VINAYAKA MISSION'S RESEARCH FOUNDATION

(DEEMED TO BE UNIVERSITY UNDER SECTION 3 OF THE UGC ACT 1956)

(Declared under Section 3 of the UGC Act 1956)

SCHOOL OF ARTS AND SCIENCE

BACHELOR OF COMPUTER SCIENCE

BOS-2021

SCIENCE BOARD - 2021

REGULATIONS 2021

B.Sc. -COMPUTER SCIENCE PROGRAMME OUTCOMES

Programme Learning Outcomes

The Bachelor of Science with Computer Science (BSc with CS) program enables students to attain, by the time of graduation:

PLO-A. Demonstrate the aptitude of Computer Programming and Computer based problem solving skills.

PLO-B. Display the knowledge of appropriate theory, practices and tools for the specification, design, implementation

PLO-C. Ability to learn and acquire knowledge through online courses available at different MOOC Providers.

PLO-D. Ability to link knowledge of Computer Science with other two chosen auxiliary disciplines of study.

PLO-E. Display ethical code of conduct in usage of Internet and Cyber systems.

PLO-F. Ability to pursue higher studies of specialization and to take up technical employment.

PLO-G. Ability to formulate, to model, to design solutions, procedure and to use software tools to solve real world problems and evaluate .

PLO-H. Ability to operate, manage, deploy, configure computer network, hardware, software operation of an organization.

PLO-I. Ability to present result using different presentation tools.

PLO-J. Ability to appreciate emerging technologies and tools.

COURSE WITH CREDITS

Semester	Language Courses (Part - I & Part - II)	Compulsory Core Courses (CC)	Discipline SpecificElective (DSE/Inter Disciplinary/ Generic Electives)	Ability Enhancement Compulsory Courses (AECC)	Skill Enhancement Course (SEC)	Total Credits
Sem I	**Tamil - I/Hindi - I (3 Credits) & English - I (3 Credits)**	**CC - I (1 x 6 credits = 6 credits)**	**DSE - I (1 x 6 credits = 6 credits)**	**AEC - I** (Environmental Science) **4 Credits**	**---**	**22**
Sem II	**Tamil - II/Hindi - II (3 Credits) & English - II (3 Credits)**	**CC - II (1 x 6 credits = 6 credits)**	**DSE - II (1 x 6 credits = 6 credits)**	**---**	**SEC – I SEC - II (2 X 4 = 8 Credits)**	**26**
Sem III	**Tamil - III/Hindi - III (3 Credits) & English - II (3 Credits)**	**CC - III & CC - IV (2 x 6 credits = 12 credits)**	**DSE - III (1 x 6 credits = 6 credits)**	**---**	**---**	**24**
Sem IV	**Tamil - IV/Hindi - IV (3 Credits)**	**CC - V & CC - VI (2 x 6 credits = 12 credits)**	**DSE - IV (1 x 6 credits = 6 credits)**	**AEC - II** (English for Communication) - **4 Credits**		**25**
Sem V	**---**	**CC - VII, CC - VIII & CC - IX (3 x 6 credits = 18 credits)**	**---**	**---**	**SEC – III SEC - IV (2 X 4 = 8 Credits)**	**26**
Sem VI	**---**	**CC - X, CC - XI & CC - XII (3 x 6 credits = 18 credits)**	**DSE – V: Project Work (1 x 6 credits = 6 credits)**	**---**	**--**	**24**
Total	**21**	**72**	**30**	**8**	**16**	**147**

Core course credit 12*6=72
PART-I: Tamil/Hindi course credit 4*3=12
PART-II: English as language core course credit 3*3=9
Discipline specific elective credit 5*6=30
Ability Enhancement compulsory course credit 2*4=8
Skill enhancement course credit 4*4=16
Total credits = 147

BOARD OF STUDIES 2021/ BOARD OF SCIENCE
Bachelor of Computer Science (B.Sc Computer Science) - Regular
CURRICULUM (CBCS – Choice Based Credit System)

OVERALL CREDITS

S. No.	Nature of Course	No. of Courses	Credit / Each course	Total No. of Credits
I	**LANGAUGE COURSES**			
	PART-I: TAMIL/HINDI	4	3	12
	PART II: ENGLISH	3	3	9
II	**CORE COURSES**			
	Compulsory Core Courses	12	6	72
III	**ELECTIVE COURSES**			
	Discipline Specific Elective Courses (Interdisciplinary/ Generic Electives)	2	6	12
	Discipline Specific Elective Courses (Computer Science)	2	6	12
	Discipline Specific Elective Courses (Project Work / Dissertation)	1	6	6
IV	**ABILITY ENHANCEMENT COURSES**			
	AECC-1: Ability Enhancement Compulsory courses-1-Environmental Science	1	4	4
	AECC-2: Ability Enhancement Compulsory courses-2-English for Communication	1	4	4
V	**SKILL ENHANCEMENT COURSES**			
	SEC: Skill Enhancement courses	4	4	16
	Total Credits			**147**

Note: VAC (Value Added Courses) and SWAYAM courses of each 2 credit will be conducted and based on the certificate of the course, this credit will be mentioned in the Grade sheet (not including in CGPA)

I-LANGUAGE COURSES

S.NO	COMPONENT CODE	SUBJECT TITLE	CREDIT	TOTAL CREDIT
1.	PART-I	**Tamil - I / Hindi – I**	3	12+9=21
2.		**Tamil - II / Hindi – II**	3	
3.		**Tamil - III / Hindi – III**	3	
4.		**Tamil - IV/ Hindi – IV**	3	
5.	PART-II	**English I**	3	
6.		**English II**	3	
7.		**English III**	3	

II – COMPULSORY CORE COURSES

S.NO	COMPONENT CODE	SUBJECT TITLE	CREDIT
1.	CC – I	Programming Methodologies	4
		Programming Methodologies Lab	2
2.	CC – II	Python Programming	4
		Python Programming Lab	2
3.	CC – III	Fundamentals of Data Structure	4
		Fundamentals of Data Structure Lab	2
4.	CC – IV	Digital Electronics and Microprocessor	4
		Digital Electronics and Microprocessor Lab	2
5.	CC – V	Database Management Systems	4
		Database Management Systems Lab	2
6.	CC – VI	Programming in Java	4
		Programming in Java Lab	2
7.	CC – VII	Operating System	4
		Operating System Lab	2
8.	CC – VIII	Visual Programming	4
		Visual Programming Lab	2
9.	CC –IX	Software Engineering	6
10.	CC – X	Advanced Java Programming	4
		Advanced Java Programming Lab	2
11.	CC – XI	Internet Technologies	4

