid- Fast, Spore, Capsule and Flagellar Staining, Motility of Bacteria	Practical
3	Study of environment around us as sources of transmission of microorganisms in foods- assessment of surface sanitation of food preparation units- swab and rinse techniques	Practical
4	Isolation of Microorganisms- different methods & maintenance of cultures of microorganisms	Practical
5	Bacteriological analysis of foods	Practical
6	Bacteriological Analysis of water: MPN	Practical
7	Bacteriological Analysis of Milk: MBRT	Practical
8	To perform various tests used in Identification of commonly found bacteria in foods: IMVIC, Urease	Practical
9	To perform various tests used in Identification of commonly found bacteria in foods: H2S, Catalase	Practical
10	To perform various tests used in Identification of commonly found bacteria in foods: Coagulase, Gelatin & Fermentation (Acid/ Gas)	Practical

UNIT – III Quality Control &Assurance Quality Control/Quality Assurance, Legislation for food safety-national & International criteria, sampling Schemes. Records, risk analysis, risk management. CC- Microbial source, code indicators of food safety and quality: Microbiological criteria of foods and their significance. The HACCP system and Food Safety Management Systems used in controlling microbiological hazards.

(1 Credit)

Practical (0.5 Credits)

S. No.	Name of practical	Nature
1	To study the implications of HACCP in relation to a food industry	Practical
2	To study the available rapid methods & diagnostic kits used in identification of microorganisms or their products.	Practical
3	To study a food processing unit dealing with advanced methods in food microbiology	Practical

Recommended Books:

1. James M.J. (2000) Modern Food Microbiology, 5th edition, CBS Publishers.

Reference Books:

1. Adams M. R. & Moss, M.O (1995) Food Microbiology, New age International Pvt. Ltd Publishers.

References/Correlation with Ancient Indian Literature:

- Gita14.17http://en.krishnakosh.org/krishna/Gita_14:17
- Chandogya Upanishad VI.6.5https://www.chinfo.org/images/userupload/Reflections/14_Chandogya_Chap_6-Tat_Twam_Asi.pdf
- Taittiriya Upanishad, III.vii.1https://www.hinduwebsite.com/taittiriya-upanishad.asp

IV SEMESTER

Food Packaging Technology

Credits-4

Objective: On successful completion of the course students will be able to: 1. Describe the role and function of packaging materials used for a range of consumer food needs and wants. 2. Relate the properties of food packages to conversion technologies, processing and packaging technologies and user requirements including safety, convenience and environmental issues. 3. Describe the technology involved in the production, shaping and printing of various packaging materials and packages.

UNIT – I Packaging Machineries & Materials Packaging Machineries, Systems and Regulations, Introduction to Food Packaging: History, Definitions, Importance and scope functions of packaging, package components. Packaging Materials and Properties: Manufacturing process, types, properties, advantages and disadvantages. Primary Packaging Materials: Paper and paper based packaging materials, Plastic as packaging materials: Brief history, processing, classification, mechanical, optical and barrier properties like WVTR, GTR, additives in plastics. Aluminum foil, Metal packaging materials: Manufacture of tin plate, TFS, fabrication, corrosion and remedial measures. Glass packaging materials: Composition, structure, properties, manufacture, design and closure.

Seminar (0.5Credits): Seminar based on Unit I is recommended   (1 Credit)

UNIT – II Packaging Requirement of different foods Secondary Packaging Material: Folding carton. Transport packaging materials- corrugated fiber board boxes, properties of corrugated fiber board boxes; drop strength, compression strength and puncture resistance strength, wooden boxes. Ancillary Packaging Materials: Printing inks, varnishes, lacquers and adhesives. Packaging Requirements of Different Types of Foods : fruits and vegetables, meat, fish, poultry, dairy products, edible oils and spice products, bakery products, confectioneries, Instant foods, extruded foods, snack foods, alcoholic and non-alcoholic carbonated beverages.

(1 Credit)

Practical (0.3Credit)

S. No.	Name of practical	Nature
1	Determination of Puncture Resistance Strength of CFB boxes.	Practical
2	Determination of Compression Strength of CFB boxes	Practical
3	Determination of Drop Strength of CFB boxes.	Practical

Group Discussion (0.2 Credits): Group Discussion based on Unit II is recommended

UNIT – III Packaging Machineries, Systems and Regulations Packaging Machineries, Systems and Regulations:- Packaging, Machineries: Bottling, canning, capping, labeling, form- fill sealing, strapping, cartonning machineries. Packaging Systems:, Vacuum and gas packaging, aseptic packaging, retort packaging, CAP & MAP, active packaging, shrink packaging, lined cartonning, system. Packaging Standards and Regulations: Laws, regulations, specifications and quality control, recycling of plastic packaging materials: Collection, separation and disposal.

(1 Credit)

Recommended Text Books:
1. Roberston G.L. (2006) Food Packaging: Principles and Practice. 2nd edition, Taylor and Francis Group.
2. Mattsoon B. and Sonesson U. (2000) Environmentally-friendly food processing. Woodhead publishing ltd.

Reference Books:
1. Ahevenainen R. (2003). Noval food packaging techniques. Woodhead publishing ltd.

Food Service Management

Credits-3

Objective: To enable students to 1.This subject equips the students for skill development, academic, understanding entreneurship. 2. Employment in various field of food industry, health clinic, NGO's etc 3.Perform training and communication skills relevant to the restaurant, food industry etc.

UNIT – I Food Service Establishment & Management Type of food service establishment: Commercial, Non Commercial, Street, mobile food unit Temporary food service establishment, vending machine, food court, High risk food Catering management- Principles of management (basic guidelines) Principle of Management (continued)Function of management: Managing, Planning, Organizing Directing, Coordinating, Controlling and Evaluating Tools of management Tangible. Tools of management, Intangible tools Management of resources Natural environment, Work environment.

(1 Credit)

UNIT – II Organization of Space & Equipment in Food Services establishment Kitchen Space – Size and types, Developing kitchen plan, Work simplification, Features to be considered in kitchen designing Storage Space – Types of storage, Factors to be considered while planning storage spaces Service Area – Location, Structural designing and planning storage spacesEquipment – Classification of equipment Selection of equipment, Designing, installation and operation purchasing equipment Care and maintenance of equipment.

(1 Credit)

UNIT – III Food Management Characteristic of food, Types of food, quality of food – quantity. Sensory quality and nutritional quality, Food purchasing – Importance Types – open market, formal, negotiated and wholesale. Receiving and Food storage – Delivery methods General guidelines for storing perishable and non perishable foods Menu Planning – Importance of menu planning Types of menus – Al a carte, table d'hôte and combination Food service Style of service, Waiter service, self service and vending.

(1 Credit)

Recommended Text Books:
1. Catering Management – An Integrated Approach – MohiniSethi, SurjeetMalhan, 2nd edition, New Age International Publishers.

Reference Books:
1. Food Hygiene and Sanitation – S Roday, Tata McGraw Hill Publishing Co. Ltd., 3rd reprint
2. Institutional Food Management –MohiniSethi

Human Physiology

Credits-3

Objective: To enable students to 1.Explain the basic knowledge of human anatomy and physiology 2.Describe and explain the normal function of the cells, tissues, organs and organ systems of the human body.

UNIT I Osseous, Haemopoietic& Cardiovascular system Cell - Structure and function, Blood - Blood cells, Haemoglobin, Blood groups, Coagulation Factors, Anaemia, Skeletal System -Bones, joints & bone deformities in brief, Cardiovascular system- Heart rate, Cardiac cycle, cardiac output, blood pressure, hypertension, radial pulse.

(1 Credit)

UNIT-II Lymphatic, Respiratory, GIT and Endocrine SystemLymphatic system -Lymph glands and its function, spleen -structure and functions, Respiratory System -Ventilation , Functions , Lungs volumes and capacities, Gastrointestinal System -Process of digestion in various parts, Endocrinology- List of Endocrine glands, Hormones- Their secretion and functions (in brief), Excretion system -Structure of nephron, Urine formation.

(1 Credit)

UNIT III Central Nervous System, Skin, Reproductive System, Special Senses Central Nervous System- Parts, Sliding Filament Theory , Neuro-Muscular Junction , Wallerian Degeneration, Motor Nervous system - Upper motor neuron system & lower motor neuron system, Sensory nervous system, Sympathetic Nervous system & Parasympathetic nervous system, **Skin** - Structure and functions, **Reproductive system**-Structure and functions of male & female reproductive organs, menstruation, puberty, menopause, fertilization and development of fertilized ovum, placenta and its function, **Special Senses**-Structure and function of eye and ear, common diseases of eye and ear (in brief).

(1 Credit)

Recommended Text Books:

1. Gandhi TP. Elements for Human anatomy, physisology& health education, B. S Shah Prakashan.

2. Kale SR & Kale RR. Practice Human anatomy, Physisology, NiraliPrakashan.

Reference Books

- Rizzo DC. Fundamentals Of Anatomy & Physiology , Delmar Cengage
- Tortora GJ, Anagnodokos NP. Principles of Anatomy and Physiology, Harper & Row Publishers N. Y.

References/Correlation with Ancient Indian Literature:

- **Rig-Veda 1-163 1,2,3,4 Figure 7**http://www.sacred-texts.com/hin/rigveda/index.htm
- **The Rigveda, A Historical Analysis, by Shrikant G. Talageri, AdityaPrakashan, New Delhi.** http://www.sacred-texts.com/hin/rigveda/index.htm

Nutritional Biochemistry

Credits-3

Objective : To enable students to 1. Describe the major metabolic pathways involved in the metabolism of nutrients in the human body. 2. Understand the principles of biochemical methods and be able to use them with appropriate instruction. 3. Understand the basis of reactivity of biologically relevant molecules and their interactions.

Unit I Basics of Energy Metabolism, Nutrition & Dietetics Unit of measuring energy, calorific value of food, BMR & factors affecting it, SDA of food, calculation of energy requirement, balanced diet, nutrition in health & diseases (protein energy malnutrition).Chemistry of Carbohydrates & their related Metabolism- Introduction, definition, classification, biomedical importance Brief outline of metabolism : Glycogenesis &glycogenolysis (in brief), Glycolysis, citric acid cycle & its significance, HMP shunt & Gluconeogenesis (in brief), regulation of blood glucose level.Chemistry of Proteins & their related Metabolism- Amino acids - Definition, classification, essential & non-essential amino acidsProtein-Introduction, definition, classification, biomedical importance Metabolism- Transformation, Decarboxylation, Ammonia formation & transport, Urea cycle.

(1 Credit)

Unit II Chemistry of Lipid, Enzyme and Acid Base Balance Chemistry of Lipids & their related Metabolism - Introduction, Definition, Classification, Essential Fatty Acids, Identification of Fats & Oils (Saponification No, Acid No, Iodine No, Acetyl No, Reichert-Miesel no etc) Brief out line of Metabolism : Beta Oxidation of Fatty Acids, Ketosis, Cholesterol & it's Clinical significance, Lipoproteins in the blood composition & their functions in brief, Atherosclerosis, Enzymes - Introduction, definition, classification, Acid Base Balance Concepts & Disorders - pH, Buffers, Acidosis, Alkalosis.

(1 Credit)

Unit III Vitamins and Minerals Vitamins -Water & fat soluble vitamins, sources, requirement, deficiency disorders & biochemical functions, Minerals- sources, requirement, deficiency disorders & biochemical functions of Macro-minerals (Calcium and phosphorus, Magnesium) and Micro-minerals (Iron, Copper, Manganese, Iodine, Fluoride, Zinc, Selenium, Cobalt, Chromium, Molybdneum).

(1 Credit)

Recommended Text Books:
1. Satyanarayana U &Chakrapani U(2006), Textbook of Biochemistry, 3rd Edition
2. Talwar GP, Textbook of Human Biochemistry by G.P. Talwar

Reference Books:
1. Harcot (2001). Text book of Medical Physiology Gayton, 10th edition.
2. Murray and Granner. Harper's book of Biochemistry edited by, Appleton and Lange.

Fruits & Vegetable Processing Technology

Credits-4

Objective: The course would furnish and acquaint a student with knowledge and understanding of the basic post harvest biological, chemical, physiological and metabolic processes and changes in fruits and vegetables. They would even learn the basic steps, application and operation of selected technologies and principles used to process, preserve and extend shelf life and value addition.

UNIT – I Post Harvest Technology Fruits and vegetables as living products: Current status of production and processing of fruits and vegetables. Chemical composition; pre and post harvest changes, harvesting and maturity standards for storage, and desirable characteristics of fruits and vegetables of processing. Post harvest treatments to enhance shelf-life, conditions for transportation and storage.

(1 Credit)

UNIT – II Types of Processing Treatments Cold chain & low temperature preservation: Types of cold preservation; Types of freezers and freeze concentrators, Cooling above freezing point, Cooling below freezing point. Control & modified atmosphere storage. Thermal processing: Canning and bottling, effect of canning and bottling on nutritive value, spoilage of canned foods, detection and control. Dehydration of Fruits & Vegetable: Thermal, Osmotic. Products processing: Juice extraction and preparation of syrups, squashes, cordials, nectars; Jam, jelly, marmalade, preserves and candies; ketchup, pickles, chutneys and sauces; fruit juice concentrates and powders; fortified soft drinks, tomato product, vinegar; cut fruits and vegetable, fruit toffee; fruit flavors and essences.

(1 Credit)

Practical (1 Credit)

S. No.	Name of practical	Nature
1	Estimation of benzoic acid	Practical
2	Estimation of So2 in processed fruit products	Practical
3	Pectin determination in fruits and vegetable products	Practical
4	Preparation fruit juices and its concentrate	Practical
5	Preparation of tomato products- ketchup	Practical

UNIT – III Packaging & By- Products Basics of Packaging materials & containers: Tin, glass, plastic and other packaging materials used in fruits and vegetables preservations. Modified atmosphere and active packaging, By-products utilization: Fruit & vegetable processing industry waste treatment, disposal and reuse. Emerging technologies for fruit and vegetable processing.

(1 Credit)

Recommended Books:
1. Fruits and Vegetables. A.K Thompson. Blackwell publishing S. Ranganna, Hand Book of Analysis and Quality Control for Fruits and Vegetable Products, Tata McGraw Hill, 2002.
2. L. Somogyi, Processing Fruits: Science and Technology, Vol I: Biology Principles and Applications, Woodhead Publishing, 1996.

References/Correlation with Ancient Indian Literature:
- Mantra (4-21-6) of the Atharva veda http://www.sacred-texts.com/hin/av.htm
- Atharva Veda's Mantra 18-4-16 http://dahd.nic.in/hi/related-links/annex-v-ii-2-superiority-cow-milk-paper-sh-ik-narang
- Rigveda (10-179-3) http://www.gatewayforindia.com/vedas/rigveda/rigveda10.shtml

V SEMESTER

Food Additives & Ingredients

Credits-4

Objective : Students would be able to acquire knowledge tools of the most important classes of chemical food additives, their technological use for the adding in certain food preparations and for a sustainable use. In addition students will have notions on food contaminants, their presence or delivery in food approaches to limit and control them.

UNIT – I Additives in Food Processing & Preservation(1.0-0.3) Additives in food processing and preservation - classification and their functions, Safety and quality evaluation of additives and contaminants, acute and chronic studies, NOAEL, ADI, Ld50. Indirect food additives.Various additives such as preservatives, antioxidants, antimicrobials, colors, flavor, emulsifiers, sequesterants, humectants, hydrocolloids, sweeteners, acidulants, anticaking, agents, buffering salts etc. with respect to chemistry, food uses and functions in food formulations Acids, bases and buffers.

(1 Credit)

Practical (0.3 credit)

S. No.	Name of practical	Nature
1	Techniques of quality assessment of fruits & vegetables	Practical
2	Techniques of quality assessment of cereals & pulses	Practical
3	Techniques of quality assessment of dairy products	Practical
4	Identification of food preservatives	Practical
5	Ingredient study of food product label	Practical

UNIT – II Flavor Technology (1-0.3) Flavor Technology: Types of flavors, flavors generated during processing - reaction flavors, flavor composites, stability of flavors during food processing, analysis of flavors, extraction techniques of flavors, flavor emulsions, essential oils and oleoresins, authentication of flavors etc.

(1 Credit)

Practical (0.3 Credit)

S. No.	Name of practical	Nature
1	Sensory evaluation of food attributes	Practical
2	Effect of processing on sensory evaluation of food attributes	Practical
3	Identification of various food flavors	Practical
4	Effect of flavor on sensory evaluation of food products	Practical

UNIT – III Food Ingredients (1.0-0.4) Ingredients used in food production e.g. sugar, starches/modified starches, fibres, proteins/protein hydrolysates and fats etc and their technology of production and application. Sugars and Sweeteners: Sugars, syrups, sugar alcohols, potent sweeteners, sugar products, caramelization. Sweetener chemistry related tousage in food Products Food Colors: Food colours - Types and properties, regulatory aspects, safety issues - natural food colours - heme pigments, chlorophylls, carotenoids, anthocyanins and flavonoids, tannins, caramel and others Artificial food colours.

(1 Credit)

Practical (0.4 credit)

S. No.	Name of practical	Nature
1	Collection of various food ingredients	Practical
2	Preparation of caramelized products	Practical
3	Food safety in food ingredients	Practical
4	Effect of artificial color on sensory quality of food	Practical
5	Identification and collection of various food colors	Practical

Recommended Text Books:

1. Branen, A. F. et al (2001). Food Additive s, 2nd Edition, Marcel Dekker.

2. George, A. B. (1991). Encyclopedia of food and color additives, Vol III, CRC Press.

Reference Books:

1. Nakai, S. and Modler, H. W (2000). Food proteins. Processing Applications, Wiley

2. Food Quality Assurance-Principles and Practices - Inteaz Ali, CHIPS, Texas.

Cereal, Pulse & Oilseed Technology

Credits-4

Objective : Students would be able to understand basic composition & structure of food grain and understand the basics of milling operations. They would learn processing of food grains into value added products and how to manage production, distribution & storage of grains and even understand the principle of alcoholic beverage preparation.

UNIT – I Cereals Processing Wheat Processing: Wheat classification, wheat grain structure quality and milling Functionality of wheat flour components and bakery ingredients. Rice Processing: Classification, paddy Processing and treatment for quality improvement, Milling and sorting, By product utilization e.g. Bran: Novel product development – Instant Rice, puffed products etc. Coarse Cereals Products: Maize, sorghum, pearl millet and small millets processing and value addition.