		Internet Technologies Lab	2
12.	CC – XII	Resource Management Techniques	6

III – DISCIPLINE SPECIFIC ELECTIVE

DSE – INTER DISCIPLINARY / GENERIC ELECTIVES (Each Any One)				
S.NO	**COMPONENT CODE**	**SUBJECT TITLE**	**CREDIT**	**TOTAL CREDIT**
1.	DSE –I	Numerical and Statistical Methods	6	6
		Discrete Mathematics	6	
		Differential and Integral Calculus	6	
2.	DSE –II	Basic Physics	6	6
		Applied Physics	6	
		Advanced Physics	6	
DSE – COMPUTER SCIENCE (Each Any One) (Including Compulsory Project)				
S.NO	**COMPONENT CODE**	**SUBJECT TITLE**	**CREDIT**	**TOTAL CREDIT**
1	DSE – III	Data Mining	6	6
		Computer Ethics	6	
		System Security	6	
2	DSE – IV	Artificial Intelligence	6	6
		Internet of Things	6	
		Computer Graphics	6	
3	DSE – V	Project Work - Dissertation – **Compulsory**	6	6

IV - ABILITY ENHANCEMENT COMPULSORY COURSES

S No	COMPONENT CODE	Ability Enhancement Compulsory Course	Credits	Total

1	AECC-I	Environmental Science	4	**4 x 2= 8**
2	AECC-II	English for Communication	4	

V – SKILL ENHANCEMENT COURSES

S No	COMPONENT CODE	Skill Enhancement Course (Each Any One)	Credits	Total
1.	SEC – I	Office Automation Tool	4	**4 x 4 = 16**
		Programming in SCILAB	4	
		Multimedia	4	
2.	SEC – II	Desktop Publishing (DTP)	4	
		Content Management Software	4	
		Web Programming	4	
3.	SEC – III	R Programming	4	
		MAT Lab	4	
		Visualization Tool	4	
4.	SEC – IV	XML Programming	4	
		Mobile Application Development	4	
		Cloud Computing	4	

VI. VALUE ADDED COURSE (ANY TWO)

No	COMPONENT CODE	VI - Value Added Course (Any One)	Credits	Total
1	VAC	Women Studies	2	**2x2=4**
2		Indian Constitution – Configurable Structure	2	
3		Basic Life Support and First Aid (Demonstration)	2	
4		Fire Safety (Demonstration)	2	
5		Industrial Health and Safety	2	

6		Computer Networking and Interface	2	
7		Campus to Corporate	2	
8		Gandhian thought	2	
9		Effective Academic Writing and Presentation	2	
10		Yoga and Meditation	2	
11		ICT Tools and Techniques-Virtual Lab	2	

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Sl. No.	Courses	Credits	Total Credits
SEMESTER - I			
1	PART-I: TAMIL-I/HINDI-I	3	22
2	PART-II : ENGLISH-I	3	
3	CC – I : Programming Methodologies	4	
4	CC – I : Programming Methodologies lab	2	
5	Discipline Specific Elective (DSE)-I	6	
6	AECC-II - Environmental Science	4	
SEMESTER - II			
7	PART-I: TAMIL-II/HINDI-II	3	26
8	PART-II: ENGLISH-II	3	
9	CC – II : Python Programming	4	
10	CC – II : Python Programming Lab	2	
11	Discipline Specific Elective (DSE)-II	6	
12	Skill Enhancement Course (SEC) – I	4	
13	Skill Enhancement Course (SEC) – II	4	
SEMESTER - III			
14	PART-I: TAMIL-III/HINDI-III	3	24
15	PART-II: ENGLISH-III	3	
16	CC – III : Fundamentals of Data Structure	4	
17	CC – III : Fundamentals of Data Structure Lab	2	
18	CC – IV: Digital Electronics and Microprocessor	4	
19	CC – IV: Digital Electronics and Microprocessor Lab	2	
20	Discipline Specific Elective (DSE)-III	6	
SEMESTER - IV			
21	PART-I: TAMIL-IV/HINDI-IV	3	25
22	AECC-II - English for Communication	4	
23	CC – V : Database Management Systems	4	
24	CC – V : Database Management Systems Lab	2	
25	CC – VI : Programming in Java	4	
26	CC – VI : Programming in Java Lab	2	
27	Discipline Specific Elective (DSE)-IV	6	
SEMESTER - V			
28	CC – VII : Operating System	4	26

29	CC – VII : Operating System Lab	2	
30	CC – VIII : Visual Programming	4	
31	CC – VIII : Visual Programming Lab	2	
32	CC – IX : Software Engineering	6	
33	Skill Enhancement Course (SEC)-III	4	
34	Skill Enhancement Course (SEC)-IV		
SEMESTER - VI			
35	CC – X: Advanced Java Programming	4	24
36	CC – X: Advanced Java Programming Lab	2	
37	CC – XI: Internet Technologies	4	
38	CC – XI: Internet Technologies Lab	2	
39	CC – XII : Resource Management Techniques	6	
40	Discipline Specific Elective (DSE)-V -(Compulsory): Project Work/Dissertation	6	
Total Credits			**147**

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject:CC-I	
Subject Title:Programming Methodologies	**Pattern: Theory**
No of Credits:4	**No of Hours: 60**

Outcomes:	1. Learn to develop simple algorithms and flow charts to solve a problem. 2. problem solving skills coupled with top down design principles. 3. Learn about the strategies of writing efficient and well-structured computer algorithms/programs. 4. Develop the skills for formulating iterative solutions to a problem. 5. Learn array processing algorithms coupled with iterative methods. 6. Learn text and string processing efficient algorithms. 7. Learn searching techniques and use of pointers. 8. Understand recursive techniques in programming.

L	**T**	**P**	**C**
4	**0**	**0**	**4**

UNIT- I **12 hours**

Introduction to Programming, Program Concept, Characteristics of Programming, Stages in Program Development, Algorithms, Notations, Design, Flowcharts, Types of Programming Methodologies, Introduction to C++ Programming - Basic Program Structure In C++, Variables and Assignments, Input and Output, Selection and Repetition Statements.

UNIT- II **12 hours**

Top-Down Design, Predefined Functions, Programmer -defined Function, Local Variable, Function Overloading, Functions with Default Arguments, Call -By-Value and Call-By-Reference Parameters, Recursion.

UNIT –III **12 hours**

Introduction to Arrays, Declaration and Referring Arrays, Arrays in Memory, Initializing Arrays. Arrays in Functions, Multi-Dimensional Arrays.

UNIT – IV **12 hours**

Structures - Member Accessing, Pointers to Structures, Structures and Functions, Arrays of Structures, Unions.

UNIT- V **12 hours**

Declaration and Initialization, Reading and Writing Strings, Arrays of Strings, String and Function, Strings and Structure, Standard String Library Functions. Searching Algorithms - Linear Search, Binary Search. Use of files for data input and output. merging and copy files.

TEXT AND REFERENCE BOOKS

1. Problem Solving and Program Design in C, J. R. Hanly and E. B. Koffman, Pearson, 2015.
2. Programming and problem solving with C++: brief edition, N. Dale and C. Weems, Jones & Bartlett Learning, 2010

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject:CC-I	
Subject Title:Programming Methodologies Lab	**Pattern: Theory**
No of Credits:2	**No of Hours:30**

L	**T**	**P**	**C**
0	**0**	**3**	**2**

Given the problem statement, students are required to formulate problem, develop flowchart/algorithm, write code, execute and test it. Students should be given assignments onfollowing:

1.
   a. To learn elementary techniques involving arithmetic operators and mathematical expressions, appropriate use of selection (if, switch, conditional operators) and control structures
   b. Learn how to use functions and parameter passing in functions, writing recursive programs.
2. Write Programs to learn the use of strings and string handling operations.
   a. Problems which can effectively demonstrate use of Arrays. Structures and Union.
   b. Write programs using pointers.
   c. Write programs to use files for data input and output.
   d. Write programs to implement search algorithms.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : CC-II	
Subject Title :Python Programming	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcomes :	Students can be able to get : Develop and Execute simple Python programs. 2. Structure a Python program into functions. 3. Using Python lists, tuples to represent compound data 4. Develop Python Programs for file processing

L	**T**	**P**	**C**
4	**0**	**0**	**4**

UNIT- I **12 hours**

Introduction to Python, Python, Features of Python, Execution of a Python, Program, Writing Our First Python Program, Data types in Python. Python Interpreter and Interactive Mode; Values and Types: int, float, boolean, string, and list; Variables, Expressions, Statements, Tuple Assignment, Precedence of Operators, Comments; Modules and Functions, Function Definition and use, Flow of Execution, Parameters and Arguments

UNIT –II **12 hours**

Operators in Python, Input and Output, Control Statements. Boolean Values and operators, Conditional (if), Alternative (if-else), Chained Conditional (if-elif-else); Iteration: state, while, for, break, continue, pass; Fruitful Functions: Return Values, Parameters, Local and Global Scope, Function Composition, Recursion

UNIT- III. **12 hours**

Arrays in Python, Strings and Characters. Strings: String Slices, Immutability, StringFunctions and Methods, String Module; Lists as Arrays. Illustrative Programs: Square Root, gcd, Exponentiation, Sum an Array of Numbers, Linear Search, Binary Search.

UNIT IV. **12 hours**

Functions, Lists and Tuples. List Operations, List Slices, List Methods, List Loop, Mutability, Aliasing, Cloning Lists, List Parameters; Tuples: Tuple Assignment, Tuple as Return Value; Dictionaries: Operations and Methods; Advanced List Processing - List Comprehension; Illustrative Programs: Selection Sort, Insertion Sort, Merge sort, Histogram.

UNIT V. **12 hours**

Files and Exception: Text Files, Reading and Writing Files, Format Operator; Command Line Arguments, Errors and Exceptions, Handling Exceptions, Modules, Packages; Illustrative Programs: Word Count, Copy File.

TEXT BOOKS

- Mark Lutz, Learning Python
- Tony Gaddis, Starting Out With Python
- Kenneth A. Lambert, Fundamentals of Python
- James Payne, Beginning Python using Python 2.6 and Python 3

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-II	
Subject Title :Python Programming Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
0	**0**	**3**	**2**

The students are required to verify their ablility to use core programming basics and program design with functions using Python programming language. The teacher shall programs to strengthen the practical expertise of the students. The following is an indicative list of programs that can be practised

1. Write a program to demonstrate different number data types in Python.
2. Write a program to perform different Arithmetic Operations on numbers in Python.
3. Write a program to create, concatenate and print a string and accessing sub-string from a given string.
4. Write a python script to print the current date in the following format "Fri Oct 11 02:26:23 IST 2019"
5. Write a program to create, append, and remove lists in python.
6. Write a program to demonstrate working with tuples in python.
7. Write a program to demonstrate working with dictionaries in python.
8. Write a python program to find largest of three numbers.
9. Write a Python program to construct the following pattern, using a nested for loop

```
*
* *
* * *
* * * *
* * * * *
* * * *
* * *
* *
*
```

10. Write a Python script that prints prime numbers less than 20.

11. Write a python program to define a module to find Fibonacci Numbers and import the module to another program.
12. Write a python program to define a module and import a specific function in that module to another program.
13. Write a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
14. Write a Python class to convert an integer to a roman numeral.
15. Write a Python class to reverse a string word by word.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : CC-III	
Subject Title :Fundamentals of Data Structures	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcomes :	On the completion of the course, the students will be able to: 1.To be familiar with fundamental data structures and with the manner in which these data structures can best be implemented; become accustomed to the description of algorithms in both functional and procedural styles 2.To have a knowledge of complexity of basic operations like insert, delete, search on these data structures. 3.Ability to choose a data structure to suitably model any data used in computer applications. 4.Design programs using various data structures including hash tables, Binary and general search trees, heaps, graphs etc. 5.Ability to assess efficiency tradeoffs among different data structure implementations. 6.Implement and know the applications of algorithms for sorting, pattern matching etc.

L	**T**	**P**	**C**
4	**0**	**0**	**4**

UNIT- I **12 hours**

Basic concepts- Algorithm Specification-Introduction, Recursive algorithms, Data Abstraction Performance analysis, Linear and Non Linear data structures, Singly Linked Lists-Operations, Concatenating, circularly linked lists-Operations for Circularly linked lists, Doubly Linked Lists-Operations. Representation of single, two dimensional arrays, sparse matrices-array and linked representations.

UNIT –II **12 hours**

Stack- Operations, Array and Linked Implementations, Applications- Infix to Postfix Conversion, Postfix Expression Evaluation, Recursion Implementation, Queue- Definition and Operations, Array and Linked Implementations, Circular Queues - Insertion and Deletion Operations, Dequeue (Double Ended Queue).

UNIT- III **12 hours**

Trees, Representation of Trees, Binary tree, Properties of Binary Trees, Binary Tree Representations- Array and Linked Representations, Binary Tree Traversals, Threaded Binary Trees, Priority Queue- Implementation, Heap- Definition, Insertion, Deletion.

UNIT –IV **12 hours**

Graphs, Graph ADT, Graph Representations, Graph Traversals, Searching, Static Hashing-Introduction, Hash tables, Hash functions, Overflow Handling.

UNIT- V **12 hours**

Sorting Methods, Comparison of Sorting Methods, Search Trees- Binary Search Trees, AVL Trees-Definition and Examples.Red-Black and Splay Trees, Comparison of Search Trees, Pattern Matching Algorithm- The Knuth-Morris-Pratt Algorithm, Tries (examples).

TEXTBOOKS

- Fundamentals of Data structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson-Freed, Universities Press.
- Data structures and Algorithm Analysis in C, 2nd edition, M. A. Weiss, Pearson.
- Lipschutz: Schaum's outline series Data structures Tata McGraw-Hill

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : CC-III	
Subject Title :Fundamentals of Data Structures Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours :30**

L	**T**	**P**	**C**
0	**0**	**3**	**2**

Students are required to write and practically execute programs to solve problem using various data structures. The teacher can suitably device problems which help students experiment using the suitable datastructures and operations. Some of the problems are indicated below.