(1 Credit)

Practicals(0.4 credit)

Sr No.	Name of practical	Nature
1	Milling of wheat with emphasis on quality and recovery.	Practical
2	Milling of rice with emphasis on quality and recovery.	Practical
3	Milling of sorghum with emphasis on quality and recovery.	Practical
4	Milling of maize with emphasis on quality and recovery.	Practical
5	Milling of pearl millet with emphasis on quality and recovery.	Practical

UNIT – II Pulse Processing Pulses: Pretreatment of pulses for milling, Methods of pulse milling, milling of major pulses. Methods to improve recovery. Oil seeds Processing: Groundnut, Mustard, Soybean, Sunflower, Safflower, Sesame and other oil bearing materials, By products of oil milling.

(1 Credit)

Practicals(0.4 credits)

Sr No.	Name of practical	Nature
1	Pulses: Milling characteristics and effect of treatments on recovery.	Practical
2	Determination of triglyceride composition of oils	Practical
3	Milling of oilseeds	Practical
4	Pretreatment of pulses for milling	Practical

UNIT – III Soyabean& Extrusion Technology Special Topics: Processing & Utilization of Soya bean for value added products, Innovative products fromcereals, pulses and oilseeds. Extrusion technology for cereals.

(1 Credit)

Practicals(0.2 credit)

Sr No.	Name of practical	Nature
1	Preparation of Soy-Milk	Practical
2	Preparation of tofu	Practical
4	Preparation of soy-snacks	Practical
5	Preparation of Soy-Milk based products	Practical
6	Development of Bakery and other products	Practical

Recommended Text Books:
1. Wheat Chemistry and Technology by Y. Pomeranz

Reference Books:
1. Post Harvest Technology of Cereals by Chakraborty AC

References/Correlation with Ancient Indian Literature:
1. Arthasastrahttps://sanskritdocuments.org/doc_z_misc_sociology_astrology/artha.html?lang=sa
2. Manusmrtihttps://sanskritdocuments.org/sanskrit/samajashastra/
3. Kasyapasamhitahttps://sanskritdocuments.org/sanskrit/vedanta/

Community Nutrition

Credits-4

Objective : To enables the students to
1. Gain knowledge on the current nutritional scenario.
2. Implement policies towards nutrition security.
3. Make improvements in developing the current public health programmes.

UNIT – I Nutrition and Health (1.0-0) Nutrition and health in National development, Malnutrition- meaning. factors contributing to malnutrition, over nutrition, Nutritional disorders- Epidemiology, clinical features, prevention and dietary treatmentfor Protein Energy malnutrition, nutritional anaemias&vitmain deficiency disorders, Methods of assessing nutritional status:a) Sampling techniques , Identifications of risk groups,b) Direct assessment - Diet surveys, anthropometric, clinical and biochemical estimation.c) Indirect assessment- Food balance sheet, ecological parameters and vital statistics.

(1 Credit)

UNIT – II Nutrition for Community (1-0.5) Improvement of nutrition of a community: a) Modern methods of improvement or nutritional quality of food, food fortification enrichment and nutrient supplementations. b) Nutrition education themes and messages in nutrition and health, Antenatal andpostnatal care, Nutritional and infection relationship : Immunization and its importance, Food borne infection and intoxication diseases, foods involved, methods of prevention, Infestation of food borne diseases , Outbreak, Prevention signs and control of infection. (1 Credit)

Practical (0.5 Credit)

S. No.	Name of practical	Nature
1	Diet and nutrition surveys: • Identification of vulnerable and risk groups. • Diet survey for breast-feeding and weaning practices of specific groups. • Use of anthropometric measurement in children.	Practical
2	Preparation of visual aids.	Practical

UNIT – III Community nutrition program planning (1-0.5) National and International agencies in uplifting the nutritional status -WHO, UNICEF, CARE, ICMR, ICAR, CSIR, CFTRI, Various nutrition related welfare programs, ICDS, SLP, MOM, and others (in brief), Community nutrition program planning - Identification of problem, analysis of causes, resources constraints, selection of interventions, setting a strategy, implementations and evaluation of the program.

(1 Credit)

Practical (0.5 Credit)

S. No.	Name of practical	Nature
1	Field visit to • Observe the working of nutrition and health oriented programs (survey based result). • Hospitals to observe nutritional deficiencies.	Practical

TEXT BOOKS

- Agarval, A.N.1981: Indian Economy problems of development and planning
- Shukla, P.K.(1982): Nutritional Problems in India

REFERENCE BOOKS

1. Jelliffle, D.B(1968): Child Health in the tropics.
2. Ghosh, S(1989): You and your child.
3. Misra, S.K. and puri, V.K(1992): Indian Economy
4. Thankamma Jacob (1976): Food Adulteration.
5. Park, J.E. and Park, K(1994): Text book of Preventive and Social Medicine. 6.Prevention of Food Adulteration Act (1994): Govt of India.

Food Storage & Transport Engineering

Credits-2

Objective : The course would help students in acquiring and applying basic knowledge of Food storage and transport technologies. Course will emphasize on the characteristics of fresh produce, important environmental factors affecting produce quality, optimum storage conditions and harvesting.

UNIT – I Food Science & Transport of Foods Food science and the transport of food: Composition of food, Chemical reactions in foods, Physical changes in foods: crystallization phenomena, Microbiology and food transportation. Food Transport: Controlled Atmosphere: The Biology of Controlled Atmospheres, Techniques in

Controlled Atmosphere Storage, Modified Atmosphere Packaging. Food Storage, Handling & Transportation: Bulk storage system: Metallic bins, silos.

(0.5 Credit)

UNIT – II Modes of Transport of Foods Transport of food stuffs by sea: Cooling of cargo in transit, Conventional refrigerated ships, Container ships, Need for refrigeration. Air transport of perishables: Cargo space, Unit load, devices: containers and pallets, Transport of fruit and vegetables : Post-harvest behavior of fruit and vegetables, Pre-cooling and the cold chain, Product requirements during transport, Storage temperature management. Product deterioration, Land transport, Shipping, Air freight. Insurance.

(1 Credit)

UNIT – III Legislation & Hygiene (1.5-0) Hygiene in food transport : Basic hygiene requirements, Shipping container loading, Inspection of incoming carriers, Quality systems in food transportation, Quality and safety in food transportation, History of quality management in food transportation, Standards for quality systems, Benefits of implementing a quality management system, Clauses of ISO9002,HACCP: A food safety management system.

(0.5 Credit)

Recommended Books:
1. IGNOU-2006 Food Processing and Engineering -II, Practical Manual, www.ignou.ac.in.
2. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998

Reference Books:
1. MarcusKarel,OwenR.FernnemaPhysicalprinciplesFoodScience,PartIandIIMarc elDekkerinc

References/Correlation with Ancient Indian Literature:

- Matsyapurana https://sanskritdocuments.org/sanskrit/purana/
- Markandeypurana https://sanskritdocuments.org/sanskrit/purana/
- Agnipurana https://sanskritdocuments.org/sanskrit/purana/

Food Laws Standards & Regulations

Credits-3

Objective : Students would be able to understand the concept of food safety, types of hazards and their control measures. They would be able to identify and prevent potential sources of food contamination. Understand the need of hygiene and sanitation for ensuring food safety, knowledge of Food Safety Management tools and understand National and International Food Safety Laws and Regulations.

UNIT – I Food Hazards & Contamination and their prevention Introduction, concept of food safety and standards, food safety strategies.Food hazards and contaminations - biological (bacteria, viruses and parasites), chemical (toxic constituents / hazardous materials) pesticides residues / environmental pollution /chemicals) and physical factors.Preventive food safety systems - monitoring of safety, wholesomeness and nutritional quality of food.Prevention and control of microbiological and chemical hazards.Food safety aspects of novel methods of food processing such as PEF, high pressure processing, thermal and non thermal processing, irradiation of foods.

(1 Credit)

UNIT – II Different Acts of Food Safety Indian and Food Regulatory Regime (Existing and new), PFA Act and Rules, Food Safety and Quality Requirements, Additives, Contaminants and Pesticide Residue.Food Safety and Standards Act, 2006, Essential Commodities Act, 1955, Global Scenario, Codex Alimentarius, WHO/FAO Expert Bodies (JECFA/ JEMRA/JMPR) WHO/FAO Expert Bodies (JECFA/ JEMRA/JMPR). Food safety inspection services (FSIS) and their utilization.

(1 Credit)

UNIT – III Quality Marks & Standards Introduction to OIE & IPPC, Other International Food Standards (e.g. European Commission, USFDA etc). WTO: Introduction to WTO Agreements: SPS and TBT Agreement, Export & Import Laws and Regulations, Export (Quality Control and Inspection) Act, 1963. Customs Act and Import Control Regulations, Other Voluntary and mandatory product specific regulations, Other Voluntary National Food Standards: BIS Other product specific standards; AGMARK. Nutritional Labeling, Health claims Voluntary Quality Standards and Certification: GMP, GHP, HACCP, GAP, Good Animal Husbandry Practices, Good Aquaculture Practices ISO 9000, ISO 22000, ISO 14000, ISO 17025, PAS 22000, FSSC 22000, BRC, BRCIOP, IFS, SQF 1000, SQF 2000. Role of NABL, CFLS.

(1 Credit)

Recommended Text Books:
1. Singal RS (1997). Handbook of indices of food quality and authenticity.Woodhead Publ. Cambridge, UK.
2. Shapton DA (1994). Principles and practices of safe processing of foods.Butterworth Publication, 3. London. Winton AL (1999). Techniques of food analysis, Allied Science Publications NewDelhi.

Reference Books:
- Pomeranze Y (2004). Food analysis - Theory and Practice CBS, Publications, New Delhi.

References/Correlation with Ancient Indian Literature:
- Maitrayaniyasamhitahttps://sanskritdocuments.org/sanskrit/purana/
- Rasa-]ala-Nidhi or Ocean of Indian chemistry and alchemy/vol.vIEd.1984/AvaniPrakashan,Ahmedabad,India;CharakSamhitahttp://www.carakasamhitaonline.com/mediawiki-1.28.2/index.php?title=Main_Page

- AvS'5/23/5;Medicine in the Veda Ikenneth Zyskhttp://www.new.dli.ernet.in/handle/2015/201547

Modern Baking & Confectionary Technology

Credits-4

Objective : Upon successful completion of the course, the student will be able to identify and explain baking terms, ingredients, equipment and tools and employ safe food handling practices using contemporary guidelines. They would acquire the knowledge of the technologies behind bakery products and understand trends in bakery industry.

Unit-I Traditional Bakery Products Introduction: Status of bakery and confectionery industries in India- Raw materials for bakery and confectionery products-Essential and optional. PFA Specification of raw materials. Bakery products technology: Dough rheology – Bread making- methods process-specification for various types of breads- Biscuit manufacturing process-Cookies- Crackers- Cakes- Buns-Petties preservation of bakery products.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	Production of bread in pilot plant.	Practical
2	Production of biscuits in pilot plant.	Practical
3	Production of cookies in pilot plant	Practical
4	Production of cake in pilot plant	Practical
5	Production of petties in pilot plant	Practical

Unit – II Bakery Machinery & Equipment Bakery machinery and equipment: Weighing Equipment- Manual scale, Automatic weigh, liquid measuring. Mixing- blenders, Horizontal and vertical planetary, continuous. Make up equipment-Divider, Rounder, Proofer, Moulder. Baking equipment – different oven, slicer.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	Visit & Study of Bakery pilot plant of the University.	Practical

Unit – III Confectionary products Confectionery products: chocolate, fondant, caramels, fudge and toffee. Equipment and process. Safety and sanitation: Health and safety- safety rules- safe practices in the work places-sanitationduties of the sanitation equipments- Code for hygiene condition in bakery and biscuitmanufacturing unit.

(1 Credit)

Practical (0.2 Credit)

S. No.	Name of practical	Nature
1	Production of toffee.	Practical
2	Production of chocolate.	Practical

Recommended text books
1. Textbook of Bakery and Confectionery, by Ashokkumar Y Prentice Hall India Learning Private Limited; 2 edition (2012)

Reference Books:
1. Theory of Cookery,Oxford University Press,1st Ed, by Parvinder S. Bali 2017
2. A Professional Text To Bakery And Confectionary, John Kingslee, New Age International, 2006

References/Correlation with Ancient Indian Literature:

1. Atharvavedahttp://www.sacred-texts.com/hin/sbe42/index.htm

VI SEMESTER

Food Process Technology

Credits-4

Objective : To enables students to
- ➢ Understand the basic concepts in food science and will get knowledge of the different food preparation methods.
- ➢ They will understand the requirement of food with respect to energy, food and consumer safety, nutrients and their impact on health.
- ➢ They will get the knowledge of nutritive value of cereals, pulses, nuts, fruits and vegetables, ant nutritional factors, germination of pulses, factors affecting cooking**.**

Unit I Processing of Cereals & Millets (1.0-0.5) Storage of cereals, Infestation control; Drying of grains, Processing of rice and rice products.Milling of wheat and production of wheat products, including flour and semolina.Milling of corn, barley, oat, coarse grains including sorghum, ragi and millets; Processing of tea, coffee and cocoa.

(1 Credit)

Practical (0.5 Credit)

S. No.	Name of practical	Nature
1	Preparation of orange squash.	Practical
2	Preparation of mango jam.	Practical
3	Preparation of guava jelly	Practical
4	Preparation of sponge cake	Practical
5	Preparation of sponge bread.	Practical

Unit II Processing of Fruits and Vegetables (1-0.5) Storage and handling of fresh fruits and vegetables, Preservation of fruits and vegetable by heat treatment.Production and preservation of fruits and vegetable juices, preservation of fruit juice by hurdle technology.

(1 Credit)

Practical (0.5 Credit)

S. No.	Name of practical	Nature
1	Preparation of dry onion, chilli& garlic.	Practical
2	Manufacture of potato powder.	Practical
3	Manufacture of ice cream.	Practical
4	Manufacture of candid fruits.	Practical

Unit III (Food Laws & Quality Control) (1-0-0) Non-alcoholic beverages; Food Laws, food rules and standards, Statistical Quality Control ; Various types of packaging.

(1 Credit)

Recommended Books:
1. Fruits and Vegetables. A.K Thompson. Blackwell publishing S. Ranganna, Hand Book of Analysis and Quality Control for Fruits and Vegetable Products, Tata McGraw Hill, 2002.

Suggested Readings:
- L. Somogyi, Processing Fruits: Science and Technology, Vol I: Biology Principles and Applications, Woodhead Publishing, 1996.

SENSORY EVALUATION

Credits-3

Objective : To enables the students to1. understand the basic principles of sensory evaluation 2..Perform training and communication skills relevant to the sensory evaluation food industry etc.

UNIT – I Packaging and Labelling Packaging and Labelling of the product, Packaging design, graphics and labeling nutritional evaluation (estimation of relevant parameters), Shelf life testing of the product (testing for appropriate quality parameters- chemical, microbiological and nutrient content, acceptability studies).

(1 Credit)

UNIT – II Overview of Sensory evaluation Subjective & Objective evaluation, Overview of sensory principles and practices: General consideration in sensory testing, flowcharts of sensory evaluation. Psychological methods Selection and screening of panel: Types of panel (Trained panel, discriminative and communicative panel).

(1 Credit)

UNIT – III Methodology for sensory evaluation Methodology for sensory evaluation: Discriminative test - difference test: paired comparison, Duo-trio, triangle, ranking, Sensitivity Test, Descriptive test - category scaling, ratio scaling, flavor profile analysis, texture profile analysis, quantitative descriptive analysis

Effective Tests: paired performance test, ranking test, rating scale: hedonic rating, food action scale rating. Maintaining suitable environmental conditions: laboratory setup and equipments.

(1 Credit)

Recommended Text Books:
1. Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992): Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.
2. Amerine, M.A.; Pangborn, R.M.; Roessler, E.B. (1965): Principles of Sensory Evaluation. Academic Press, New York.

Reference Books:
1. Kapsalis, J.G. (1987): Objective Methods in Food Quality Assessment. CRC Press, Florida.
2. Martens, M.; Dalen, G.A.; Russwurm, H. (eds) (1987): Flavour Science and Technology. John Wiley and Sons, Chichester

References/Correlation with Ancient Indian Literature:
- Rasa-]ala-Nidhi or Ocean of Indian chemistry and alchemy/vol.vIEd.1984/AvaniPrakashan,Ahmedabad,India;CharakSamhitahttp://www.carakasamhita online.com/mediawiki-1.28.2/index.php?title=Main_Page
- Rigveda1/191/9http://www.sacred-texts.com/hin/rigveda/index.htm
- Atharva Veda. X. 3http://www.sacred-texts.com/hin/sbe42/index.htm

Dietetics and Counseling

Credits-3

Objective : To enables the students to 1. Understand the principles and methods of counselling. 2. Apply counselling methods to patients with different diseases.

Unit-I General approach of Counseling (1-0) Practical consideration in giving dietary advice and counseling
  I.   Factors affecting and individual food choice,
  II.   Communication of dietary advice,
  III. Consideration of behavior modification,
  IV.   Motivation.

(1 Credit)

Unit-II Counseling for Educating Patients (1-0) Counseling and educating patient-

  I.   Introduction to nutrition counseling,
  II.   Determining the role of nutrition counselor,
  III. Responsibilities of the nutrition counselor,
  IV.   Practitioner v/s client managed care,
  V.   Conceptualizing entrepreneur skills and behavior,
  VI.   Communication and negotiation skills.

Teaching aids used by dietitians- charts, leaflets, posters etc., preparation of teaching material for patients suffering from Digestive disorders, Hypertension, Diabetes, Atherosclerosis & Hepatitis and cirrhosis.

(1 Credit)

Unit-III Role of Computer Application in Dietary Counseling (1-0) Computer Application

  a) Use of computers by dietitian,
  b) Dietary computations,
  c) Dietetic management,
  d) Education/ training,
  e) Information storage,
  f) Administrations,
  g) Research,

  ➢ Computer application-
      A. Execution of software packages,
      B. Straight line, frequency table, bar diagram, pie chart, Preparation of dietary charts for patients,
      C. Statistical computation- mean, median, standard deviation, conclusion and regression test.