1. Write program that uses functions to perform the following:
   a. Creation of list of elements where the size of the list, elements to be inserted and deleted are dynamically given as input.
   b. Implement the operations, insertion, deletion at a given position in the list and search for an element in the list
   c. To display the elements in forward / reverse order

2. Write a program that demonstrates the application of stack operations (Eg: infix expression to postfix conversion)

3. Write aprogram to implement queue data structure and basic operations on it (Insertion, deletion, find length) and code at least one application using queues.

4. Write a program that uses well defined functions toCreate a binary tree of elementsand Traverse a Binary tree in preorder, inorder and postorder.

5. Write program that implements linear and binary search methods ofsearching for an element in a list

6. Write and trace programs to understand the various phases of sorting elements using the methods
   a. Insertion Sort
   b. Quicksort
   c. Bubble sort

7. Write and trace programs to Create a Binary search tree and insert and delete from the tree.Represent suitably a graph data structure and demonstrate operations of traversals on it.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-IV	
Subject Title :Digital Electronics and Microprocessor	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcomes :	After the completion of this course, a successful student will be able to do the following: 1. Design and implement Combinational circuits. 2. Design and implement synchronous and asynchronous sequential circuits 3. perform experiments on assembly language programming 4. analyze the data transfer information through serial & parallel ports.

L	**T**	**P**	**C**
4	**0**	**0**	**4**

UNIT I **12 Hours**

Binary Systems & Code conversion,BooleanAlgebra& Logic Gates –Truth Tables –Universal Gates – Simplification of Boolean functions: SOP, POS methods –K-map, –Combinational Logic: Adders &Subtractors –Multiplexer –Demultiplexer -Encoder –Decoder.

UNIT II **12 Hours**

Sequential Logic: RS, ClockedRS, D, JK, Master Slave JK, T Flip-Flops –Shift Registers –Types of Shift Registers –Counters: Ripple Counter –Synchronous Counters –Up-Down Counter.

UNIT III **12 Hours**

Introduction to Microprocessor – Evolution of microprocessor – general architecture of microprocessor system – architecture of 8085 A – pin configuration– machine language and assembly language. The 8085 instruction set - Instruction classification – instruction and data format – addressing modes – instruction set of 8085 – data transfer operations, arithmetic operations, logic operations, Stack operations, I/O operations and machine control operations – programming techniques such as looping counting and indexing.

UNIT IV **12 Hours**

Programming a Microprocessor – Program writing for 8-bitaddition, subtraction, multiplication and division – 16 bit addition, subtraction, multiplication – BCD addition and subtraction – BCD to binary and binary to BCD conversion – octal to binary conversion – ASCII to BCD and BCD to ASCII conversions – ASCII to binary and binary to ASCII conversions – biggest and smallest – sorting and searching – block data transfer.

UNIT V **12 Hours**

Counters and time delays – Time delay using single register and register pair hexadecimal counter. Timing sequences – opcode fetch cycle – memory read cycle – memory write cycle – I/O read cycle – I/O write cycle. Data transfer methods - Memory organization – memory mapping – I/O mapping

TEXT BOOKS:

1. M. Morris Mano,2005, Digital Logic and Computer Design, Prentice-Hall of India Pvt. Ltd.
2. Introduction to Microprocessor – A.P. Mathur, TMH-2007

REFERNECE BOOKS:

1. D. P. Leach and A. P. Malvino,2002,Digital Principles and Applications,5thEdition, Tata McGraw, Hill Publishing Co. Ltd.
2. Microprocessor Architecture, Programming and applications with 8085 / 8085 A' – R.S.GAONKAR, Wiley Eastern Limited

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-IV	
Subject Title : Digital Electronics and Microprocessor Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
0	**0**	**3**	**2**

I. DIGITAL ELECTRONICS:

1.Verification of Truth Table for AND, OR, NOT, NAND, NOR and EX-OR gates.
2.Realisationof NOT, AND, OR, X-OR gates with only NAND and only NOR gates.
3.Verification of DeMorgan's Law.
4.Implementation of Half-Adder and Half-Subtractor.
5.Implementation of Full-Adder and Full-Subtractor.

II: MICROPROCESSOR:

1. 8-bit addition and subtraction
2. 16 - bit addition and subtraction.
3. BCD addition and subtraction.
4. 8 - bit multiplication and division.
5. Searching for an element in an array.
6. Sorting in Ascending order.
7. Finding largest and smallest elements from an array.
8. Sorting in descending order.
9. BCD to Hex and Hex to BCD.
10. Binary to ASCII and ASCII to Binary.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-V	
Subject Title :Database Management Systems	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcomes :	At the end of the course, the students will be able to : 1. Gain knowledge of database systems and database management systems software. 2. Ability to model data in applications using conceptual modelling tools such as ER Diagrams and design data base schemas based on the model. 3. Formulate, using SQL, solutions to a broad range of query and data update problems. 4. Demonstrate an understanding of normalization theory and apply such knowledge to the normalization of a database. 5. Be acquainted with the basics of transaction processing and concurrency control. 6. Familiarity with database storage structures and access techniques. 7. Compare, contrast and analyse the various emerging technologies for database systems such as NoSQL. 8. Analyse strengths and weaknesses of the applications of database technologies to various subject areas.

L	**T**	**P**	**C**
4	**0**	**0**	**4**

UNIT-I **12 hours**

Basic Database Concepts, Terminology, and Architecture; Types of Database Management Systems. Differences between Relational and other Database Models. Data Modelling: Relations, Schemas, Constraints, Queries, and Updates; Conceptual vs. Physical Modeling; Entity Types, attributes, ER Diagrams.

UNIT –II **12 hours**

SQL Data Definition: Specifying Tables, Data Types, Constraints; Simple SELECT, INSERT, UPDATE, DELETE Statements; Complex SELECT Queries, including Joins and Nested Queries; Actions and Triggers; Views; Altering Schemas.

UNIT –III **12 hours**

Relational Algebra: Definition of Algebra; Relations as Sets; Operations: SELECT, PROJECT, JOIN, etc. Normalization Theory and Functional Dependencies, 2NF, 3NF, BCNF, 4NF, 5NF;

UNIT -IV

Indexing: Files, Blocks, and Records, Hashing; RAID; Replication; Single-Level and Multi-Level Indexes; B-Trees and B+-Trees. Query Processing Translation of SQL into Query Plans; Basics of Transactions, Concurrency and Recovery.

UNIT- V **12 hours**

DATABASE PROGRAMMING: Embedded SQL; Dynamic SQL, JDBC; Avoiding Injection Attacks; Stored Procedures; Lightweight Data Access Layers for Python and JavaScript Applications; PHP and MySQL, Object Relational Modeling: Hibernate for Java, Active Record for Rails.

BIG DATA: Motivations; OLAP vs. OLTP; Batch Processing; MapReduce and Hadoop; Spark; Other Systems: HBase. Working with POSTGRES, REDIS, MONGO, and NEO: Setting up the same Database on Four Platforms; Basic Queries and Reporting.