(1 Credit)

Recommended Text Books:
   1. Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992): Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.
   2. Amerine, M.A.; Pangborn, R.M.; Roessler, E.B. (1965): Principles of Sensory Evaluation. Academic Press, New York.

Reference Books:
   • Kapsalis, J.G. (1987): Objective Methods in Food Quality Assessment. CRC Press, Florida.

RESEARCH METHODOLOGY

Credits-3

Objective : To enables thestudents to understand the basic concepts of research methodology including meaning and objectives of research, types of research, various research criteria, research problem, research design, measurement and scaling techniques in research, various scaling techniques in research, methods of data collection in research and report writing of research.

UNIT – I Introduction & Types of research Research methodology: Introduction & meaning of research, Objectives of research, motivation in research. Types of research & research approaches. Research methods vs. methodology, Criteria for good research.
Research problem: Statement of research problem, Statement of purpose and objectives of research problem, Necessity of defining the problem.

(1 Credit)

UNIT – II Research design Research design: Meaning of research design, Need for research design, Features for good design, Different research designs, Basic principles of research design.
Measurement & scaling techniques: Measurement in research- Measurement scales, sources of error in measurement, Technique of developing measurement tools, Meaning of scaling, its classification, important scaling techniques.

(1 Credit)

UNIT – III Methods of data collection Methods of data collection: collection of primary data, collection data through questionnaires& schedules, Difference between questionnaires & schedules Report Writing.

(1 Credit)

Recommended Text Books:
1. Kothari CR (2004). Research Methodology: Methods and Techniques, New Age International.
2. Bhattacharya DK (2009). Research Methodology, Excel Books.

Reference Text
1. Annals of Food Science & Technology
2. Journal of Nutrition
3. Journal of Food Science & Technology

References/Correlation with Ancient Indian Literature:
- V¡jasaneyisamhitahttp://www.sacred-texts.com/hin/#other
- Vishnu Puranahttps://sanskritdocuments.org/sanskrit/purana/
- 3.Shabdhakalpadrumahttp://www.sacred-texts.com/hin/#other

Food Business Management

Credits-3

Objective : To enables the Students to understand theories and functions of Business Management, food industry management; marketing management and human resource development, personal management.

UNIT – I Business Management Business management; introduction, theories and functions, food industry management; marketing management and human resource development, personal management.Sectors in food industry and scale of operations in India. Human Resource Management Study the basics about HR and related policies and capacity mapping approaches for better management. Consumer Behavior towards Food Consumption, Consumer Surveys by various Institutes and Agencies, Various Journals on Consumer Behavior and Market Research, Internet based data search.

(1 Credit)

UNIT – II International trade International trade; basics, classical theory, theory of absolute advantage. theory of comparative, modern theory, free trade- protection, methods of protection, quotas, bounties, exchange control, devaluation, commercial treaties, terms of trade, balance of payments, EXIM policy, foreign exchange, mechanics of foreign exchange, GATT, WTO, role of WTO, International Trade in agriculture. World trade agreements related with food business, export trends and prospects of food products in India.

(1 Credit)

UNIT – III World consumption of food World consumption of food; patterns and types of food consumption across the globe. Ethnic food habits of different regions. Govt. institutions related to international ad trade; APEDA, Tea board, spice board, wine board, MOFPI etc. management of export import organization, registration, documentation, export import logistics, case studies. Export and import policies relevant to horticultural sector.
Project: Consumer Survey on one identified product -both qualitative and quantitative analysis (say, Consumer behavior towards Pickles and Chutneys).

(1 Credit)

Recommended Text Books:
1. Principles of Agri Business Management - D. David and S Erickson 1987. McGraw Hill Book Co., New Delhi.
2. Agricultural Marketing in India - Acharya S S and Agarwal N L 1987. Oxford & ISH Publishing Co., New Delhi.

Reference Books:
- Marketing in the International Environment - CundiffHigler 1993, Prentice Hall of India, New Delhi.
- GAD implications of Denkel proposals - G S Batra&Narindevkumar (1994) Azmol Publications Pvt., New Delhi.
- Marketing Management - PhillKottler. 1994. Prentice Hall of India, New Delhi

References/Correlation with Ancient Indian Literature:
1. Atharvavedahttp://www.sacred-texts.com/hin/sbe42/index.htm
2. V¡jasaneyisamhitahttp://www.sacred-texts.com/hin/#other
3. Vishnu Puranahttps://sanskritdocuments.org/sanskrit/purana/

FOOD PROJECT PLANNING AND ENTREPRENEURSHIP

Credits-3

Objective : To enables the students to
1. Develop an insight of Entrepreneurs and Entrepreneurship development and understand the basics of Business project report and SWOT analysis.
2. Develop insight for different types of Fund raising. Understand the different support system for business development.

UNIT – I Indian Economy Indian Economy and contribution of various sub-sectors in the economy. Structural base of Indian economic Life. Contribution of MSME sectors in the national economy. Impact of globalization and liberalization on MSME sectors. Agricultural sector and food processing industry-problems and opportunity. Self employment need and various mode open in Food Processing and Agri- sector.

(1 Credit)

UNIT – II Fundamentals of marketing principles and marketing Fundamentals of marketing principles and marketing mix, Sales and distribution management, Costing and cost management, pricing methods, fundamentals of operations and supply chain management, organization structure and human resource management , capital structure and methods of raising fund. Opportunity identification andfeasibility studies, financial analysis, technical entrepreneurship.Project sizing, fund management and enterprise management issues.Problem solving, decision making processes and tools, conflict and change management in a new industrial enterprise, Systems approach and consideration in an entrepreneurial venture. Management reporting and information system for monitoring and control of the new enterprise, managing Innovation. Marketing challenges and approaches for new productsand services. Sustaining in a competitive environment.

(1 Credit)

UNIT – III Entrepreneurship Development Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by Individual entrepreneurs.Globalization and the emerging business/entrepreneurial environment. Concept of entrepreneurship: entrepreneurial and managerial characteristics managing an enterprise; motivation and entrepreneurship development; importance of planning, Budgeting monitoring, evaluation and follow up; managing competition.

Entrepreneurship Development Programs (EDP). SWOT analysis; Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship.Government policy on small and Medium Enterprises (SMEs)/ Small Scale industries (SSls).Export and Import Policies relevant to Food Processing Sector.Venture capital, contract farming and joint ventures.Public-private partnership (PPP).Over view of Food Process Industry.Characteristics of Indian Food Processing Industry.Social Responsibility of Food Processing Business.

(1 Credit)

Recommended Text Books:
1. Entrepreneurship - Thomas W Zimmer and Norman M Scarborough 1996. Prentice Hall, New Jersey, USA.
2. Entrepreneurship Strategies and Resources - Mark J Dollinger 1999. Prentice hall, Upper Saddal River, New Jersey, USA.

Reference Books:
1. Entrepreneurial Development - Khanks SS 1999. S. Chand and company New Delhi.

References/Correlation with Ancient Indian Literature:
- Atharvavedahttp://www.sacred-texts.com/hin/sbe42/index.htm
- Taittiriyasamhitahttps://sanskritdocuments.org/sanskrit/purana/
- V¡jasaneyisamhitahttps://sanskritdocuments.org/sanskrit/purana/

Clinical Nutrition

Credits-4

Objective : To enables the students to 1. Understand the etiology, Physiologic and Metabolic Anomalies of acute and chronic diseases and patient needs. Know the effect of the various diseases on nutritional status 2. Nutritional and dietary requirements. Be able to recommend and provide appropriate nutritional care 3. Prevention / and treatment of the various diseases.

UNIT I (Concept of Diet Therapy) (1-0.4) Concept of Diet therapy- Growth and source of dietetics, purpose and principles of therapeutic diets, modification of normal diet, classification of therapeutic diets, Role of Dietician- Definition of nutritional care, interpersonal relationship with patient, planning and implementary dietary care, Team approach to nutritional care.Routine hospital diets: Preoperative and postoperative diets, study and review of hospital diet. Basic concepts and methods of (a) Oral feeding (b) Tube feeding (c) Parental nutrition (d) Intravenous feeding, Diet in surgical conditions, burns and cancerObesity and leanness- causes, complication and health effects, dietary treatment and other recommendation.

(1 Credit)

Practical (0.4 credit)

S. no.	Name of practical	Nature
1	Planning, preparations and calculations of diets with modified- (a) Consistency (b) Fibre and residue (c) Diet for Diarrhoea and constipation (d) Diet for peptic ulcer. (e) Diet tor liver disease.	Practical
2	Planning, preparation and calculation of diets in fever and infections.	Practical

UNIT II (Diet in Disorders) (1-0.3) Diet in fever and infections- Types- metabolism in fever, general dietary consideration diet in influenza, typhoid fever, recurrent malaria and Tuberculosis, Diet in Gastritits- peptic ulcer- symptoms, clinical findings, treatment, dietary modification, adequate nutrition, amount of food, and intervals of feeding, Chemically and mechanically irrigating foods, four stage diet (Liquid, soft, convalescent, liberalized diet).Diet in disturbances of small intestine and color- Diarrhoea- (child and adult)- classification, modification of diet , fibre, residue. Fluids & nutritional adequacy, Constipation- flatulence - dietary considerations, (Ulcerative colitis adults)- symptoms, dietary treatment, Spruce, coeliac disease- disaccharide intolerance, dietary treatment, Diet in diseases of the liver, gall bladder and pancreas- Etiology, symptoms and dietary treatment in - Jaundice, hepatitis, cirrhosis andhepatic coma, b) Role of alcohol in liver diseases c) Dietary treatment in cholecystitis, cholelithiasis and pancreatitis, Gout- Nature and occurrence of uric acid, causes, symptoms and diet.

(1 Credit)

Practical (0.3 credit)

Sr. no.	Name of practical	Nature
1	• Planning, preparation and calculation of diets for insulin dependent Diabetes mellitus, • Planning, snacks. deserts and beverages for diabetes.	Practical
2	• Planning. Preparation and calculation of diet in cardiovascular diseases.	Practical

UNIT-III (Nutritional Management of Disorders) (1-0.3) Diet in allergy and skin disturbances: Definition, classification, manifestations, common food allergies and test and dietetic treatment, Diet in Diabetes mellitus: a) Incidence and predisposing factors, b) Symptoms-types and tests for detection c) Metabolism in diabetes, d) Dietary treatment & meal management, e) Hypoglycemic agent, insulin and its types., f) Complication of diabetes, Diet in Renal diseases- Basic renal function, symptoms and dietary treatment in acute and chronic glomerulonephritis, Nephrosis, renal failure, dialysis. urinary calculi-causes & treatment, acid and alkali producing and neutral foods and dietary treatment, Diet in Cardiovascular diseases- Role of nutrition in cardiac efficiency, incidence of Atherosclerosis, dietary principles, Hyperlipidenmia, Hypertension- causes and dietary treatment, Sodium restricted diet, level of sodium restriction, sources of sodium, danger of severe sodium restriction.

(1 Credit)

Practical (0.3 credit)

S. No.	Name of practical	Nature
1	Planning, preparations and calculation of diet in Kidney failure, Kidney transplant, Renal complication & Kidney stones.	Practical
2	Planning, preparations and calculation of diet in Cancer, Trauma (burns) & Surgery	Practical

Recommended Text Books:
1. Mahan LK, Escott-Stump S (2000). Krause's Food Nutrition and Diet Therapy, 10th Edition, W.B. Saunders Ltd
2. Shils ME, Olson, JA, Shike, M, Ross, AC (1999). Modern Nutrition in Health and Disease, 9th Edition, Williams and Wilkins

Reference Books

- Escott-Stump S (1998). Nutrition and Diagnosis Related Care, 4th Edition, Williams and Wilkins.
- Garrow JS, James WPT, Ralph A (2000). Human Nutrition and Dietetics, 10th, Edition, Churchill Livingstone
    - Williams SR (1993). Nutrition and Diet Therapy, 7th Edition, Times Mirror/Mosby College Publishing.

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

Faculty of Agriculture and Veterinary Science

Department of Food and Biotechnology

SYLLABUS

BACHELOR OF SCIENCE -FOOD SCIENCE & TECHNOLOGY (B. SC. FST)

DURATION – 3YEARS/ 6 SEMESTER

SYLLABUS FOR:
3 YEARS (1-6 SEM)

JAYOTI VIDYAPEETH WOMEN'S UNIVERSITY, JAIPUR

PROGRAM DETAIL

Name of Program	-	Bachelor of Science (B.Sc.)
Program Code	-	B. Sc. FST
Mode of Program	-	Semester
Duration of Program	-	3yrs/ 6Semester
Total Credits of Program	-	154
Curriculum Type and Medium Choice	-	English

Program Outcomes

Graduates will gain and apply knowledge of Food technology, Science and Engineering concepts to solve problems related to field of Food technology. Graduates will be able to decide and apply appropriate tools of Food technology for making new food products & technologies

Specific Program Outcomes

Apply the knowledge of New emerging Food Technology industry world. Recognize the importance of bioethics, entrepreneurship, Communication and management skills so as to usher next generation of Indian Food Tech industrialists.

SYLLABUS DETAIL

I SEMESTER

S. No.	Credit	Name of Course
1	4	Food & Nutrition
2	4.5	Fundamentals of Chemistry
3	1.5	Fundamentals of Chemistry Lab
4	3	Basics of Biosciences
5	1	Basics of Biosciences Lab
6	3	Introduction to food technology
7	3	Fundamentals of Biological Chemistry
8	1	Fundamentals of Biological Chemistry Lab
9	3	Biomolecules
10	1	Biomolecules Lab
TOTAL	25	

II SEMESTER

S. No.	Credit	Name of Course
1	3	Fundamentals of microbiology
2	1	Fundamentals of microbiology Lab
3	3	Thermodynamics
4	3	Cell biology
5	1	Cell biology Lab
6	2	Unit operations in Food Industry
7	1	Unit operations in Food Industry Lab
8	3	Analytical Chemistry
9	1	Analytical Chemistry Lab
10	3	Fundamentals of Food Science & Technology
11	1	Fundamentals of Food Science & Technology Lab
12	1	Industrial Visit
TOTAL	23	

III SEMESTER

S. No.	Credit	Name of Course
1	3	Metabolism and Bioenergetics
2	1	Metabolism and Bioenergetics Lab
3	3	Basic Enzymology
4	1	Basic Enzymology **Lab**
5	3	Technology of Milk & Milk Products
6	1	Technology of Milk & Milk Products lab
7	3	Principles of Food Preservation
8	1	Principles of Food Preservation **lab**
9	2	Biostatistics
10	1	Biostatistics **lab**
11	3	Food Microbiology & Safety
12	1	Food Microbiology &Safety **lab**
13	10	Industrial Training (60 Days, after II Sem, during Summer vacation)
Total	33	

IV SEMESTER

S. No.	Credit	Name of Course
1	3	Food Packaging Technology
2	1	Food Packaging Technology Lab
3	3	Meat, Fish and Poultry Product Technology
4	3	Dairy Plant Management
5	3	Waste management of Food Industries
6	3	Fruits and Vegetable Processing Technology
7	1	Fruits and Vegetable Processing Technology**lab**
8	4	Minor Project
9	1	Industrial Visit
Total	22	

V SEMESTER

S. No.	Credit	Name of Course
1	3	Food additives and ingredients
2	1	Food additives and ingredients Lab
3	3	Cereal, Pulse & oilseed Technology
4	1	Cereal, Pulse & oilseed Technology **lab**
5	2	Basic Food Engineering
6	1	Basic Food Engineering**lab**
7	2	Food Storage and Transport
8	3	Food Laws**.** Standards & Regulations
9	3	Modern Baking & Confectionary Technology
10	1	Modern Baking & Confectionary Technology **lab**
11	10	Industrial Training **(**60 Days, after IV Sem, during Summer vacation**)**
Total	30	

VI SEMESTER

S. No.	Credit	Name of Course
1	3	Food Process Technology
2	1	Food Process Technology Lab
3	3	Sensory Evaluation
4	3	Modeling & simulation of Bioprocess
5	3	Research Methodology
6	3	Food Business Management
7	3	Food Project Planning and Entrepreneurship
8	3	Dairy Engineering
9	1	Dairy Engineering**lab**
Total	23	

B. Sc. FST 1ST YEAR

I SEMESTER

Foods & Nutrition

Credits-4

Objective: The objective of this paper is to make students familiar with various principles of food and nutrition.

UNIT – I Relationship of Food, Nutrition & Health Definitions of food, nutrition and health and inter-relationship between them. Description of basic terms and concepts. Functions of Nutrients, Guidelines for Good Health, RDA, Reference Man and Woman, Factors affecting RDA, Methods for Deriving RDA, Uses of RDA, BMR, Factors affecting BMR.

(2 Credit)

UNIT –II Functions of Foods, Nutrient & Source Functions of food. Nutritional aspects of carbohydrates (including glycemic index and load), proteins and fats. Functions of energy and minerals and vitamins and water. Food sources of nutrients. Concept of a balanced diet. Dietary fiber, its sources and importance.

(1.3 Credit)

UNIT – III RDA & Enhancement of Nutritional Quality Overview of human nutrition requirements (RDA) through the life cycle. Factors affecting bio-availability of nutrients example, nutrient interactions, food components like antinutrients etc. Principles of meal planning. Ways to increase nutritional quality of food such as enrichment, fortification, fermentation and mutual supplementation. Best cooking and processing procedures to reduce cooking losses of nutrients. Common nutritional deficiencies such as PEM, iron, vitamin A, iodine, calcium and vitamin D, zinc etc. Emerging common degenerated disorders.

(1.4 Credit)

Reference Books:

1. Food Science N N. Potter & J Hotchkiss
2. Food Processing and Preservation G Subbalakshmi
3. Food Packaging Technology Handbook NIIR
4. A practical Guide for Implementation of ISO HACCP Sohrab

Fundamentals of Chemistry

Credits-4.5

Objective: To develop the understanding of basic chemistry and its types. To make students understand about the practical aspects of things. Students will able to identify various matters and equipment used in labs, perform some basic experiments.

UNIT I – Overview of Physical Chemistry Solutions: Concept of homogeneous and heterogeneous solution, Introduction of the terms, Ionization, acidity, basicity, equivalent weight and gram equivalent weight with suitable example. Preparation of solution, Normality, Molarity, and Molality as applied in relation to a solution. Simple numerical problems related to volumetric analysis. Brief concept of gravimetric analysis.

(1.5 Credit)

Practicals: (Credit: 0.5)

S.No.	Name of Practical
1	Preparation of original solution.
2	Correct group detection
3	Cu with change in concentration of electrolytes ($CuSO_4$
4	Zn with $ZnSO_4$
5	using starch solution as indicator (clock reaction).

UNIT II- Overview of Inorganic chemistry Occurrence and principles of extraction of aluminium, copper, zinc and Iron. position of hydrogen in periodic table, isotopes, preparation, properties and uses of hydrogen; hydrides-ionic, covalent and interstitial; physical and chemical properties of water, heavy water. Hydrogen peroxide-preparation, properties and structure; hydrogen as a fuel.Uses of hydrogen peroxide.

(1.5 Credit)

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Systematic detection of ion.
2	Any two confirmatory tests of cation.
3	Physical nature.
4	Flame test.
5	Charcoal cavity test.

UNIT III Overview Organic Chemistry Stereochemistry of Organic Compounds: Concept of isomerism. Type of isomerism. Optical Isomerism - Elements of symmetry, molecular chirality, enantiomers, stereogenic centre, optical activity, properties of enantiomers , chiral and acheral molecules and erythrodiastereomers, *, D & L and R & S systems of nomenclature.
Geometric Isomerism: Determination of configuration of geometric isomers. E & Z system of nomenclature.
Conformational isomerism: Newman projection and Sawhorse formulae, Fischer and flying wedge formulae. Application of Stereochemistry in biochemistry.

(1.5 Credit)

Practical: (Credit: 0.5)

S.No.	Name of Practical
1	Recrystallization.
2	Melting points and Boiling point and the identification of an unknown and known compound nepthlene,Benzene
3	Molecular modelling.
4	L.S modelling.
5	Distillation, steam distillation.

Recommended text Books:

1. P.W. Atkins, Physical Chemistry(7th Edition), Oxford University Press, 2006.
2. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prentice Hall of India Pvt. Ltd., 5th Ed, 1990

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Basics of Biosciences

Credits-4.5

UNIT-I Introduction to biology Diversity in biological systems, Cell biology and cell structure, difference between Prokaryotes & Eukaryotes systems, Five-kingdom classification and General characters, Brief account on Ecology, Morphology, Nutrition, osmosis, Locomotion and Reproduction, useful and harmful effects of Bacteria, Viruses, Algae, Fungi and Protozoans.

(1 Credit)

Practical: (0.4 credit)

Sr. no.	Name of practical	Nature
1	To perform gram staining.	Practical
2	To study different types of Algae by making their slides.	Practical
3	To study different types of Fungi by making their slides.	Practical
4	To study slides of Protozoans.	Practical
5	Study of osmosis by potato osmoscope.	Practical

UNIT-II Classification and physiology of plant Classification of Plant Kingdom. Concepts of Growth, Meristems, Plant growth regulators, Bacterial & Plant photosynthesis; oxygenic and anoxygenic photosynthesis; chlorophyll as trapper of solar energy, photosynthetic reaction centres, Hill reaction, PS I & PS II, Photophosphorylation - cyclic & non-cyclic; Dark reaction & CO2 fixation.

(1 Credit)

Practical: (0.4 credit)

Sr. no.	Name of practical	Nature
1	To isolate chloroplast from plants.	Practical
2	Separation of plant pigments through paper chromatography.	Practical
3	Demonstration of O_2 evolution during photosynthesis.	Practical
4	Study of distribution of stomata in the upper and lower surface of leaves.	Practical

UNIT-III Classification and physiology of animals Classification of Animal Kingdom, Functions, morphology, growth and Reproduction, economic importance. Phylogeny of Invertebrate & Vertebrate Phyla, Concepts of Species & Ecosystem. Introduction of cell cycle, cell division, Electrolytes, Body fluids.

(1 Credit)

Practical:(0.2 credit)

Sr. no.	Name of practical	Nature
1	To study mitosis in onion root tip.	Practical
2	To study meiosis in grasshopper testis	Practical
3	To test the presence of urea in urine.	Practical
4	To detect the presence of sugar in urine/blood sample	Practical
5	To detect the presence of albumin in urine.	Practical

Recommended Text Books:

1. NCERT Textbook for Class 11 Biology
2. NCERT Textbook for Class 12 Biology

Reference Books:

1. Cell and Molecular biology – P.K. Gupta
2. Plant Physiology- H.S. Srivastav
3. Animal Physiology- A.K. Berry

Introduction to Food Technology

Credits- 3

Objective: Students would be able to understand the principles of food science, different areas of food science and the historical evolution of food processing. They would be able to understand the basics of plant and animal foods, their types, structure and composition, nutritional value, changes taking place during storage and different processing methods used.

Unit- I Introduction to food composition Introduction , Food composition & Food group, Introduction Introduction to food science and technology, Food composition Food composition – Carbohydrates, protein, fat, vitamins and minerals water, Food groups Composition and nutritive value of Cereals, Pulses, Legumes, Oil seeds, Fruits, Vegetables, Meat, Fish, Poultry and Milk.

(1 Credit)

Unit – II Introduction to food preservation Food preservation -High temperature, low temperature and chemical preservations. Concept of nutrition, Digestion and absorption of nutrients, balanced diet, malnutrition, Packaging-Functions of packaging, types of food packaging materials.

(1 Credit)

Unit II Introduction to role of microbes in food technology Microbiology- Microorganisms important in foods, food contamination, food spoilage, food born diseases, Engineering -Unit operation, principles of heat exchangers, Pasteurizer, refrigerator, freezer and drier.

(1 Credit)

References:

1. Food Science N N. Potter & J Hotchkiss
2. Food Processing and Preservation G Subbalakshmi
3. Food Packaging Technology Handbook NIIR
4. A practical Guide for Implementation of ISO HACCP Sohrab

Fundamentals of Biological Chemistry

Credits- 4

Objective: Students would be able to understand the principles of food science, different areas of food science and the historical evolution of food processing. They would be able to understand the basics of plant and animal foods, their types, structure and composition, nutritional value, changes taking place during storage and different processing methods used.

UNIT-I Origin of life, Origin of amino acids, nucleotides, Urey Miller's expt., Unicellular organism, multicellular organisms. Concept of biomolecules, polymerisation, formation of polymers i.e. proteins, nucleic acids, Molecular interactions, biological functions.Chiral interactions, pH, pK, buffers.Reactionmechanism.Nucleophile, electrophile, Acid base reaction, nucleophilic addition, nucleophilic substitution, electrophilic addition, electrophilic substitution reaction.   (1 Credit)

UNIT-II Carbohydrates: Introduction, biological importance. Definition, Classification, {glyceraldehydes, Simple Aldose, Simple Ketose, D-glucose, Conformation of D glucose], Monosaccharides other than glucose, glyocosidic, bond, disaccharides, polysaccharides [starch, glycogen, peptidoglycan, proteoglycan matrix.

(1 Credit)

Practical: (1 credits)

Sr. no.	Name of practical	Nature
1	**Test for Carbohydrates**	**Practical**
2	**Test for proteins**	**Practical**
3	**Test for Lipids**	**Practical**

UNIT-III Lipids: Introduction, Classes, Fatty acids [Physical prop. Chemical prop, Sap value, acid value, iodine number,rancidity. Glycerolipid, Sphingolipid, Lipid derived from isoprene, Behavior of lipid in water, Bile acids, bile salts, plasma lipoproteins, Vesicles, membrane transport.

Recommended Text books:
1. Outlines of Biochemistry: Conn and Stumpf
2. Principles of Biochemistry: JefforyZubey

Suggested Readings:
1. Biochemistry: Stryer

Bio-molecules

Credits-4

Unit-I Carbohydrates General account of the chemical nature of living cells. Carbohydrates: Classification (Monosachharides, Di- sachharides and Polysachharides), configurations and conformations, sugar derivatives, structural and storage polysaccharides.

(1 Credit)

Practical:(0.3credit)

Sr. no.	Name of practical	Nature
1	**To perform Molish test for the qualitative estimation of carbohydrate.**	**Practical**
		Practical
	(i)　　Preparation of Molish reagent **(ii)**　　Estimation and observation of carbohydrate	Practical and practice
2	**To perform Benedict test for the qualitative estimation of carbohydrate.**	**Practical**
	(i)　　Preparation of Benedict's reagent (ii)　　Estimation and observation of carbohydrate	Practical
		Practical and practice
3	**To perform Fehling's test for the qualitative estimation of reducing sugar's**	**Practical**
	(i)　　Preparation of Fehling's reagent	Practical
	(ii)　　Estimation and observation of carbohydrate	Practical and practice
4	**To perform Barfoed's test for the qualitative estimation of reducing sugar's**	**Practical**
	(i)　　Preparation of Barfoed's reagent	Practical
	(ii)　　Estimation and observation of carbohydrate	Practical and practice
5	**To perform Inversion of Sucrose*:*** (i)　　Preparation of reagents for inversion (ii)　　Estimation of converted sugar by Fehling's reagent.	**Practical**
		Practical
		Practical

Unit-II Proteins Amino acids: General properties, peptide bond, essential and non-essential amino acids. Classification, different levels of protein structure, forces stabilizing protein structure, protein folding, protein modification.

(1 Credit)

Practical : (0.3 Credit)

Sr. no.	Name of practical	Nature
1	**To perform Ninhydrin test for the qualitative estimation of amino acids.**	**Practical**
		Practical
	(iii)　　Preparation of Ninhydrin reagent **(iv)**　　Estimation and observation of amino acids.	Practical
2	**To perform Xanthoproteic testfor the qualitative estimation of amino acids.**	**Practical**

	(iii) Preparation of Xanthoproteic reagent	Practical
	(iv) Estimation and observation of amino acids.	Practical
3	**To perform Millon'stestfor the qualitative estimation of amino acids (Tyrosine, Phenylalanine & Glycine).**	**Practical**
	(iii) Preparation of Millon's reagent	Practical
	(iv) Estimation and observation of amino acids.	Practical
4	**To perform Lead-Sulfide test for the qualitative estimation of Cysteine and Cystine.**	**Practical**
	(iii) Preparation of Lead sulfite reagent	Practical
	(iv) Estimation and observation of amino acids.	Practical and practice
5	**To perform Sakaguchitestfor the qualitative estimation of Arginine.**	**Practical**
	(i) Preparation of Sakaguchi reagent	Practical
	(ii) Estimation and observation of amino acids	Practical

Unit- III Lipids and Vitamin Lipids: Classification, properties of lipid aggregates and biological significance.Vitamins: Water and fat soluble vitamins and their deficiency diseases .
(1 Credit)
Practicals: (0.4 credit)

Sr. no.	Name of practical	Nature
1	**To Estimate the Saponification value of oils.**	**Practical**
	(i) Preparation of reagents.	Practical
	(i) Determination of Saponification number.	Practical
2	**To Estimate the acid value of oils.**	**Practical**
	(i) Preparation of reagents.	Practical
	(ii) Determination of acid value by titration	Practical
3	**Determination of Total Lipid Concentration**	**Practical**
	(i) The preparation of a sample for solvent extraction	Practical
	(ii) Extraction of lipids and its determination.	Practical

Recommended Text Books:
1. Fundamentals of Biochemistry - J.L. Jain , S. Chand publication
2. Fundamentals of Biochemistry - Dr A C Deb

Reference Books:
- Biochemistry- U. Satyanarayana, U. Chakrapani , BOOKS AND ALLIED (P) LTD. (2008)

II SEMESTER

Fundamentals of Microbiology

Credits-4

Unit- I Introduction-aims and scope Introduction-aims and scope, Role of microbes in agriculture, public health, medicine and industry, Organization of prokaryotic and eukaryotic cells: Structure and function of cell organelles and surface structure and cellular reserve materials; Distinguishing features of various groups of microorganisms: actinomycetes, bacteria, molds, yeasts and algae and their broad classification.

(1 Credit)

Practicals: (0.4 credit)

Sr. no.	Name of practical	Nature
1	Purify the given bacterial sample by serial dilution method	practical
	(i) To prepare culture media for microorganisms	Practical
	(ii) Growth study of Microorganisms	practical
2	Perform Gram's staining in given bacterial sample	Practical
	(i) Preparation of staining solutions	Practical
	(ii) Microscopic observation and identification	practical
3	Identify the fungal flora of soil and their microscopic view	Practical
	(i) To prepare culture media for microorganisms	Practical
	(ii) Microscopic examination and identification	practical
4	Preparation of culture media for algae	Practical
	(i) Media preparation and standard stock preparation	Practical
	(ii) Autoclaving and finalization of media for inoculation	practical
5	Perform antagonistic activity of micro organisms n	Practical
	(i) Culture media preparation, inoculation of 2 different organisms	Practical
	(ii) Observation of result	practical

Unit-II Characteristics of micro-organisms Characteristics of selected groups of microorganisms including microorganisms of extreme environment, Microbial nutrition and growth-principles of nutrition, growth measurement techniques, effect of environmental and culture parameters on growth, assimilation of nitrogen and sulphur, Isolation and preservation of cultures. (1 Credit)

Practicals: (0.4 credit)

Sr. no.	Name of practical	Nature
1	Isolate the microorganism of extreme environmental condition	practical
	(i) To prepare culture media for microorganisms	Practical
	(ii) Streaking	practical
2	Study the bacterial growth curve with complete phases	Practical
	(i) Preparation of culture media for microorganisms	
	(ii) Microscopic observation and identification of density of MO	Practical
		practical
3	Isolate nitrogen fixating bacteria and their identification	Practical
	(i) To prepare culture media for microorganisms	
	(ii) Staining, Microscopic examination and identification	Practical
		practical
4	Effect of environmental conditions on bacterial growth	Practical
	(i) Media preparation and standard stock preparation	
	(ii) Effect of unusual condition on MO	Practical

		practical
5	Perform the preservation process for bacterial culture (i) Culture media preparation, inoculation	Practical
	(ii) Observation of result after complete duration	Practical
		practical

Unit-III Energy transduction in microbial systems Energy transduction in microbial systems: fermentation, aerobic and anaerobic respiration. Phototrophic microorganisms, Phosphoketolase, Entner-Doudoroff and glyoxalate pathways, Control of microbial growth effect of heat, disinfectants and therapeutic agents, Microbial pathogenicity, Bioassays. (1 Credit)

Practicals: (0.2 credit)

Sr. no.	Name of practical	Nature
1	Study the batch and fed batch culture condition on bacterial growth	practical
	(i) To prepare culture media for microorganisms	Practical
	(ii) Observation of different density and growth of MO	practical
2	Isolate the bacterial pigments form cyanobacteria	Practical
	(i) Preparation of culture media for microorganisms	Practical
	(ii) Microscopic observation and identification and isolation of Chl pigment	practical
3	Chromatographic evaluation of bacterial pigments	Practical
	(i) To prepare culture media for microorganisms	Practical
	(ii) Chromatographic identification of pigment	practical

4	To determine the ability of Microorganisms to degrade and ferment carbohydrates with the production of acid or acid and gas
	     (i) Media preparation and standard stock preparation
	     (ii) Microbial production
		Practical

		Practical
		practical

5	To detect the antibiotic sensitivity on the given culture sample (Antibiotic Sensitivity Test)
	     (i) Culture media preparation, inoculation
	     (ii) Observation of result after complete antimicrobial activity
		Practical

		Practical
		practical

Recommended Text Books:

1. Microbiology – L. M. Prescott
2. A Textbook Of Basic And Applied Microbiology - Aneja K.R.

Recommended Reference Books:

1. Pelczar Microbiology
2. Practical microbiology by Satish Gupte
3. Basic practical microbiology a manual – Cuteri

Thermodynamics

Credits- 3

UNIT – I Basic concept of Thermodynamics Basic Concepts: Introduction and scope of Thermodynamics, Thermostatics, Thermodynamic properties, Cycle integral for property and non-property variable, Stored and transit forms of energy, Thermodynamic systems and control volume, Isolated system, Universe, Steady flow system, their characteristics and examples, Types of work, Thermodynamic Processes.

(1 Credit)

UNIT – II Laws of Thermodynamics Laws of Thermodynamics: Zeroth Law, First Law of Thermodynamics, Second Law of Thermodynamics, Carnot Theorem, Steam Engine,Concept of entropy,T-S Diagram ,availability and irreversibilities. Pure Substances: Behaviour of pure substances.

(1 Credit)

UNIT – III Heat transfer Rankine vs. Carnot, modified Rankine cycle. Air Standard Cycles: Assumptions, Analysis of Otto, Diesel, Dual and Joule cycles, Calculation of cycle work and state values.Introduction to Heat Transfer, Refrigeration and Air-Conditioning.

(1 Credit)

Recommended text Books:

1. Heat thermodynamics and statistical physics by Brijlal, N.Subrahmanyam, S.Chand publication New Delhi.

Reference Books:

1. Timoshenko S P and Young D H, "Engineering Mechanics", McGraw Hill (International) 4/e, New Delhi (1984).
2. Beer, Ferdinand: Johnston, Jr., E. Russell, "Vector Mechanics for Engineers: Statics (in SI Units)", 3rd Edition Tata McGraw Hill, 2000.
3. R C Hibbeler, "Engineering Mechanics: Statics (in SI Units)", Pearson Education, India, 2000.

Cell Biology

Credits- 4

Unit-I Ultra-structure of Plant and animal cell Cell – Shapes, morphology, Cell theory, Cells , Structure-function relationship including organelles and their Biogenesis (e.g., Endoplasmic reticulum, Mitochondria, Chloroplast, Golgi body, nucleus, lysosomes, vacuoles), Membrane structure , Membrane transport, Cytoskeleton, Extracellular matrix , Cell junctions.

(1 Credit)

Practicals: (0.5 credit)

Sr. no.	Name of practical	Nature
1	**Study of Microscopy: - Simple, Compound, & Phase Contrast Microscope**	**Practical**
	(i) **Learn about simple microscope**	**Practical**
	(ii) **Learn about compound microscope**	**practical**
	(iii) **Learn about phase contrast microscope**	**practical**
2	**Study of cell organelles by using Models, Charts and Slides.**	**Practical**
	(i) **Study of models**	
	(ii) **Study of charts (iii)Study of slides**	
3	**To demonstrate osmosis by using potato osmoscope.**	**Practical**

	(i)	Setting up of potato osmoscope	Practical
	(ii)	Demonstration of osmosis	practical

Unit-II Brief Idea about cell cycle Cell cycle: different phases of cell cycle (G_1, S- phase, G_2 and M-phase). Regulation of cell cycle: role of cyclins and CDKs, Check points. Mitosis: phases of mitosis (prophase, metaphase, anaphase, telophase and cytokinesis). Significance of mitosis. Meiosis: phases of meiosis and gametogenesis.