TEXTBOOKS

- Elmasri's and Navathe's*Fundamentals of Database Systems*. Addison-Wesley

REFERENCE BOOK

- Data base Management Systems, Raghu Ramakrishnan, Johannes Gehrke, McGraw Hill Education
- Data base System Concepts, A. Silberschatz, Henry. F. Korth, S. Sudarshan, McGraw Hill Education

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-V	
Subject Title : Database Management Systems Lab	**Pattern : Practical**
No of Credits :2	**No of Hours : 30**

L	**T**	**P**	**C**
0	**0**	**3**	**2**

Students are required to practice the concepts learnt in the theory by designing and querying a database for a chosen organization (Like Library, Transport etc). The teacher may devise appropriate weekly lab assignments to help students practice the designing , querying a database in the context of example database. Some indicative list of experiments is given below.

Experiment 1: E-R Model

Analyze the organization and identify the entities , attributes and relationships in it. .

Identify the primary keys for all the entities. Identify the other keys like candidate keys, partial keys, if any.

Experiment 2: Concept design with E-R Model

Relate the entities appropriately. Apply cardinalities for each relationship. Identify strong entities and weak entities (if any).

Experiment 3: Relational Model

Represent all the entities (Strong, Weak) in tabular fashion. Represent relation ships in a tabular fashion.

Experiment 4: Normalization

Apply the First, Second and Third Normalization levels on the database designed for the organization

Experiment 5: Installation of Mysql and practicing DDL commands

Installation of MySql. Creating databases, How to create tables, altering the database, dropping tables and databases if not required. Try truncate, rename commands etc.

Experiment 6: Practicing DML commands on the Database created for the example organization

DML commands are used to for managing data within schema objects. Some examples:

- SELECT - retrieve data from the a database
- INSERT - insert data into a table
- UPDATE - updates existing data within a table
- DELETE - deletes all records from a table, the space for the records remain

Experiment 7: Querying

practice queries (along with sub queries) involving ANY, ALL, IN, Exists, NOT EXISTS, UNION, INTERSECT, Constraints etc.

Experiment 8 and Experiment 9: Querying (continued…)

Practice queries using Aggregate functions (COUNT, SUM, AVG, and MAX and MIN), GROUP

BY, HAVING and Creation and dropping of Views.

Experiment 10: Triggers

Work on Triggers. Creation of, insert trigger, delete trigger, update trigger. Practice triggers using the above database.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-VI	
Subject Title :Programming in Java	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcomes :	At the end of the course, students should be able to 1. Knowledge of the structure and model of the Java programming language, 2. Use the Java programming language for various programming technologies 3. Develop software in the Java programming language, 4. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements

L	T	P	C
4	0	0	4

UNIT- I **15 HOURS**

Introduction: Java Essentials, Its characteristics, Execution and Compilation, Data types, Variables, Control Statements, Standard Input/ Output.

UNIT- II **15 HOURS**

Constructors, Object Oriented Concepts: Encaptulation, Abstraction, Inheritance, Polymorphisms, JAVA Packages.

UNIT –III **15 HOURS**

Exception Handling, Wrapper Classes, Autoboxing, Multi-thread Programming.

UNIT- IV **15 HOURS**

Applets, Event Handling, AWT, Database Handling using JDBC.

TEXT BOOKS

- E Balaguruswamy, Programming with JAVA, A Primer (5e), Kindle Edition

REFERENCE BOOKS

- Bruce Eckel, Thinking in Java (4e)
- Herbert Schildt, Java: The Complete Reference (9e)
- Y. Daniel Liang, Introduction to Java Programming (10e)
- Paul Deitel, Harvey Deitel, Java: How To Program (10e)
- Cay S. Horsttnann, Core Java Volume I –Fundamentals (10e)

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-VI	
Subject Title : Programming in Java Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
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Students are required to implement object-oriented paradigm using JAVA. Below are the list of some of the experiments.

Part A

1. Program on strings: Check the equality of two strings, Reverse a string.
2. Program using loops: to find the sum of digits of a given number, display a multiplication table, display all prime numbers between 1 to 1000.
3. Program to demonstrate all math class functions.

Part B

4. Program on files : to copy a file to another file using Java to package classes.
5. Program to demonstrate method over-riding and overloading
6. Programs on inheritances.
7. Multi-threaded programming.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-VII	
Subject Title : Operating System	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcomes :	At the end of the course, students will be able to implement various algorithms required for management, scheduling, allocation and communication used in operating system. 1.Describe the important computer system resources and the role of operating system in their management policies and algorithms. 2. To understand various functions, structures and history of operating systems and should be able to specify objectives of modern operating systems and describe how operating systems have evolved over time. 3. Understanding of design issues associated with operating systems. 4. Understand various process management concepts including scheduling, synchronization, and deadlocks. 5. To have a basic knowledge about multithreading. 6. To understand concepts of memory management including virtual memory. 7. To understand issues related to file system interface and implementation, disk management. 8. To understand and identify potential threats to operating systems and the security features design to guard against them. 9. To have sound knowledge of various types of operating systems including Unix and Android. 10. Describe the functions of a contemporary operating system with respect to convenience, efficiency, and the ability to evolve.

L	**T**	**P**	**C**
4	**0**	**0**	**4**

UNIT –I **12 hours**

(Introduction to Operating System) What is Operating System? History and Evolution of OS, Basic OS functions, Resource Abstraction, Types of Operating Systems– Multiprogramming Systems, Batch

Systems, Time Sharing Systems; Operating Systems for Personal Computers, Workstations and Hand-held Devices, Process Control & Real time Systems.

UNIT- II **12 hours**

(Operating System Organization and Process Characterization) Processor and User Modes, Kernels, System Calls and System Programs, System View of the Process and Resources, Process Abstraction, Process Hierarchy, Threads, Threading Issues, Thread Libraries; Process Scheduling, Non-Pre-emptive and Pre- emptive Scheduling Algorithms.

UNIT- III **12 hours**

Process Management (Deadlock) Deadlock, Deadlock Characterization, Necessary and Sufficient Conditions for Deadlock, Deadlock Handling Approaches: Deadlock Prevention, Deadlock Avoidance and Deadlock Detection and Recovery.

UNIT- IV **12 hours**

(Inter Process Communication and Synchronization) Concurrent and Dependent Processes, Critical Section, Semaphores, Methods for Inter-process Communication; Process Synchronization, Classical Process Synchronization Problems: Producer-Consumer, Reader-Writer.

UNIT- V **12 hours**

(Memory Management) Physical and Virtual Address Space; Memory Allocation Strategies– Fixed and -Variable Partitions, Paging, Segmentation, Virtual Memory.