(1 Credit)

Practicals: (0.5 credit)

Sr. no.	Name of practical	Nature
1	**Squash preparation of Onion root tip to study Mitosis.**	Practical
	(i) Squash preparation	Practical
	(ii) Making slide	practical
	(iii) Observation of mitosis	practical
2	**Preparation of polytene chromosome in chironomous larva/fruit fly.**	Practical
	(i) Separation of chromosome	
	(ii) Making slide (iii)Observation of chromosomes	
3	**Study of meiosis in Grasshopper testis.**	Practical
	(i) Separation of testis	Practical
	(ii) Making slide	practical
	(iii) Observation of meiosis	practical
4	**Learn about cell cycle and Gametogenesis through charts and models**	Practice

Unit- III Cell signaling Signaling: different pathways (G-protein mediated, cAMP mediated and tyrosine kinase mediated), secondary messengers. Cell differentiation, program cell death, techniques in Cell biology (microscopy, chromatography, centrifugation and spectroscopy).
(1 Credit)

Recommended Books:
1. Cell and molecular biology by P.K. Gupta
2. Cell biology by C. B. Panwar, Rastogi publication.

Reference books:
1. Molecular Biology of the Cell- Bruce Alberts, Alexander Johnson, Julian Lewis and Martin Raff.
2. The Cell: A Molecular Approach, Sixth Edition by Geoffrey M. Cooper and Robert E. Hausman

Unit Operations in food Industry

Credits- 3

Objective: Upon successful completion of this course, students should be able to:

1. Explain basic principles of unit operations and also waste treatment in food industry.
2. Explain the methods and effects of preservation and processing on food product quality.
3. Apply numerical solution to solve problems involved in unit operations of food processing.

UNIT – I Flow, Heat Transfer Principles of fluid flow, heat transfer, heat exchanger, EMC & Water activity, Evaporation, Distillation, Drying, Dehydration; Types of dryers, Material handling equipment; Size reduction, Energy requirement in Size Reduction.

(1 Credit)

Practical (1 Credit)

S. No.	Name of practical	Nature
1	Solvent Extraction (Extraction)	Practice
2	Distilled Water Preparation (Distillation)	Practice
3	Study & Demonstration of Spiral & Planetary Mixers (Mixing)	Practice
4	Sieve Analysis (Sieving)	Practice
5	Study & Demonstration of Ball Mill (Size Reduction)	Practice
6.	Study & Demonstration of Refrigeration System (Refrigeration)	Practice

UNIT – II Separation, Mixing Sieve analysis, Mixing, Kneading, Blending, Homogenization, Size Separation, Sedimentation, Extraction, Leaching, Crystallization, Thermal Processing, Refrigeration principles, Cooling, freezing, thawing of food materials.

(1.5 Credit)

UNIT – III Mechanical Separation, Grading & Emulsification Absorption and adsorption, Mechanical Cleaning, Grading, Sorting, Filtration, Membranic Separation, Emulsification.

(0.5 Credit)

Recommended Books:
1. Albert Ibarz, Gustavo V. Barbosa-Canovas, Unit Operations in Food Engineering, CRC Press 2010
2. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998
3. R.L. Earle and M.D. Earle, Food Engineering, 1978

Analytical Chemistry

Credits- 4

Unit- I Separation methods Solvent extraction (liquid-liquid extraction): General principles, relationship between percentage of extraction and distribution coefficient and distribution ratio, multiple extraction, extraction of metal organic complexes and ion association complexes. Chromatographic techniques: Classification, basic principles, theory of chromatography- Ion exchange chromatography - ion exchange process, synthesis and structure of ion-exchange resin and separation of lanthanides. Paper and thin-layer chromatography- stationary and mobile phases, various techniques of development – visualization and evaluation of chromatograms, separation of inorganic and organic compounds.

(1 Credit)

Practicals: (0.5 credit)

Sr. no.	Name of practical	Nature
1	To perform Ion exchange methods-	Practical
	(i) To the preparation of solution.	Practical
	(ii) To separation and estimation of mg (II) and Zn (II).	practical
2	To perform of Solvent extraction-	Practical
	(iii) To prepare solution.	Practical
	(iv) To separation and estimation of Mg (II) and Fe.	practical
3	To the study Green leaves with the help of Thin layer chromatography-.	Practical
	(i) To preparation and Identification of organic compound.(Benzene)	Practical
	(ii) Determination of R_f value .	practical
4	To the study of Organic compound with the help of Column chromatography. (i) Separation of fluoresin and methylene blue. (ii) Separation of a mixture of dying using cyclo hexane and ethyl acetate(8.5:1.5).	Practical
		Practical
		Practical
5	To the study of Paper chromatography-Ascending and circular.	Practical
	(i) Separation of a mixture of Phenylalanine and glycine.	Practical
	(ii) Observation of result.	Practical

Unit- II Spectral methods UV absorption spectroscopy: Beer-Lambert law, molar extinction coefficient, analysis of UV spectra, types of electronic transitions, effect of conjugation, concept of chromophores and oxochromes, bathochromic, hypsochromic, hyperchromic and hypochromic shifts, UV spectra of conjugated enes and enones.

(1 Credit)

Practicals: (0.5 credit)

1	Spectral methods –	Practical
	(i) To Determine of Beer -Lambert law.	Practical
	(ii) Calculation of law by U.V	practical
2	Spectroscopy methods-	Practical
	(i)To prepare the solution.	Practical
	(ii) Simultaneous determination of Co (II) and Cr (III) in a mixture of both by spectro - photometric method.	Practical
3	Thermal Methods-	Practical
	(i) To the study of Determine the content of iron in vitamin tablets by colorimetric method.	Practical
	(ii) Calculation by colorimetric methods.	Practical
4	To the study of fluoresin and methylene blue with the help of Column chromatography-	Practical
	(i) Identification of organic compound.	Practical
	(ii) Separation of a mixture of dying using cyclo hexane and ethyl acetate(8.5:1.5).	Practical
5.	To Analysis Solvent extraction methods-	Practical
	(i)To the Preparation of solution.	Practical
	(ii) Separation and estimation of Mg (II) and Fe metal.	Practical

Unit-III Thermal methods Theory, instrumentation and applications of Thermogravimetric method of analysis (TGA), (b) Differential thermal methods of analysis (DTA), (c) Differential scanning colorimetry (DSA).

(1 Credit)
Recommended text book:

1.   Qualitative analysis ,G.R.Chatwal,

Reference books:

- Vogel's Qualitative analysis ,Svehla,Orient Longman.
- Inorganic synthesis McGrawHell

Fundamentals of Food Science & Technology

Credits- 4

Objective: Students would be able to understand Scope of food processing in India and different areas of food processing. They would be able to understand the processing of different food products like meat and meat products, Fruit and vegetable, milk and milk products and marine products.

UNIT – I Food Processing & Packaging and Food Industries Scope of food processing in India; Introduction to food processing, food preservation, food packaging, food drying and dehydration. Important food industries in India; role of Food Science & Technology in national economy.

(1 Credit)

Practical: (0.4Credit)

S. No.	Name of practical	Nature
1	Study of Various Processed foods available in the market	Practical
2	Study of Different Methods of Food Preservation	Practical
3	Study of Different types of Drying Techniques	Practical
4	Study of Different types of Packaging Materials	Practical
5	Study of Different Food Industries in India	Practical

UNIT – II Processing of food products Fruit and vegetable processing, processing of meat and meat products, processing of milk and milk products, processing of marine products.

(1 Credit)

Practical: 0.4 Credit

S. No.	Name of practical	Nature
1	Processing of Fruits	Practical
2	Processing of Vegetables	Practical
3	Processing of Milk & Milk Products	Practical
4	Processing of Meat Products	Practical
5	Processing of Marine Products	Practical

UNIT – III Unit operations and Food Engineering Unit operations in food industry. Rheology of food.Basic principles of food engineering.Introduction to various food processing equipments.

(1 Credit)

Practical (0.2 Credits)

S. No.	Name of practical	Nature
1	Study of Various Food Processing Equipments	Practical
2	Study of Unit operations in Food Industry	Practical
3	Study of Food Rheology	Practical

Recommended Books:
1. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998
2. Vickie A. Vaclavik, Elizabeth W. Christian, Essentials of Food Science, Springer, 2008
3. B. Srilakshmi, Food Science, New Age International, 2007

III SEMESTER

Metabolism and Bioenergetics

Credits- 4

UNIT – I Bioenergetics and Carbohydrate metabolism Molecular basis of life, proteins, classification, structure, function, dynamics, specificity and techniques; Protein configuration, conformation, conformational analysis, Ramachandran's map and energy calculations; Helix to coil transition of proteins. Carbohydrates and lipids,classification, structure and function, membrane fluidity. Structural proteins, actin, myosin and muscle contraction**.**

(1 Credit)

Practicals: (0.4 credits)

Sr. no.	Name of practical	Nature
1.	**To understand the principle and operation of Spectrophotometer**	**Practical**
2.	**Determination of reducing sugars by Nelson- Somogyi's method** 1. Preparation of reagents 2. To perform the assay **3.** Observation and Calculations	**practical**
3.	**Determination of starch in plant Tissue** 1. Preparation of reagents 2. To perform the assay **3.** Observation and Calculations	**Practical**
4.	**Determination of Glycogen in Liver** 1. Preparation of reagents 2. To perform the assay **3.** Observation and calculations	**Practical**

UNIT – II Lipid Metabolism Nucleic acids, nomenclature, properties and techniques, backbone torsional angle and sugar conformation. Enzymes, introduction, classification, kinetics and Catalysis.Metabolism, basic concepts and design.

(1 Credit)

Practical (0.4 credit)

Sr. no.	Name of practical	Nature
1	**Extraction and estimation of total lipid content in the given sample of oilseed** 1. Preparation of reagents and extraction of total lipids 2. Estimation of total lipids	**Practical**
2	**Separation and identification of various lipids by Column Chromatography** 1. Preparation of reagents 2. Separation of Lipids 3. Identification of lipids	**Practical**
3	**Separation of various Components in different lipid fractions by thin layer chromatography** 1. Preparation of reagents 2. Separation of various components	**Practical**
4	**Estimation of Cholesterol content by Liebermann- Burchard method** 1. Preparation of reagents 2. To perform the assay 3. Observation and Calculations	**Practical**

UNIT – III Protein and Nucleic acid metabolism Carbohydrates and lipids,classification, structure and function. Metabolism of carbohydrates, glycolysis, citric acid cycle and oxidative phosphorylation, lipid, amino acid and nucleotide metabolism..Integration of metabolism, coordinated control and regulation.Photosynthesis, chloroplast, dark and light reactions.

(1 Credit)

Practical (0.2 credit)

Sr. no.	Name of practical	Nature
1.	**Estimation of protein by Lowry's method** 1. Preparation of reagents 2. To Perform the assay 3. Observation and Calculations	**Practical**
2.	**Determination of Protein by Bradford method** 1. Preparation of reagents 2. To perform the assay and calculation for the concentration of protein	**Practical**

Recommended text Books:

1. A.L. Lehninger, D.L. Nelson, M.M. Cox, " Principles of Boichemistry", 3rd Edn., Worth Publishers.

Reference Books:
1. Biochemistry by Voet and Voet
2. Biochemistry by U. Staynarayan
3. Biochemistry by LubertStryer. W. H. Freeman & Company, NY.
4. G. Zubay, "Biochemistry", 4th Edn.,McGrawhill Publishers.

References/Correlation with Ancient Indian Literature:

1. AsvalayanaGrhya Sutra II 7

   https://www.australiancouncilofhinduclergy.com/uploads/5/5/4/9/5549439/asvalayana-eng.pdf

2. Atharvedahttp://www.sacred-texts.com/hin/av.htm

3. Yajurvedahttp://vedicheritage.gov.in/science/

Basic Enzymology

Credits- 4

UNIT I Introduction & Classification ofenzymes Introduction– Characterstics of Enzymes, Concept of Activation energy, free energy, Difference between enzyme and biocatalyst, IUB enzyme classification (specific examples), enzyme specificity, methods for isolation, purification and characterization of enzymes

(1 Credit)

Practicals: (0.5credit)

Sr. no.	Name of practical	Nature
1	**To examine the effect of pH on activity of alkaline phosphatase** 1. Preparation of Reagents 2. To perform the assay 3. Observation and calculations	**Practical**
2	**To determine the temperature optima for alkaline phosphatase** 1. Preparation of Reagents 2. To perform the assay **3.** Observation and calculations	**Practical**
3	**Time course of enzymatic reaction** 1. Reagent preparation 2. To perform the assay and observe for the results	**Practical**

| 4 | **Specificity of enzyme action.**
   1. Preparation of Reagents
   2. To perform the assay and observation | **Practical** |

UNIT II Enzyme kinetics Kinetics of enzyme action –Concept of ES complex, active site, specificity, derivation of Michaelis-Menten equation for uni- substrate reactions. Different plots for the determination of Km & Vmax and their physiological significances. Importance of Kcat/Km. Kinetics of zero & first order reactions.Classification of multi-substrate reactions with examples of each class.Derivation of the rate of expression for Ping Pong, random & ordered Bi-Bi mechanisms. Use of initial velocity, inhibition and exchange studies to differentiate between multi-substrate reaction mechanisms.

(1 Credit)

Practicals: (0.5 credit)

Sr. no.	Name of practical	Nature
1.	**To understand the principle and operation of Spectrophotometer**	**Practical**
2.	**Influence of substrate concentration on the rate of enzymatic reaction**. 1. Preparation of Reagents 2. To perform the assay 3. Observation and calculations	**Practical**
3.	**Inhibition of enzyme activity Determination of K_i values** 1. Preparation of Reagents 2. To perform the assay **3.** Observation and calculations	**Practical**
4.	**Determination of β-amylase activity in germinating barley seeds** **1.** Preparation of Reagents **2.** To perform the assay **3.** Observations and calculations	**Practical**

UNIT III Enzyme Inhibition and Mechanism of Enzyme action(2) Reversible and irreversible inhibition. Competitive, non-competitive, uncompetitive, mixed type inhibitiors and their kinetics, determination of Ki and numerical based on these. Suicide inhibitor.Mechanism of Enzyme Action – Acid-base catalysis, covalent catalysis, proximity, orientation effect.Strain and distortion theory.Chemical modification of active site groups. Site directed mutagenesis of enzymes. Mechanism of action of chymotrypsin, lysozyme, glyceraldehyde 3-phosphate dehydrogenase, aldolase, carboxypeptidase, triose phosphate isomerase and alcohol dehydrogenase.

(2 Credit)

Recommended Text Books :
1. N.S. Kulkarni -General Enzymology

Reference Books
1. Travor and Palmer - Enzymology
2. A.L. Lehninger, D.L. Nelson, M.M. Cox, " Principles of Boichemistry", 3rd Edn., Worth Publishers.

References/Correlation with Ancient Indian Literature:

1. RasRatna Samuchchayhttps://www.exoticindiaart.com/book/details/rasa-ratna-samucchaya-NZI038/
2. RasayanShastra   https://www.pgurus.com/chemistry-ancient-india/

Technology of Milk & Milk Products

Credits- 4

Objective: Students would be able to understand the basics of milk and milk processing. Understand the importance of dairy, the techniques that can be used for preservation and manufacturing of various value added milk products. Understand the processing of various milk products like butter, ghee, flavored milk, yoghurt and shrikhand, ice cream, cheese, channa, paneer, condensed milk and milk powder.

UNIT – I Composition of Milk Milk: Definition, composition, and Present milk industry scenario and its future, Physical and chemical properties, Nutritive value of milk and milk products and its national and international standards. Practices related to procurement and transportation of milk, soy milk manufacturing and processing, Types of Milk- standardized milk, recombined milk, toned milk and double toned milk.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	To determine the titratable acidity of milk	Practical
2	Determination of Physico- chemical properties of Milk	Practical
3	To test the quality of milk using COB test	Practical

UNIT – II Testing & Microbiology of Milk Testing the authenticity of Milk & Milk Products: Detection of foreign fats, milk of other species, microbiology of milk, Spoilage of Milk, Good Hygeine Practices in Milk Processing: Principal Hazards, cleaning and disinfection agents and processes. Reception, cream separation.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	To conduct the platform test of milk sampling of dairy products	Practical
2	Detection of common adulterants in Milk	Practical
3	Separation and standardization of Milk	Practical

UNIT – III Processing of Milk & Milk Products Milk Processing: Clarification, Homogenization, Pasteurization, Sterilization of Milk, UHT Milk, Aseptic Packaging and Storage. Technology of Traditional Indian Dairy products, Technology of fat rich dairy products like Cream, Butter, ghee and margarine, Technology of fermented milk and probiotic milk based products, flavored milk.

(1 Credit)

Practical(0.2 Credits)

S. No.	Name of practical	Nature
1	Preparation of Flavored Milk	Practical
2	Preparation of traditional Indian dairy products	Practical
3	Preparation of white and salted butter and ghee	Practical

Recommended Text Books:
1. Many N.S. Shadakshasawamy M, Food Facts and Principles, New Age International, 2004.

Reference Books:
1. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998
2. Vickie A. Vaclavik, Elizabeth W. Christian, Essentials of Food Science, Springer, 2008

References/Correlation with Ancient Indian Literature:

- Prasna Upanishad 1-5https://esamskriti.com/Prasnopanishad-TNS-Complete.pdf

- Brihadaranyaka Upanishad (V.12)https://www.swami-krishnananda.org/brdup-audio.html

- ChhandogyaUpanishad (VII. 26)https://www.chinfo.org/images/userupload/Reflections/16_Bhumaiva_Sukham_Chand_7.pdf

Principles of Food Preservation

Credits- 4

Objective: This course deals with the techniques and principles involved in processing and preserving the various food products. The student will be able to apply the principles and methods involved in the processing of different foods and discuss their processing. They would understand important application of various preservation methods in food industries.

UNIT – I Water Activity & Moisture Removal Principles of food preservation, Asepsis, removal of microorganisms, Maintenance of anaerobic conditions, Methods of food preservation. Water Activity and Food Preservation, Free and Bound water, Effect of water activity on quality of food constituents during storage (proteins, lipids and carbohydrates) Effect on physical and nutritional quality, Water activity and food stability, Effect of packaging material on water activity.

(1 Credit)

Practical (0.4Credit)

S. No.	Name of practical	Nature
1	Measurement of water activity in Fresh fruits	Practical
2	Measurement of water activity in dehydrated fruits - Raisins, figs (dry), dried vegetable	Practical
3	Measurement of water activity in milk powder/instant coffee powder	Practical
4	Effect of packaging material on water activity	Practical
5	To see Osmosis in Raisins	Practical

UNIT – II Controlled Atmospheric Storage & Freezing (1-0.7) Preservation through temperature reduction, Storage of food at chilling temperature - behaviour, Refrigeration Controlled Atmosphere Storage (CAS), Modified Atmosphere Storage (MAS), Chilling defects Freezing-principles, fundamental aspects of freezing Freezing process-technological spects Freezing damage-osmotic damage, solute Structural damage Preservation by use of High Temperatures, Concentration of food Evaporation Freeze concentration, Membrane process for concentration.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	**Low Temperature processing** (i) Processed food / fruits / vegetables Banana, Sapota, Vegetables (ii) Processing of fruits and vegetables and storage at low various packaging material (after giving appropriate pre-treatment)	Practical
2	**Frozen food Processing** (i) Fruit pulp processing, packaging and freezing (using material and methods)	Practical
3	**High Temperature processing** (i) Experiments on Blanching of vegetables (ii) Experiments on sterilization	Practical
4	Experiments on concentration	Practical
5	Quality analysis of the products during storage, storage studies	Practical

UNIT – III Dehydration of foods & Preservation Techniques Dehydration of food (Food Preservation through water removal), Transport of water in foods, Different methods of dehydration, Cabinet drying, sun / solar drying, Osmo drying, Osmo-vac drying, micro-vac drying, vacuum drying,. Recent advances in dehydration of food. Freeze drying: Introduction, principles, process and preservation. Preservation using high Sugar-Jam, Jellies, Squashes, syrups, marmalades, cordials, concentrate etc. Salting preservation Use of common salt, principle, process Fish salting Pickling Pickle salting (sauerkraut, cucumber, Kim chi) Vegetable salting Acidified - brined pickles (vegetables-onion, garlic).

(1 Credit)

Practical (0.2 Credit)

S. No.	Name of practical	Nature
1	Dehydration : Cereal/Pulse based products (including comparative packaging) Banana powder, Potato and Sweet Potato powder appropriate pre-treatment)	Practical
2	Sugar based products: Jam making	Practical
3	Sugar based products – Jelly making	Practical
4	Salting: Salting of vegetables, Brining / preservation of vegetables in brine using variouscontainers	Practical
5	Effect of chemical preservatives (Benzoate, So2, salts (KMS, NaMs)	Practical

Recommended Text Books:

1. GiridhariLal, G.S. Siddappa and G.L. Tondon Preservation of Fruits and Vegetables, CFTRI, ICAR, New Delhi -12.
2. Diane M. Barrett, Laszlo Somogyi, HoshahalliRamaswamyProcessingFruits,IIedition,ScienceandTechnology,CRCPress

Reference Books:

1. B. Sivasankar, Food Processing & Preservation, PHI Learning Private Limited, 2002
2. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998

References/Correlation with Ancient Indian Literature:

1. Maitrayani Upanishad (VI. 9)https://www.yousigma.com/religionandphilosophy/maitrayani.html
2. Arunika Upanishad (Taitt. Up. II. 2)https://archive.org/stream/EssentialsOfUpanishadsKashyapR.L.SAKSI/Essentials%20of%20Upanishads%20%20%20Kashyap%20R.L.%20SAKSI_djvu.txt
3. (MahabharathaAnu.65-46)https://sanskritdocuments.org/mirrors/mahabharata/mbhK/mahabharata-k-01-sa.html
4. Atharva Veda (2-13-1).http://www.sacred-texts.com/hin/av/index.htm

Biostatistics

Credits- 3

UNIT-I Classification and Tabulation of Data Classification and tabulation of data ,Frequency distribution Histogram , Frequency polygon and frequency curve ,Cumulative frequency curves, Measures of central tendency: arithmetic mean geometric mean harmonic mean median, mode; Measures of dispersion: range, quartile deviation, mean deviation, variance and standard deviation; Correlation: karl Pearson's correlation coefficient, Spearman's rank correlation coefficient, Spearman's rank correlation coefficient, Regression: Lines of regression and regression coefficient.

(1 Credit)

Practical (0.5 Credit)

Sr. no.	Name of practical	Nature
1.	To find out Mean	Practical
2.	To find out Median	Practical
3.	To find out Mode	Practical
4.	To draw Bar Graph	Practical
5.	To draw Pie diagram	Practical

UNIT-II Vital Statistics Vital statistics: Concept, importance, Vital index, Birthrates: CBR,GFR,SFR,TFR, Death rates: CDR, SDR, STDR, Life tables: introduction, Description and uses, Sampling: concept of population and sample, Sampling distribution and standard error of sample mean and sample proportion, Hypothesis testing, type I& II errors, Level of significance, Critical region, acceptance region, p-values of the statistics, confidence limits.

(0.5 Credit)

Practical (0.5 Credit)

Sr. no.	Name of practical	Nature
1.	To draw Histogram	Practical
2.	To draw line graph	Practical
3.	To find out correlation	Practical
4.	To find out rank correlation	Practical
5.	To draw Histogram	Practical

UNIT-III ANOVA and sampling Large sample tests (normal test): Test for one sample proportion and two sample proportion test, Small sample tests : t-test (test for one and two sample means): F-test, Chi square test (goodness of fit test, test of independence, homogeneity of samples), Analysis of variance (ANOVA);One way and two way analysis of variance, Application of these tests to analyze the biological data.
(0.5 Credit)

Recommended Text Books:

1. Elements of Biostatistics; S. Prasad; Rastogi Publications, Merrut
2. Elements of Mathematical Statistics; S.C.Gupta and V.K. Kapur; Sulatanchand& Sons, New Delhi

Reference books:
1. Statical methods in Biology; T.I. Norman; Bailey,3rd edition
2. Fundamentals of Mathematics; S.C. Gupta andV.k. kapur; Sultan Chand& sons , New Delhi

References/Correlation with Ancient Indian Literature:

1. Sankhyā: The Indian Journal of Statistics Published by: Indian Statistical Institute https://www.springer.com/statistics/journal/13171
2. The Sulba Sutras   http://www-history.mcs.st-and.ac.uk/Projects/Pearce/Chapters/Ch4_2.html
3. "History of Hindu Mathematics, Asia Publishing House, Bombay, 1962"https://link.springer.com/article/10.1007/BF02836134

Food Microbiology & Safety

Credits- 4

Objective: Students would be able to acquaint the knowledge of the important genera of microorganisms associated with food and their characteristics. They would be able to explain the role of microbes in fermentation, spoilage and food borne diseases. Gain Knowledge of Food safety and hygiene, types of hazards associated with food and understand the current Food Regulations.

UNIT – I Introduction to food microbiology & food Borne Diseases

Introduction to Food Microbiology, History of food Microbiology, Scope of Food Microbiology, and Types of organisms associated with food: Bacteria, Fungi, Yeast, and Mold. Growth Kinetics and factors affecting growth of microorganisms. Sources of Microbial contamination on foods, Sources of Microbial contamination in food and its control .Food Microbiology and Public Health- Food Poisoning, Food Poisonings due to pathogens, important features. Bacterial Agents of food borne illness- a brief account of various organisms related with food poisoning. Food Borne Diseases.

(1 Credit)

UNIT – II Role of Microorganisms & Techniques in Microbiology

Beneficial Role of microorganisms in foods.Introduction to Biotics & Probiotics. Screening, Detection and enumeration techniques including rapid detection techniques for food micro flora including pathogens, Requirement of Microbiology laboratory for food analysis, preparation & maintenance of cultures, media, sterilization techniques, disposal of used cultures and media detection and detection techniques of microorganisms in foods: culture, microscopic examinations, physical, chemical and immunological methods of microbial detection.

(1 Credit)

Practical (0.5Credits)

S. No.	Name of practical	Nature
1	Preparation of common laboratory &Special media for cultivation of bacteria, yeast & molds	Practical
2	Staining of bacteria: Gram's Staining, Acid- Fast, Spore, Capsule and Flagellar Staining, Motility of Bacteria	Practical
3	Study of environment around us as sources of transmission of microorganisms in foods- assessment of surface sanitation of food preparation units- swab and rinse techniques	Practical
4	Isolation of Microorganisms- different methods & maintenance of cultures of microorganisms	Practical
5	Bacteriological analysis of foods	Practical
6	Bacteriological Analysis of water: MPN	Practical
7	Bacteriological Analysis of Milk: MBRT	Practical
8	To perform various tests used in Identification of commonly found bacteria in foods: IMVIC, Urease	Practical
9	To perform various tests used in Identification of commonly found bacteria in foods: H2S, Catalase	Practical
10	To perform various tests used in Identification of commonly found bacteria in foods: Coagulase, Gelatin & Fermentation (Acid/ Gas)	Practical

UNIT – III Quality Control & Assurance Quality Control/Quality Assurance, Legislation for food safety- national & International criteria, sampling Schemes. Records, risk analysis, risk management. CC- Microbial source, code indicators of food safety and quality: Microbiological criteria of foods and their significance. The HACCP system and Food Safety Management Systems used in controlling microbiological hazards.
(1 Credit)

Practical (0.5 Credits)

S. No.	Name of practical	Nature
1	To study the implications of HACCP in relation to a food industry	Practical
2	To study the available rapid methods & diagnostic kits used in identification of microorganisms or their products.	Practical
3	To study a food processing unit dealing with advanced methods in food microbiology	Practical

Recommended Books:

1. James M.J. (2000) Modern Food Microbiology, 5th edition, CBS Publishers.

Reference Books:

1. Adams M. R. & Moss, M.O (1995) Food Microbiology, New age International Pvt. Ltd Publishers.

References/Correlation with Ancient Indian Literature:

- Gita14.17http://en.krishnakosh.org/krishna/Gita_14:17
- Chandogya Upanishad VI.6.5https://www.chinfo.org/images/userupload/Reflections/14_Chandogya_Chap_6-Tat_Twam_Asi.pdf
- Taittiriya Upanishad, III.vii.1https://www.hinduwebsite.com/taittiriya-upanishad.asp

IV SEMESTER

Food Packaging Technology

Credits- 4

Objective: On successful completion of the course students will be able to:

1. Describe the role and function of packaging materials used for a range of consumer food needs and wants.
2. Relate the properties of food packages to conversion technologies, processing and packaging technologies and user requirements including safety, convenience and environmental issues.
3. Describe the technology involved in the production, shaping and printing of various packaging materials and packages.

UNIT – I Packaging Machineries & Materials Packaging Machineries, Systems and Regulations, Introduction to Food Packaging: History, Definitions, Importance and scope functions of packaging, package components. Packaging Materials and Properties: Manufacturing process, types, properties, advantages and disadvantages. Primary Packaging Materials: Paper and paper based packaging materials, Plastic as packaging materials: Brief history, processing, classification, mechanical, optical and barrier properties like WVTR, GTR, additives in plastics. Aluminum foil, Metal packaging materials: Manufacture of tin plate, TFS, fabrication, corrosion and remedial measures. Glass packaging materials: Composition, structure, properties, manufacture, design and closure.

(1 Credit)

Seminar (0.5Credits): Seminar based on Unit I is recommended

UNIT – II Packaging Requirement of different foods Secondary Packaging Material: Folding carton. Transport packaging materials- corrugated fiber board boxes, properties of corrugated fiber board boxes; drop strength, compression strength and puncture resistance strength, wooden boxes. Ancillary Packaging Materials: Printing inks, varnishes, lacquers and adhesives. Packaging Requirements of Different Types of Foods : fruits and vegetables, meat, fish, poultry, dairy products, edible oils and spice products, bakery products, confectioneries, Instant foods, extruded foods, snack foods, alcoholic and non-alcoholic carbonated beverages.

(1 Credit)

Practical (0.3Credit)

S. No.	Name of practical	Nature
1	Determination of Puncture Resistance Strength of CFB boxes.	Practical
2	Determination of Compression Strength of CFB boxes	Practical
3	Determination of Drop Strength of CFB boxes.	Practical

Group Discussion (0.2 Credits): Group Discussion based on Unit II is recommended

UNIT – III Packaging Machineries, Systems and Regulations Packaging Machineries, Systems and Regulations:- Packaging, Machineries: Bottling, canning, capping, labeling, form- fill sealing, strapping, cartonning machineries. Packaging Systems:, Vacuum and gas packaging, aseptic packaging, retort packaging, CAP & MAP, active packaging, shrink packaging, lined cartonning, system. Packaging Standards and Regulations: Laws, regulations, specifications and quality control, recycling of plastic packaging materials: Collection, separation and disposal.

(1 Credit)

Recommended Text Books:

1. Roberston G.L. (2006) Food Packaging: Principles and Practice. 2nd edition, Taylor and Francis Group.
2. Mattsoon B. and Sonesson U. (2000) Environmentally-friendly food processing. Woodhead publishing ltd.

Reference Books:
1. Ahevenainen R. (2003). Noval food packaging techniques. Woodhead publishing ltd.

Meat, Fish and Poultry Product Technology

Credits- 3

Course Outcome-On successful completion of the course students would be able to develop the knowledge in the area of animal product processing and technology. They would be able to appreciate the application of scientific principles in the processing and preservation of these materials.

UNIT – I Introduction to Meat & its microbiology Introduction to meat; Meat production, processing and composition trends and nutritive value; Slaughtering techniques of animal and slaughtering practices; Meat cuts and portions of meat; Meat quality; Inspection and grading of meat; Physicochemical composition of muscle, connective tissue, intramuscular fat; Post-mortem changes in muscle; Conversion of muscle to meat. The eating quality of meat - color, water holding capacity (WHC) and juiciness, texture and tenderness, odor and taste; Meat microbiology and safety.

(1 Credit)

UNIT – II Meat processing & Egg quality Meat processing- comminution, emulsification, curing, smoking, cooking, ageing and tenderization; Meat products - meat emulsion, fermented meats, sausages, ham, bacon and comminuted meat products; Meat analogs; Meat storage and preservation- by temperature control (refrigeration, freezing, thermal processing), by moisture control (dehydration, freeze drying, curing, IMF meat), by microbial inhibition (chemical preservation, ionizing radiation); Meat production, processing and consumption trends. Egg and egg products- Structure, composition and functions of eggs; Changes in eggs due to aging; Abnormalities in eggs; Functions of eggs in food products; Inspection and grading for egg quality.

(1 Credit)

UNIT – III Fish processing & preservation Fish as raw material for processing and its physical properties. Factors affecting the quality of product and post-harvest losses. Chilling and freezing of fish and other aquatic products. Physical, chemical, microbiological and sensory changes during storage. Principles of thermal processing. decimal reduction time, thermal death time, "Z" and "F" values, 12D concept, determination of process time. Canning process for fish/shellfish.Value added and ready to use canned products. Retort pouch processing of fish and fishery products principles and techniques. Nutritional importance of fish meal and quality requirements. Value added products of fish: Present market trends, scope and types of value addition, Important value added products.

(1 Credit)

Recommended Text Books:
- Vaclavik V.A. and Christian EW (2003), Essentials of food science, 2nd edition, Springer International.
- Laurie R.A. (1998), Lawrie's meat Science, 6th edition, Woodhead Publishing Ltd..

Reference Books:
1. Stadelman W.J. and Cotterill O.J. (2001), Egg science and technology, CBS Publishers.
2. Pearson A.M. and Gillett T.A. (1996), Processed Meats, CBS Publishers.
3. Stadelman W.J., Olson V.M., Shemwell G.A. and Pasch S. (1988), Egg and poultry meat processing,
4. Elliswood Ltd.

Dairy Plant Management

Credits- 3

Objective: Students would be able to define management, production planning and control. They would learn about energy conservation, auditing, financial and managerial efficiency and will be able to know about safety hazards, prevention and breakdown maintenance.

Unit I Production Management Production Management: Definition, Function and structure of Production Management, Production planning & Control, Work study and measurement moiton and time study, Plant Operations.

(1 Credit)

Unit II Managerial Efficiency Efficiency factors losses, Financial and Managerial efficiency, Provision for Industrial Legislation in India, Particularly in dairy industry, Personal Management. Manpower planning, recruitment, training, transfer, promotions policies, Job specifications, Job evaluation, Job enhancement, Job enrichment, MBO, working conditions.

(1 Credit)

Unit III Safety hazards & Prevention Safety hazards, hazards prevention security for plant machinery and the employees, Plant Maintenance. Prevention & Break-down maintenance Spare parts inventory, tools & lubricants etc. Food hygiene, personnel hygiene, plant hygiene, water quality etc. Cleaning and Sanitation – different type of cleaning and sanitizing agents, Effluent treatment: Type, degree and treatment of waste.

(1 Credit)

Recommended Text Books:
1. Martin 1872- Mortensen,Management of Dairy Plants,Wentworth Press

Reference Books:
1. J David,Contemporary Trends in Dairy Plant Management – 2007,Kitab Mahal Agencies

Waste Management of Food Industries

Credits- 3

Objective:- By the end of semester students will be able to understand and analyze different types of food industry wastes their Classification, their special characteristics and management of wastes from different food processing industries. The students will also acquaint knowledge about food industry waste by products.

UNIT – I Classification and characterization of food industrial wastes Introduction: Classification and characterization of food industrial wastes from fruit and vegetable processing industry, beverage industry, fish, meat and poultry industry, sugar industry and dairy industry; Waste disposal methods – physical, chemical and biological; Economical aspects of waste treatment and disposal.

(1 Credit)

UNIT – II Treatment methods for liquid wastes from food process industries Treatment methods for liquid wastes from food process industries; Design of activated sludge process, Rotating biological contactors, Trickling filters, UASB, Biogas plant. Treatment methods of solid wastes: Biological composting, drying and incineration; Design of solid waste management system: Landfill digester, Vermicomposting pit.