TEXT & REFERENCE BOOKS

1.A Silberschatz, P.B. Galvin, G. Gagne, Operating Systems Concepts, 8th Edition, John Wiley Publications 2008.
2.A.S. Tanenbaum, Modern Operating Systems, 3rd Edition, Pearson Education 2007.
3.G. Nutt, Operating Systems: A Modern Perspective, 2nd Edition Pearson Education 1997.
4.W. Stallings, Operating Systems, Internals & Design Principles 2008 5th Edition, Prentice Hall of India.
5.M. Milenkovic, Operating Systems- Concepts and design, Tata McGraw Hill 1992.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-VII	
Subject Title : Operating System Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
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Note: Following exercises can be performed using Linux or Unix

1. Usage of following commands: ls, pwd, tty, cat, who, who am I, rm, mkdir, rmdir, touch, cd.
2. Usage of following commands: cal, cat(append), cat(concatenate), mv, cp, man, dat
3. Usage of following commands: chmod, grep, tput (clear, highlight), bc.
4. Write a shell script to check if the number entered at the command line is prime or not.
5. Write a shell script to modify "cal" command to display calendars of the specified months.
6. Write a shell script to modify "cal" command to display calendars of the specified range of months.
7. Write a shell script to accept a login name. If not a valid login name display message – "Entered login name is invalid".
8. Write a shell script to display date in the mm/dd/yy format.
9. Write a shell script to display on the screen sorted output of "who" command along with the total number of users .
10. Write a shell script to display the multiplication table any number,
11. Write a shell script to compare two files and if found equal asks the user to delete the duplicate file.
12. Write a shell script to find the sum of digits of a given number.
13. Write a shell script to merge the contents of three files, sort the contents and then display them page by page.
14. Write a shell script to find the LCD(least common divisor) of two numbers.
15. Write a shell script to perform the tasks of basic calculator.
16. Write a shell script to find the power of a given number.
17. Write a shell script to find the factorial of a given number.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-VIII	
Subject Title : Visual Programming	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcomes :	On successful completion of this course,students should be able to: 1. To design and develop Windows-based businessapplications 2. Able to create Program design and coding 3. Able to work with GUI based programming. **4.** Grade them according to commercial standards.

L	**T**	**P**	**C**
4	**0**	**0**	**4**

UNIT-I **12 Hours**

Customizing a Form - Writing Simple Programs - Toolbox - Creating Controls - Name Property - Command Button - Access Keys - Image Controls - Text Boxes - Labels - Message Boxes - Grid - Editing Tools - Variables - Data Types - String - Numbers.

UNIT-II **12 Hours**

Displaying Information - Determinate Loops - Indeterminate Loops - Conditionals - Built-in Functions - Functions and Procedures.

UNIT-III **12 Hours**

Lists - Arrays - Sorting and Searching - Records - Control Arrays - Combo Boxes - Grid Control - Projects with Multiple forms - DoEvents and Sub Main - Error Trapping.

UNIT-IV **12 Hours**

VB Objects - Dialog Boxes - Common Controls - Menus - MDI Forms - Testing, Debugging and Optimization - Working with Graphics.

UNIT-V **12 Hours**

Monitoring Mouse activity - File Handling - File System Controls - File System Objects - COM/OLE - automation - DLL Servers - OLE Drag and Drop.

TEXT BOOKS

1. Deitel, Visual Basic 6 How to Program. Pearson Education

2. NeolJerke, The Complete Reference Visual Basic 6, Tata McGraw Hill (1999).

3. Evangelas and Petroutsos, Mastering VB 6, 1st Edition, BPB Publications (2001).
4. V.K. Jain, Introduction to OOP and VB, Vikas Publishing House (2003)
5. Gottfried, Programming with Visual Basic, Schaum's Series - Tata McGraw Hill.
6. Reselman, Peasley and Pruchniak, Using Visual Basic 6, PHI (2000).

REFERENCES

1. Gary Cornell - Visual Basic 6 from the Ground up - Tata McGraw Hill - 1999.
2. Noel Jerke - Visual Basic 6 (The Complete Reference) - Tata McGraw Hill – 1999

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-VIII	
Subject Title : Visual Programming Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
0	**0**	**3**	**2**

1. Write a program outputs the squares, roots, cubes and complements of integers between 1 and 100.

2. Create a calculator.

3. Write a script to Sort numbers and strings

4. Create a program to generate a hit counter

5. Create a program to verify whether email address provided by user is valid or invalid.

6. Write a program to scroll the text on status bar.

7. The form consists of two multiple choice list and one single choice list a. the first multiple choice list display the major dishes available. b. the second Multiple choice list display the stocks available. c. The single choice list display the miscellaneous (Milkshakes, soft drinks, softy available etc.)

8. Write a sript to create a digital clock.

9. Program to handle basic events: The message map, saving the view's state, initializing a view class data member.

10. Program using graphical device interface objects

11. Program to display modal and modaless dialogs.

12. Program using static and dynamic controls

13. . Program with tool bars and status bars

14. Program using SDI and MDI serialization

15. Program to create dynamic link libraries using MFC

16) Program to interface with database

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : CC-IX	
Subject Title : SOFTWARE ENGINEERING	**Pattern : Theory**
No of Credits : 6	**No of Hours :80**

OUTCOME:

1. Basic knowledge and understanding of the analysis and design of complex systems.
2. Ability to apply software engineering principles and techniques.
3. To produce efficient, reliable, robust and cost-effective software solutions.
4. Ability to work as an effective member or leader of software engineering teams.
5. To manage time, processes and resources effectively by prioritising competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain.

L	**T**	**P**	**C**
6	**0**	**0**	**6**

UNIT I: **16 hours**

Software Development Approaches: Introduction; Evolving Role of Software; Software Characteristics; Software Applications. Software Design Processes: Introduction; What is Meant by Software Engineering?, Definitions of Software Engineering; The Serial or Linear Sequential Development Model; Iterative Development Model; The incremental Development Model

UNIT II: **16 hours**

Software Design Principles: Introduction, System Models: Data -flow Models, Semantic Data Models, Object Models, Inheritance Models, Object Aggregation, Service Usage Models, Data Dictionaries; Software Design: The Design Process, Design Methods, Design description, Design Strategies, Design Quality; Architectural Design: System Structuring, The Repository Model, The Client–Server Model, The Abstract Machine Model, Control Models, Modular Decomposition, Domain-Specific Architectures.

UNIT III: **16 hours**

Object Oriented Design: Introduction; Object Oriented Design: Objects, Object Classes & Inheritance, Inheritance, Object Identification, An Object -Oriented Design Example, Object Aggregation; Service Usage; Object Interface Design: Design Evolution, Function Oriented Design, Data–Flow Design; Structural Decomposition: Detailed Design.

UNIT IV: **16 hours**

An Assessment of Process Life-Cycle Models: Introduction; Overview of the Assessment of Process; The Dimension of Time; The Need for a Business Model in Software Engineering; Classic Invalid

Assumptions: First Assumption: Internal or External Drivers, Second Assumption: Software or Business Processes, Third Assumption: Processes or Projects, Fourth Assumption: Process Centered or Architecture Centered; Implications of the New Business Model; Role of the Problem - Solving Process in this Approach: Data, Problem Definition, Tools and Capabilities; Redefining the Software Engineering Process: Round-Trip Problem-Solving Approach, Activities, Goals, Interdisciplinary Resources, Time.