(1 Credit)

UNIT – III Biofilters and bioclarifiers Biofilters and bioclarifiers, Ion exchange treatment of waste water, Drinking-water treatment, Recovery of useful materials from effluents by different methods.

(1 Credit)

Recommended Text Books:
1. Food Industry Wastes: Disposal and Recovery; Herzka A & Booth RG; 1981, Applied Science Pub Ltd.
2. Water & Wastewater Engineering; Fair GM, Geyer JC & Okun DA; 1986, John Wiley & Sons, Inc.
3. Wastewater Treatment; Bartlett RE; Applied Science Pub Ltd.
4. Symposium: Processing Agricultural & Municipal Wastes; Inglett GE; 1973, AVI.

Reference Books:
1. Food Processing Waste Management; Green JH & Kramer A; 1979, AVI.
2. Environmental Biotechnology: Principles and Applications; Rittmann BE & McCarty PL; 2001, Mc-Grow-Hill International editions.
3. Environmental Biotechnology; Bhattacharyya B C & Banerjee R; Oxford University Press.

References/Correlation with Ancient Indian Literature:

- Ganguli, K.M. (1883-1896) "Adi Parva" in The Mahabharata of Krishna-DwaipayanaVyasa (12 Volumes). Calcuttahttps://archive.org/stream/TheMahabharataOfKrishna-dwaipayanaVyasa/MahabharataOfVyasa-EnglishTranslationByKMGanguli_djvu.txt
- Dutt, M.N. (1895) The Mahabharata (Volume 1): Adi Parva. Calcutta: Elysium Presshttps://www.wikizero.com/en/Adi_Parva
- Debroy, B. (2010) The Mahabharata, Volume 1. Gurgaon: Penguin Books India, pp xxiii - xxvihttps://www.wikizero.com/en/Anushasana_Parva

- "Book 1: AdiParva: JatugrihaParva". Sacred-texts.com. Retrieved 1 September 2010https://wikivisually.com/wiki/Mahabharata

Fruits & Vegetable Processing Technology

Credits- 4

Objective: The course would furnish and acquaint a student with knowledge and understanding of the basic post harvest biological, chemical, physiological and metabolic processes and changes in fruits and vegetables. They would even learn the basic steps, application and operation of selected technologies and principles used to process, preserve and extend shelf life and value addition.

UNIT – I Post Harvest Technology Fruits and vegetables as living products: Current status of production and processing of fruits and vegetables. Chemical composition; pre and post harvest changes, harvesting and maturity standards for storage, and desirable characteristics of fruits and vegetables of processing. Post harvest treatments to enhance shelf-life, conditions for transportation and storage. Pre- cooling.

(1 Credit)

UNIT – II Types of Processing Treatments Cold chain & low temperature preservation: Types of cold preservation; Types of freezers and freeze concentrators, Cooling above freezing point, Cooling below freezing point. Control & modified atmosphere storage. Thermal processing: Canning and bottling, effect of canning and bottling on nutritive value, spoilage of canned foods, detection and control. Dehydration of Fruits & Vegetable: Thermal, Osmotic. Products processing: Juice extraction and preparation of syrups, squashes, cordials, nectars; Jam, jelly, marmalade, preserves and candies; ketchup, pickles, chutneys and sauces; fruit juice concentrates and powders; fortified soft drinks, tomato product, vinegar; cut fruits and vegetable, fruit toffee; fruit flavors and essences.

(1 Credit)

Practical (1 Credit)

S. No.	Name of practical	Nature
1	**Estimation of benzoic acid**	**Practical**
2	**Estimation of So2 in processed fruit products**	**Practical**
3	**Pectin determination in fruits and vegetable products**	**Practical**
4	**Preparation fruit juices and its concentrate**	**Practical**
5	**Preparation of tomato products- ketchup**	**Practical**

UNIT – III Packaging & By- Products Basics of Packaging materials & containers: Tin, glass, plastic and other packaging materials used in fruits and vegetables preservations. Modified atmosphere and active packaging, By-products utilization: Fruit & vegetable processing industry waste treatment, disposal and reuse. Emerging technologies for fruit and vegetable processing.

(1 Credit)

Recommended Books:
1. Fruits and Vegetables. A.K Thompson. Blackwell publishing S. Ranganna, Hand Book of Analysis and Quality Control for Fruits and Vegetable Products, Tata McGraw Hill, 2002.
2. L. Somogyi, Processing Fruits: Science and Technology, Vol I: Biology Principles and Applications, Woodhead Publishing, 1996.

References/Correlation with Ancient Indian Literature:
- Mantra (4-21-6) of the Atharva veda http://www.sacred-texts.com/hin/av.htm
- Atharva Veda's Mantra 18-4-16 http://dahd.nic.in/hi/related-links/annex-v-ii-2-superiority-cow-milk-paper-sh-ik-narang
- Rigveda (10-179-3) http://www.gatewayforindia.com/vedas/rigveda/rigveda10.shtml

V SEMESTER

Food Additives & Ingredients

Credits- 4

Objective: Students would be able to acquire knowledge tools of the most important classes of chemical food additives, their technological use for the adding in certain food preparations and for a sustainable use. In addition students will have notions on food contaminants, their presence or delivery in food approaches to limit and control them.

UNIT – I Additives in Food Processing & Preservation (1.0-0.3) Additives in food processing and preservation - classification and their functions, Safety and quality evaluation of additives and contaminants, acute and chronic studies, NOAEL, ADI, Ld50. Indirect food additives. Various additives such as preservatives, antioxidants, antimicrobials, colors, flavor, emulsifiers, sequesterants, humectants, hydrocolloids, sweeteners, acidulants, anticaking, agents, buffering salts etc. with respect to chemistry, food uses and functions in food formulations Acids, bases and buffers.

(1 Credit)

Practical (0.3 credit)

S. No.	Name of practical	Nature
1	Techniques of quality assessment of fruits & vegetables	Practical
2	Techniques of quality assessment of cereals & pulses	Practical
3	Techniques of quality assessment of dairy products	Practical
4	Identification of food preservatives	Practical
5	Ingredient study of food product label	Practical

UNIT – II Flavor Technology(1-0.3) Flavor Technology: Types of flavors, flavors generated during processing - reaction flavors, flavor composites, stability of flavors during food processing, analysis of flavors, extraction techniques of flavors, flavor emulsions, essential oils and oleoresins, authentication of flavors etc.

(1 Credit)

Practical (0.3 Credit)

S. No.	Name of practical	Nature
1	Sensory evaluation of food attributes	Practical
2	Effect of processing on sensory evaluation of food attributes	Practical
3	Identification of various food flavors	Practical
4	Effect of flavor on sensory evaluation of food products	Practical

UNIT – III Food Ingredients (1.0-0.4) Ingredients used in food production e.g. sugar, starches/modified starches, fibres, proteins/protein hydrolysates and fats etc and their technology of production and application. Sugars and Sweeteners: Sugars, syrups, sugar alcohols, potent sweeteners, sugar products, caramelization. Sweetener chemistry related tousage in food Products Food Colors: Food colours - Types and properties, regulatory aspects, safety issues - natural food colours - heme pigments, chlorophylls, carotenoids, anthocyanins and flavonoids, tannins, caramel and others Artificial food colours.

(1 Credit)

Practical (0.4 credit)

S. No.	Name of practical	Nature
1	Collection of various food ingredients	Practical
2	Preparation of caramelized products	Practical
4	Food safety in food ingredients	Practical
5	Effect of artificial color on sensory quality of food	Practical
6	Identification and collection of various food colors	Practical

Recommended Text Books:

1. Branen, A. F. et al (2001). Food Additive s, 2nd Edition, Marcel Dekker.
2. George, A. B. (1991). Encyclopedia of food and color additives, Vol III, CRC Press.

Reference Books:

1. Nakai, S. and Modler, H. W (2000). Food proteins. Processing Applications, Wiley
2. Food Quality Assurance-Principles and Practices - Inteaz Ali, CHIPS, Texas.

Cereal, Pulse & Oilseed Technology

Credits- 4

Objective - Students would be able to understand basic composition & structure of food grain and understand the basics of milling operations. They would learn processing of food grains into value added products and how to manage production, distribution & storage of grains and even understand the principle of alcoholic beverage preparation.

UNIT – I Cereals Processing Wheat Processing: Wheat classification, wheat grain structure quality and milling Functionality of wheat flour components and bakery ingredients. Rice Processing: Classification, paddy Processing and treatment for quality improvement, Milling and sorting, By product utilization e.g. Bran: Novel product development – Instant Rice, puffed products etc. Coarse Cereals Products: Maize, sorghum, pearl millet and small millets processing and value addition.

(1 Credit)

Practicals (0.4 credit)

Sr No.	Name of practical	Nature
1	Milling of wheat with emphasis on quality and recovery.	Practical
2	Milling of rice with emphasis on quality and recovery.	Practical
3	Milling of sorghum with emphasis on quality and recovery.	Practical
4	Milling of maize with emphasis on quality and recovery.	Practical
5	Milling of pearl millet with emphasis on quality and recovery.	Practical

UNIT – II Pulse Processing Pulses: Pretreatment of pulses for milling, Methods of pulse milling, milling of major pulses. Methods to improve recovery. Oil seeds Processing: Groundnut, Mustard, Soybean, Sunflower, Safflower, Sesame and other oil bearing materials, By products of oil milling.

(1 Credit)

Practicals (0.4 credits)

Sr No.	Name of practical	Nature
1	Pulses: Milling characteristics and effect of treatments on recovery.	Practical
2	Determination of triglyceride composition of oils	Practical
3	Milling of oilseeds	Practical
4	Pretreatment of pulses for milling	Practical

UNIT – III Soyabean& Extrusion Technology Special Topics: Processing & Utilization of Soya bean for value added products, Innovative products from cereals, pulses and oilseeds. Extrusion technology for cereals.

(1 Credit)

Practicals(0.2 credit)

Sr No.	Name of practical	Nature
1	Preparation of Soy-Milk	Practical
2	Preparation of tofu	Practical
4	Preparation of soy-snacks	Practical
5	Preparation of Soy-Milk based products	Practical
6	Development of Bakery and other products	Practical

Recommended Text Books:
1. Wheat Chemistry and Technology by Y. Pomeranz

Reference Books:
1. Post Harvest Technology of Cereals by Chakraborty AC

References/Correlation with Ancient Indian Literature:
1. Arthasastrahttps://sanskritdocuments.org/doc_z_misc_sociology_astrology/artha.html?lang=sa
2. Manusmrtihttps://sanskritdocuments.org/sanskrit/samajashastra/
3. Kasyapasamhitahttps://sanskritdocuments.org/sanskrit/vedanta/

Basic Food Engineering

Credits- 3

Objective: Student would learn to Emphasis the various properties of the raw material used in food processing, different processing technologies required in transforming them into quality food products and material handling equipment involved in food processing operations.

UNIT – I Materials Handling Material Handling- Theory, Classification of various material handling equipments- conveyors (gravity & powered conveyors), elevators (bucket & screw type elevators), trucks) high lift & pallet trucks), cranes and hoists. Cleaning- types of contaminants found on raw foods, aims of cleaning, methods of cleaning- dry, wet and combination methods, Dry cleaning methods: screening, aspiration, magnetic cleaning and abrasive cleaning, Wet cleaning methods: soaking, spray washing, floatation washing and ultrasonic washing.

(0.5 Credit)

UNIT – II Sorting & Grading Sorting & Grading- Advantages of sorting & grading, grading factors, methods of sorting and grading, Size Reduction: reasons/ Benefits of size reduction, nature of forces used in size reduction, criteria of size reduction, equipment selection (hardness of feed, mechanical structure of feed, moisture content and temperature sensitivity of feed), mode of operation of size reduction equipment – open circuit and closed circuit grinding, free crushing, choke feeding and wet milling.

(0.5 Credit)

Practical (0.5 Credit)

S. No.	Name of practical	Nature
1	Sieve Analysis of mean particle diameter	Practical
2	Sorting & Grading of foods	Practical
3	Energy Requirement for size reduction using different mills	Practical

UNIT – III Mixing & Conveying Mixing Terminology (agitating, kneading, blending, and homogenizing), Mixing equipments- mixers for blending and homogenizing). Mixing Equipments- mixers for liquids of low or moderate viscosity (Paddle agitators, turbine agitators and propeller agitators), mixers for high viscosity pastes (Pan mixers, horizontal mixer and dough mixer), mixers for dry solids (tumbler mixer & vertical screw mixer), effects of mixing on foods.

(1 Credit)

Practical (0.5 Credit)

S. No.	Name of practical	Nature
1	Mixing indices for mixing solids	Practical
2	Power consumption for mixing of liquids using different impellers	Practical

Recommended Books:
1. Earle, R. L. (1983) Unit Operations in Food Processing, 2nd edition, Pergamon Press, Oxford, U.K

Reference Books:
1. Introduction to Food Engineering (Food Science and Technology), by R Paul Singh, Dennis R. Heldman, 2013

References/Correlation with Ancient Indian Literature:
- Raghuvamsa,https://sanskritdocuments.org/sanskrit/major_works/
- Kumarasambhavahttps://sanskritdocuments.org/sanskrit/major_works/
- Malavikagnimitrahttps://archive.org/stream/cu31924022967578#page/n9/mode/2up

Food Storage & Transport Engineering

Credits- 2

Objective: The course would help students in acquiring and applying basic knowledge of Food storage and transport technologies. Course will emphasize on the characteristics of fresh produce, important environmental factors affecting produce quality, optimum storage conditions and harvesting.

UNIT – I Food Science & Transport of Foods Food science and the transport of food: Composition of food, Chemical reactions in foods, Physical changes in foods: crystallization phenomena, Microbiology and food transportation. Food Transport: Controlled Atmosphere: The Biology of Controlled Atmospheres, Techniques in Controlled Atmosphere Storage, Modified Atmosphere Packaging. Food Storage, Handling & Transportation: Bulk storage system: Metallic bins, silos.

(0.5 Credit)

UNIT – II Modes of Transport of Foods Transport of food stuffs by sea: Cooling of cargo in transit, Conventional refrigerated ships, Container ships, Need for refrigeration. Air transport of perishables: Cargo space, Unit load, devices: containers and pallets, Transport of fruit and vegetables : Post-harvest behavior of fruit and vegetables, Pre-cooling and the cold chain, Product requirements during transport, Storage temperature management. Product deterioration, Land transport, Shipping, Air freight Insurance.

(1 Credit)

UNIT – III Legislation & Hygiene Hygiene in food transport : Basic hygiene requirements, Shipping container loading, Inspection of incoming carriers, Quality systems in food transportation, Quality and safety in food transportation, History of quality management in food transportation, Standards for quality systems, Benefits of implementing a quality management system, Clauses of ISO9002,HACCP: A food safety management system. (0.5 Credit)

Recommended Books:
1. IGNOU-2006 Food Processing and Engineering -II, Practical Manual, www.ignou.ac.in.
2. Norman N. Potter, Joseph H. Hotchkiss. Food Science, Springer, 1998

Reference Books:
1. Marcus Karel,OwenR.FernnemaPhysicalprinciplesFoodScience,PartIandIIMarcelDekkerinc

References/Correlation with Ancient Indian Literature:

- Matsyapuranahttps://sanskritdocuments.org/sanskrit/purana/
- Markandeypuranahttps://sanskritdocuments.org/sanskrit/purana/
- Agnipuranahttps://sanskritdocuments.org/sanskrit/purana/

Food Laws Standards & Regulations

Credits- 3

Objective: Students would be able to understand the concept of food safety, types of hazards and their control measures. They would be able to identify and prevent potential sources of food contamination. Understand the need of hygiene and sanitation for ensuring food safety, knowledge of Food Safety Management tools and understand National and International Food Safety Laws and Regulations.

UNIT – I Food Hazards & Contamination and their prevention Introduction, concept of food safety and standards, food safety strategies. Food hazards and contaminations - biological (bacteria, viruses and parasites), chemical (toxic constituents / hazardous materials) pesticides residues / environmental pollution /chemicals) and physical factors.Preventive food safety systems - monitoring of safety, wholesomeness and nutritional quality of food.Prevention and control of microbiological and chemical hazards.Food safety aspects of novel methods of food processing such as PEF, high pressure processing, thermal and non thermal processing, irradiation of foods.

(1 Credit)

UNIT – II Different Acts of Food Safety Indian and Food Regulatory Regime (Existing and new), PFA Act and Rules, Food Safety and Quality Requirements, Additives, Contaminants and Pesticide Residue. Food Safety and Standards Act, 2006, Essential Commodities Act, 1955, Global Scenario, Codex Alimentarius, WHO/FAO Expert Bodies (JECFA/ JEMRA/JMPR) WHO/FAO Expert Bodies (JECFA/ JEMRA/JMPR). Food safety inspection services (FSIS) and their utilization.

(1 Credit)

UNIT – III Quality Marks & Standards Introduction to OIE & IPPC, Other International Food Standards (e.g. European Commission, USFDA etc). WTO: Introduction to WTO Agreements: SPS and TBT Agreement, Export & Import Laws and Regulations, Export (Quality Control and Inspection) Act, 1963. Customs Act and Import Control Regulations, Other Voluntary and mandatory product specific regulations, Other Voluntary National Food Standards: BIS Other product specific standards; AGMARK. Nutritional Labeling, Health claims Voluntary Quality Standards and Certification: GMP, GHP, HACCP, GAP, Good Animal Husbandry Practices, Good Aquaculture Practices ISO 9000, ISO 22000, ISO 14000, ISO 17025, PAS 22000, FSSC 22000, BRC, BRCIOP, IFS, SQF 1000, SQF 2000. Role of NABL, CFLS.

(1 Credit)

Recommended Text Books:
1. Singal RS (1997). Handbook of indices of food quality and authenticity. Woodhead Publ. Cambridge, UK.
2. Shapton DA (1994). Principles and practices of safe processing of foods. Butterworth Publication, 3. London. Winton AL (1999). Techniques of food analysis, Allied Science Publications NewDelhi.

Reference Books:
1. Pomeranze Y (2004). Food analysis - Theory and Practice CBS, Publications, New Delhi.