UNIT V: **16 hours**

Software Reliability: Introduction; Software Reliability Metrics; Programming for Reliability: Fault Avoidance, Fault Tolerance, Software Reuse.

Software Testing Techniques: Introduction; Software Testing Fundamental; Testing Principles; White Box Testing; Control Structure Testing; Black Box Testing; Boundary Value Analysis; Testing GUIs; Testing Documentation and Help Facilities; Software Testing Strategies: Introduction; Organizing for Software Testing; Software Testing Strategy, Unit Testing: Unit Test Considerations, Top -Down Integration, Bottom-Up Integration.

REFERENCE BOOKS

1. R. G. Pressman – Software Engineering, TMH
2. Sommerville, Ian, Software Engineering, Pearson Education
3. Pankaj Jalote – An Integrated Approach to Software Engineering, Narosa Publications.
4. Pfleeger, Shari Lawrence, Software Engineering Theory and Practice, second edition. Prentice-Hall 2001.
5. Object Oriented & Classical Software Engineering (Fifth Edition), SCHACH,TMH 41

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-X	
Subject Title : Advanced JAVA Programming	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcomes :	On successful completion of this course, students should be able to: 1. Advanced technology in Java such as Internationalization, and Remote method Invocation 2. To write sophisticated Java applications 3. To use Java language for writing well-organized, complex computer programs with both command-line and GUI 4. Develop a JSP code to create a Web site 5. Construct Web Application using Servlets 6. Web application using Java Server Pages

L	**T**	**P**	**C**
4	**0**	**0**	**4**

UNIT I: 12 HOURS

Remote method invocation : Overview of RMI , Introduction to RMI , Developing an RMI Application , Setting up RMI, Architecture of an RMI Application, RMI Architecture, RMI over IIOP.Database Access, RMI Database, Overview of JDBC, JDBC Drivers, JDBC Driver types, Connecting to a Database, Database connections, Statement Interfaces, JDBC statements, Using MetaData, Statement Objects, ResultSets, Result and ResultSets, Commit and Rollback, Transaction Control, JDBC – Exceptions, Exception Handling

UNIT II: 12 HOURS

Servlet – Introduction, Background – Servlet, Types : Generic Servlet, HttpServlet, Servlet Life Cycle, Servlet Classes: Servlet Classes, ServletRequest, ServletResponse, ServletContext, ServletConfig, Methods of Servlet Interface , Session Tracking , Session API

UNIT III: 12 HOURS

JSP Overview, JSP Working Principle, Components of a JSP page, JSP Architecture, JSP life Cycle, JSP API, JSP – Directives, JSP Client Request, JSP Server Response, Model1 Vs Model2, JSP Actions

UNIT IV: 12 HOURS

EJB Architecture: Logical Architecture, EJB overview, Software Architecture, EJB Architecture, EJB Session Beans, Life Cycle of EJB, EJB Entity Bean, Message Driven Beans, EJB Annotations, EJB – Access Database, EJB : exception Handling

UNIT V: 12 HOURS

Understanding the need for MVC , Architecture, Struts2 configuration, Struts2 Actions, Struts2 Interceptors, Struts2 framework Interceptors, Struts2 Result type, Struts2 File upload, Struts2 Database Access, Create Action using JSP file, Create Main page using JSP file, Create View, Create Configuration File

TEXT BOOKS:

1. Elliotte Rusty Harold, (2013), "Java Network Programming", O'Reilly Publishers. (For Unit I to III)
2. Antonio Goncalves, (2010), "Beginning Java EE 6 Platform with GlassFish 3", Apress, Second Edition. (For Units IV to V

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-X	
Subject Title : Advanced JAVA Programming Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
0	**0**	**3**	**2**

1. Create distributed applications using RMI
2. Create applications which can demonstrate the use of JDBC for Database Connectivity.
3. Create student applications using JDBC Database Connectivity
4. Develop Web Applications Using Servlet
5. Develop Web Applications Using ServletRequest, ServletResponse
6. Program that demonstrates the use of session management in Servlet.
7. Web Applications using JSP
8. Create a JSP based Web application which allows the user to edit his/her database Information.
9. An EJB application that demonstrates Session Bean- Stateless Bean
10. An EJB application that demonstrates Session Bean –Stateful Bean
11. An EJB application that demonstrates Entity Bean.
12. Build a web application that collects the user's name and displays "Hello World" followed by the user name.
13. Creating our view which will be required to browse and upload a selected file.

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BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : CC-X1	
Subject Title : INTERNET TECHNOLOGIES	**Pattern : Theory**
No of Credits : 4	**No of Hours :80**

OUTCOME:

1. To understand the terms related to the Internet and how the Internet is changing the world.
2. To understand how computers are connected to the Internet and demonstrate the ability to use the World Wide Web.
3. Demonstrate an understanding of and the ability to use electronic mail and other internet based services
4. Understand the design principles of Web pages and how they are created
5. To develop an ability to create basic Web pages with HTML.

L	**T**	**P**	**C**
6	**0**	**0**	**6**

UNIT –I **16 hours**

Introduction: Overview, Network of Networks, Intranet, Extranet and Internet. WorldWide Web, Domain and Sub domain, Address Resolution, DNS, Telnet, FTP, HTTP. Review of TCP/IP: Features, Segment, Three-Way Handshaking, Flow Control, Error Control, Congestion control,

UNIT-II **16 hours**

IP Datagram, IPv4 and IPv6. IP Subnetting and addressing: Classful and Classless Addressing, Subnetting. NAT, IP masquerading, IP tables. Internet Routing Protocol: Routing -Intra and Inter Domain Routing, Unicast and Multicast Routing, Broadcast. Electronic Mail: POP3, SMTP.

UNIT- III **16 hours**

HTML: Introduction, Editors, Elements, Attributes, Heading, Paragraph. Formatting, Link, Head, Table, List, Block, Layout, CSS. Form, Iframe, Colors, Colorname, Colorvalue. Image Maps: map, area, attributes of image area.

UNIT – IV **16 hours**

Extensible Markup Language (XML): Introduction, Tree, Syntax, Elements, Attributes, Validation, Viewing. XHTML in brief. CGI Scripts: Introduction, Environment Variable, GET and POST Methods.

UNIT- V **16 hours**

JavaScript: Basics, Statements, comments, variable, comparison, condition, switch, loop, break. Object - string, array, Boolean, reg-ex. Function, Errors, Validation. Cookies: Definition of cookies, Create and Store a cookie with example.