References/Correlation with Ancient Indian Literature:
- Maitrayaniyasamhitahttps://sanskritdocuments.org/sanskrit/purana/
- Rasa-]ala-Nidhi or Ocean of Indian chemistry and alchemy/vol.vIEd.1984/AvaniPrakashan,Ahmedabad,India;CharakSamhitahttp://www.carakasamhitaonline.com/mediawiki-1.28.2/index.php?title=Main_Page
- **AvS'5/23/5;Medicine in the Veda Ikenneth Zysk**http://www.new.dli.ernet.in/handle/2015/201547

Modern Baking & Confectionary Technology

Credits- 3

Objective: Upon successful completion of the course, the student will be able to identify and explain baking terms, ingredients, equipment and tools and employ safe food handling practices using contemporary guidelines. They would acquire the knowledge of the technologies behind bakery products and understand trends in bakery industry.

Unit-I Traditional Bakery Products Introduction: Status of bakery and confectionery industries in India- Raw materials for bakery and confectionery products-Essential and optional. PFA Specification of raw materials. Bakery products technology: Dough rheology – Bread making- methods process-specification for various types of breads-Biscuit manufacturing process-Cookies- Crackers- Cakes- Buns-Petties preservation of bakery products.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	Production of bread in pilot plant.	Practical
2	Production of biscuits in pilot plant.	Practical
3	Production of cookies in pilot plant	Practical
4	Production of cake in pilot plant	Practical
5	Production of petties in pilot plant	Practical

Unit – II Bakery Machinery & Equipment Bakery machinery and equipment: Weighing Equipment- Manual scale, Automatic weigh, liquid measuring. Mixing- blenders, Horizontal and vertical planetary, continuous. Make up equipment-Divider, Rounder, Proofer, Moulder. Baking equipment – different oven, slicer.

(1 Credit)

Practical (0.4 Credit)

S. No.	Name of practical	Nature
1	Visit & Study of Bakery pilot plant of the University.	Practical

Unit – III Confectionary products Confectionery products: chocolate, fondant, caramels, fudge and toffee. Equipment and process. Safety and sanitation: Health and safety- safety rules- safe practices in the work places-sanitationduties of the sanitation equipments- Code for hygiene condition in bakery and biscuit manufacturing unit.

(1 Credit)

Practical (0.2 Credit)

S. No.	Name of practical	Nature
1	Production of toffee.	Practical
2	Production of chocolate.	Practical

Recommended text books
1. Textbook of Bakery and Confectionery, by Ashokkumar Y Prentice Hall India Learning Private Limited; 2 edition (2012)

Reference Books:
1. Theory of Cookery,Oxford University Press,1st Ed, by Parvinder S. Bali 2017
2. A Professional Text To Bakery And Confectionary, John Kingslee, New Age International, 2006

References/Correlation with Ancient Indian Literature:
1. **Atharvaveda**http://www.sacred-texts.com/hin/sbe42/index.htm
2. **Taittiriyasamhita**http://www.sacred-texts.com/hin/#other
3. **V¡jasaneyisamhita**http://www.sacred-texts.com/hin/#other
4. **Maitrayaniyasamhita**http://www.sacred-texts.com/hin/#other

VI SEMESTER

Food Process Technology

Credits- 4

Objective: Students will understand the basic concepts in food science and will get knowledge of the different food preparation methods. They will understand the requirement of food with respect to energy, food and consumer safety, nutrients and their impact on health. They will get the knowledge of nutritive value of cereals, pulses, nuts, fruits and vegetables, ant nutritional factors, germination of pulses, factors affecting cooking.

Unit I Processing of Cereals & Millets (1.0-0.5) Storage of cereals, Infestation control; Drying of grains, Processing of rice and rice products.Milling of wheat and production of wheat products, including flour and semolina.Milling of corn, barley, oat, coarse grains including sorghum, ragi and millets; Processing of tea, coffee and cocoa.

(1 Credit)

Practical (0.5 Credit)

S. No.	Name of practical	Nature
1	Preparation of orange squash.	Practical
2	Preparation of mango jam.	Practical
3	Preparation of guava jelly	Practical
4	Preparation of sponge cake	Practical
5	Preparation of sponge bread.	Practical

Unit II Processing of Fruits and Vegetables (1-0.5) Storage and handling of fresh fruits and vegetables, Preservation of fruits and vegetable by heat treatment.Production and preservation of fruits and vegetable juices, preservation of fruit juice by hurdle technology.

(1 Credit)

Practical (0.5 Credit)

S. No.	Name of practical	Nature
1	Preparation of dry onion, chilli& garlic.	Practical
2	Manufacture of potato powder.	Practical
3	Manufacture of ice cream.	Practical
4	Manufacture of candid fruits.	Practical

Unit III Food Laws & Quality Control (1-0-0) Non-alcoholic beverages; Food Laws, food rules and standards, Statistical Quality Control ; Various types of packaging.
(1 Credit)

Recommended Books:

1. Fruits and Vegetables. A.K Thompson. Blackwell publishing S. Ranganna, Hand Book of Analysis and Quality Control for Fruits and Vegetable Products, Tata McGraw Hill, 2002.

Suggested Readings:

- L. Somogyi, Processing Fruits: Science and Technology, Vol I: Biology Principles and Applications, Woodhead Publishing, 1996.

SENSORY EVALUATION

Credits- 3

Objective - Students would be able to have an insight of 4 basic tastes and derived tastes in food, basic understanding of flavors, colors and texture in foods and concept of sensory panels and various instruments used in assessing the quality parameters of food.

UNIT – I Packaging and Labelling Packaging and Labelling of the product, Packaging design, graphics and labeling nutritional evaluation (estimation of relevant parameters), Shelf life testing of the product (testing for appropriate quality parameters- chemical, microbiological and nutrient content, acceptability studies).

(1 Credit)

UNIT – II Overview of Sensory evaluation Subjective & Objective evaluation, Overview of sensory principles and practices: General consideration in sensory testing, flowcharts of sensory evaluation. Psychological methods Selection and screening of panel: Types of panel (Trained panel, discriminative and communicative panel).

(1 Credit)

UNIT – III Methodology for sensory evaluation Methodology for sensory evaluation: Discriminative test - difference test: paired comparison, Duo-trio, triangle, ranking, Sensitivity Test, Descriptive test - category scaling, ratio scaling, flavor profile analysis, texture profile analysis, quantitative descriptive analysis
Effective Tests: paired performance test, ranking test, rating scale: hedonic rating, food action scale rating. Maintaining suitable environmental conditions: laboratory setup and equipments.

(1 Credit)

Recommended Text Books:
1. Lyon, D.H.; Francombe, M.A.; Hasdell, T.A.; Lawson, K. (eds) (1992): Guidelines for Sensory Analysis in Food Product Development and Quality Control. Chapman and Hall, London.
2. Amerine, M.A.; Pangborn, R.M.; Roessler, E.B. (1965): Principles of Sensory Evaluation. Academic Press, New York.

Reference Books:
1. Kapsalis, J.G. (1987): Objective Methods in Food Quality Assessment. CRC Press, Florida.
2. Martens, M.; Dalen, G.A.; Russwurm, H. (eds) (1987): Flavour Science and Technology. John Wiley and Sons, Chichester

References/Correlation with Ancient Indian Literature:
- Rasa-]ala-Nidhi or Ocean of Indian chemistry and alchemy/vol.vIEd.1984/AvaniPrakashan,Ahmedabad,India;CharakSamhitahttp://www.carakasamhitaonline.com/mediawiki-1.28.2/index.php?title=Main_Page
- **Rigveda1/191/9**http://www.sacred-texts.com/hin/rigveda/index.htm
- **Atharva Veda. X. 3**http://www.sacred-texts.com/hin/sbe42/index.htm

MODELLING AND SIMULATION OF BIOPROCESSES

Credits- 3

Objctive: Students will be able to understand about general approach of modeling, modeling fundamentals, chemical kinetics, microbial growth kinetics. Students will also learn about heat transfer, energy balance conversion and selectivity of energy, numerical techniques in modeling, simulation tools and software and modeling of batch, fed-batch and continuous culture reactors.

Unit-I General approach of Modelling Modelling Fundamentals, General Aspects of the Modelling Approach ,General Modelling Procedure, Material Balance Equations , Chemical Kinetics, Rate of Chemical Reaction, Reaction Rate Constant, Chemical Equilibrium and Temperature, Microbial Growth Kinetics.

(1 Credit)

Unit-II Mass Transfer Theory Mass Transfer Theory, Heat Transfer, Total Material Balance Equation, Energy Balance Equation, Momentum Balances, Yield, Conversion and Selectivity, Time Constants.

(1 Credit)

Unit-III Parameters Numerical Integration techniques, trapezoidal rule, Parameter estimation, Least square method, Simulation Tools, Simulation Software, Modelling of batch, fed-batch and Continuous Stirred-Tank Reactor.

(1 Credit)

Recommended Text Book:
1. Biological reaction engineering: dynamic modelling fundamentals By Irving J. Dunn

References/Correlation with Ancient Indian Literature:
1. V¡jasaneyisamhitahttp://www.sacred-texts.com/hin/#other
2. Vishnu Puranahttps://sanskritdocuments.org/sanskrit/purana/
3. Shabdhakalpadrumahttp://www.sacred-texts.com/hin/#other

RESEARCH METHODOLOGY

Credits- 3

Objective: Students will be able to understand the basic concepts of research methodology including meaning and objectives of research, types of research, various research criteria, research problem, research design, measurement and scaling techniques in research, various scaling techniques in research, methods of data collection in research and report writing of research.

UNIT – I Introduction & Types of research Research methodology: Introduction & meaning of research, Objectives of research, motivation in research. Types of research & research approaches. Research methods vs. methodology, Criteria for good research.
Research problem: Statement of research problem, Statement of purpose and objectives of research problem, Necessity of defining the problem.

(1 Credit)

UNIT – II Research design Research design: Meaning of research design, Need for research design, Features for good design, Different research designs, Basic principles of research design.
Measurement & scaling techniques: Measurement in research- Measurement scales, sources of error in measurement, Technique of developing measurement tools, Meaning of scaling, its classification, important scaling techniques.

(1 Credit)

UNIT – III Methods of data collection Methods of data collection: collection of primary data, collection data through questionnaires& schedules, Difference between questionnaires & schedules. Report Writing.

(1 Credit)

Recommended Text Books:
1. Kothari CR (2004). Research Methodology: Methods and Techniques, New Age International.
2. Bhattacharya DK (2009). Research Methodology, Excel Books.

Reference Text
1. Annals of Food Science & Technology
2. Journal of Nutrition
3. Journal of Food Science & Technology

References/Correlation with Ancient Indian Literature:
- V¡jasaneyisamhitahttp://www.sacred-texts.com/hin/#other
- Vishnu Puranahttps://sanskritdocuments.org/sanskrit/purana/
- 3.Shabdhakalpadrumahttp://www.sacred-texts.com/hin/#other

Food Business Management

Credits- 3

Objective: Students would be able to introduction, theories and functions of Business Management, food industry management; marketing management and human resource development, personal management.

UNIT – I Business Management Business management; introduction, theories and functions, food industry management; marketing management and human resource development, personal management. Sectors in food industry and scale of operations in India. Human Resource Management Study the basics about HR and related policies and capacity mapping approaches for better management. Consumer Behavior towards Food Consumption, Consumer Surveys by various Institutes and Agencies, Various Journals on Consumer Behavior and Market Research, Internet based data search.

(1 Credit)

UNIT – II International trade International trade; basics, classical theory, theory of absolute advantage. theory of comparative, modern theory, free trade- protection, methods of protection, quotas, bounties, exchange control, devaluation, commercial treaties, terms of trade, balance of payments, EXIM policy, foreign exchange, mechanics of foreign exchange, GATT, WTO, role of WTO, International Trade in agriculture. World trade agreements related with food business, export trends and prospects of food products in India.

(1 Credit)

UNIT – III World consumption of food World consumption of food; patterns and types of food consumption across the globe. Ethnic food habits of different regions. Govt. institutions related to international ad trade; APEDA, Tea board, spice board, wine board, MOFPI etc. management of export import organization, registration, documentation, export import logistics, case studies. Export and import policies relevant to horticultural sector.
Project: Consumer Survey on one identified product -both qualitative and quantitative analysis (say, Consumer behavior towards Pickles and Chutneys).

(1 Credit)

Recommended Text Books:
1. Principles of Agri Business Management - D. David and S Erickson 1987. Mc Graw Hill Book Co., New Delhi.
2. Agricultural Marketing in India - Acharya S S and Agarwal N L 1987. Oxford & ISH Publishing Co., New Delhi.

Reference Books:
1. Marketing in the International Environment - CundiffHigler 1993, Prentice Hall of India, New Delhi.
2. GAD implications of Denkel proposals - G S Batra&Narindevkumar (1994) Azmol Publications Pvt., New Delhi.
3. Marketing Management - Phill Kottler. 1994. Prentice Hall of India, New Delhi

References/Correlation with Ancient Indian Literature:
- Atharvavedahttp://www.sacred-texts.com/hin/sbe42/index.htm
- V¡jasaneyisamhitahttp://www.sacred-texts.com/hin/#other
- Vishnu Puranahttps://sanskritdocuments.org/sanskrit/purana/

FOOD PROJECT PLANNING AND ENTREPRENEURSHIP

Credits- 3

Objective: Students would be able to develop an insight of Entrepreneurs and Entrepreneurship development and understand the basics of Business project report and SWOT analysis. Develop insight for different types of Fund raising. Understand the different support system for business development.

UNIT – I Indian Economy Indian Economy and contribution of various sub-sectors in the economy. Structural base of Indian economic Life. Contribution of MSME sectors in the national economy. Impact of globalization and liberalization on MSME sectors. Agricultural sector and food processing industry-problems and opportunity. Self employment need and various mode open in Food Processing and Agri- sector.

(1 Credit)

UNIT – II Fundamentals of marketing principles and marketing Fundamentals of marketing principles and marketing mix, Sales and distribution management, Costing and cost management, pricing methods, fundamentals of operations and supply chain management, organization structure and human resource management , capital structure and methods of raising fund. Opportunity identification and feasibility studies, financial analysis, technical entrepreneurship. Project sizing, fund management and enterprise management issues. Problem solving, decision making processes and tools, conflict and change management in a new industrial enterprise, Systems approach and consideration in an entrepreneurial venture. Management reporting and information system for monitoring and control of the new enterprise, managing Innovation. Marketing challenges and approaches for new productsand services. Sustaining in a competitive environment

(1 Credit)

UNIT – III Entrepreneurship Development Entrepreneurship Development: Assessing overall business environment in the Indian economy. Overview of Indian social, political and economic systems and their implications for decision making by Individual entrepreneurs.Globalization and the emerging business/entrepreneurial environment. Concept of entrepreneurship: entrepreneurial and managerial characteristics managing an enterprise; motivation and entrepreneurship development; importance of planning, Budgeting monitoring, evaluation and follow up; managing competition.
Entrepreneurship Development Programs (EDP). SWOT analysis; Generation, incubation and commercialization of ideas and innovations. Government schemes and incentives for promotion of entrepreneurship. Government policy on small and Medium Enterprises (SMEs)/ Small Scale industries (SSls).Export and Import Policies relevant to Food Processing Sector. Venture capital, contract farming and joint ventures.Public-private partnership (PPP).Over view of Food Process Industry. Characteristics of Indian Food Processing Industry.Social Responsibility of Food Processing Business.

(1 Credit)

Recommended Text Books:
1. Entrepreneurship - Thomas W Zimmer and Norman M Scarborough 1996. Prentice Hall, New Jersey, USA.
2. Entrepreneurship Strategies and Resources - Mark J Dollinger 1999. Prentice hall, Upper Saddal River, New Jersey, USA.

Reference Books:
1. Entrepreneurial Development - Khanks SS 1999. S. Chand and company New Delhi.

References/Correlation with Ancient Indian Literature:
- Atharvaveda http://www.sacred-texts.com/hin/sbe42/index.htm
- Taittiriyasamhita https://sanskritdocuments.org/sanskrit/purana/
- V¡jasaneyisamhita https://sanskritdocuments.org/sanskrit/purana/

Dairy Engineering

Credits- 4

Course Outcome- Students would be able to describe the engineering principles used in dairy processes responsible for evaporation, drying and refrigeration and other related processes. They would be able to evaluate the integration of engineering concepts required for the optimized processing of milk streams.

UNIT I (Market milk) Market Milk- definition, composition.Physio- chemical properties of milk and other dairy products.Milk reception and storage.Processing of milk- pasteurization, sterilization, homogenization, standardization.Fortification of milk and milk products.

(1 Credit)

Practical (0.4 credit)

Sr. no.	Name of practical	Nature
1	Moisture & ash estimation of milk and milk products	Practical
2	Sensory evaluation of milk	Practical
3	Acidity estimation in milk	Practical
4.	Rapid platform tests	Practical

UNIT II (Production &preservation of milk products) Production and preservation of cream butter, ghee, butter oil, condensed & powdered milk, ice-cream. Technology of yogurt, paneer, cheese spread.

(1 Credit)

Practical (0.4 credit)

Sr. no.	Name of practical	Nature
1	Preparation of ghee	Practical
2	Preparation of shrikhand	Practical
3	Preparation of fruit yoghurt	Practical
4.	Preparation of cheese product	Practical
5	Preparation of khoya product	Practical

UNIT-III Packaging & distribution of milk & its products Packaging and distribution of milk and milk product.Utilization of milk industry by- products.Milk & milk product standards. Process flow chart for product manufacture, Batch & Continuous drying systems, Freezing and Low Temperature Preservation of Food.

(1 Credit)

Practical (0.2 credit)

Sr. no.	Name of practical	Nature
1	Study of packaging material of milk and milk products	Practical
2	Preparation of whey based products	Practical

Recommended text books
1. Dairy Engineering: Advanced Technologies and Their Applications
2. 1st Edition by MurlidharMeghwal, Megh R. Goyal, Rupesh S. Chavan,Apple Academic Press,2017

Reference Books:
1. Dairy Science and Technology, 2nd Edition, by P. Walstra, Pieter Walstra, Jan T. M. Wouters, Tom J. Geurtsm,Apple Academic Press, 2005
2. Handbook of Farm, Dairy and Food Machinery by Kutz& Myer, 2007, Springer Netherlands

References/Correlation with Ancient Indian Literature:
- Matsyapuranahttps://sanskritdocuments.org/sanskrit/purana/
- Markandeypuranahttps://sanskritdocuments.org/sanskrit/purana/
- Agnipuranahttps://sanskritdocuments.org/sanskrit/purana/