TEXT & REFERENCE BOOKS

- Web Technology: A Developer's Perspective, N.P. Gopalan and J. Akilandeswari, PHI, Learning, Delhi, 2013.
- Internetworking Technologies, An Engineering Perspective, Rahul Banerjee, PHI Learning, Delhi, 2011.
- Java Server Pages, Hans Bergsten, Third Edition, O'Reilly Media December 2003.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :CC-XI	
Subject Title : INTERNET TECHNOLOGIES Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
0	**0**	**3**	**2**

HTML & CSS

1.Create a HTML document using CSS giving details of your name, age, telephone, address, TLC code & enrollment no. aligned in proper order

2.Create a HTML document containing a nested list showing the content page of any book

3.Create the following table in HTML with Dummy Data

Name of the train	Place	Destination	Train No	Time		Fair
				Arrival	Departure	

4. Create a home page for a TLC in following format

TLC Information	
Links	Appropriate Information

5.Design a web page using different CSS properties like border, background, text, and font.

XML & XHTML

1. Create a well-formed XML document containing details of a car like: id, company name, model, engine and mileage.
2. Develop and demonstrate a XHTML file that includes Javascript script for the following problems: a) Input: A number n obtained using prompt Output: The first n Fibonacci numbers b) Input: A number n obtained using prompt Output: A table of numbers from 1 to n and their squares using alert
3. Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include 100 USN, Name, Name of the College, Brach, Year of Joining, and e-mail id. Make up sample data for 3 students.

JAVA Script

1. Create a student registration form. Create functions to perform the following checks:
    a. Roll number is a 7-digit numeric value
    b. Name should be an alphabetical value(String)
    c. Non-empty fields like DOB
2. Implement a static password protection.
3. Write a java script
    a. To change the colour of text using SetTimeOut()
    b. To move an image across screen using SetInterval()

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : CC-XII		
Subject Title : Resource Management Techniques	**Pattern : Theory**	
No of Credits : 6	**No of Hours :90**	

Objectives:

The student should be made to be familiar with resource management techniques. Learn to solve problems in linear programming and Integer programming. Be exposed to CPM and PERT.

Course Learning Outcomes:

(i) Solve optimization problems using simplex method.
(ii) Apply integer programming and linear programming to solve real-life applications.
(iii) Use PERT and CPM for problems in project management

L	T	P	C
5	1	0	6

Unit-1: **13 Hours**

Basics of Operations Research (OR): Characteristics of O.R - Necessity of O.R in Industry -OR and Decision making - Role of computers in O.R. Linear programming: Formulations and Graphical solution (of 2 variables) canonical & standard terms of Linear programming problem. Algebraic solution: Simplex method.

Unit-2: **13 Hours**

Algebraic solution: Charnes method of penalties - two phase simplex method - concept of Duality - properties of duality - Dual simplex method.

Unit-3: **13 Hours**

Transportation model: Definition - formulation and solution of transportation models - the row - minima, column - minima, matrix minima and vogel's approximation methods. Assignment model: Definition of Assignment model - comparison with transportation model - formulation and solution of Assignment model - variations of Assignment problem.

Unit-4: **13 Hours**

Sequencing problem: Processing each of n jobs through m machines - processing n jobs through 2 machines - processing n jobs through 3 machines - processing 2 jobs through m machines -

processing n jobs through m machines - travelling salesman problem. Game Theory: Characteristics of games -Maximin, Minimax criteria of optimality - Dominance property - algebraic and graphical method of solution of solving 2 x 2 games.

Unit-5: **13 Hours**

Pert - CPM: Networks - Fulkerson's Rule - measure of activity - PERT computation - CPM computation - resource scheduling. Simulation: Various methods of obtaining random numbers for use in computer simulation - Additive, multiplicative and mixed types of congruence random number generators - Monte Carlo method of simulation - its advantages and disadvantages.

Total hours: 65+15 =90 hours

References:

i) Hamdy A. Taha: ,1996,Operation Research - An Introduction, 5th edition, Prentice Hall of India, Pvt. Ltd., New Delhi .

ii.) Ackoff R.L. and Sasieni M. W,1968, Fundamentals of Operations Research, John Wiley and sons, New York.

iii) Charnes A. Cooper W. and Hendersen A.,1953, Introduction to Linear Programming, Wiley and Sons, New York.

iv) Srinath L.S,1973, PERT and CPM principles and applications, Affiliated East West Press Pvt. Ltd., New York .

III – DISCIPLINE SPECIFIC ELECTIVE

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –I	
Subject Title : Numerical and Statistical Methods	**Pattern : Theory**
No of Credits : 6	**No of Hours : 90**

L	T	P	C
5	1	0	6

Objectives:

- To have a good foundation in all the concepts of Numerical Methods.
- To understand the basic concepts of Statistics, Central Tendency.

UNIT – I **13 HOURS**

Algebric equations – solving by Newton –Raphson Method – Gauss elimination method for solving system of equations – Gauss Seidal method of Iteration – Numerical integration by Trapezoidal and Simpson's Rule.

UNIT – II **13 HOURS**

Euler's Method of solving an ordinary Differential Equation Numerically; Runge-Kutta;s second order method of solving ordinary differential equations.

UNIT III **13 HOURS**

Statistics - Definition - Scope and Limitation - Presentation of Data - Diagrammatic and Graphical Representation of Data.

UNIT IV **13 HOURS**

Measures of Central Tendency - Mean - Median and Mode - GM and HM - their Limitations.

UNIT V **13 HOURS**

Measures of Dispersion - Range - Mean Deviation - Quartile Deviation - Standard Deviation - Coefficient Variation - Lorenz Curve - Measures of Skewness - Karl Pearson and Bowley's methods.

LECTURE HRS :65
TUTORIAL HRS:25

Text Book :-

1. "Numerical methods in Science and Engineering", by Dr.M.K.Venketaraman M.A., M.Tech., Ph.D., National Publishing company, Madras – 1997.
2. "Mathematical Statistics" by P.R.Vittal, Margham Publications-2001

Reference Book:-

1. P.R.Vital –" Business Statistics and Mathematics"-Margam Publications
2. A.Singaravelu " Numerical Methods"Meenakshi Agency,Chennai

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –I	
Subject Title : Discrete Mathematics	**Pattern : Theory**
No of Credits : 6	**No of Hours : 90**

L	T	P	C
5	1	0	6

Objectives

1. Express a logic sentence in terms of predicates, quantifiers, and logical connectives
2. Simplify and evaluate basic logic statements including compound statements, implications, inverses, converses, and contrapositives using truth tables and the properties of logic.
3. Represent a graph using an adjacency list and an adjacency matrix and apply graph theory to application problems such as computer networks.

Outcome:

1. Write an argument using logical notation and determine if the argument is or is not valid.
2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
3. Understand the basic principles of sets and operations in sets.
4. Demonstrate different traversal methods for graphs.
5. Model problems in Computer Science using graphs

UNIT I **13 HOURS**

Propositional logic – Propositional equivalences – Predicates and quantifiers – Nested quantifiers – Rules of inference – Introduction to proofs – Proof methods and strategy.

UNIT II **13 HOURS**

Mathematical induction – Strong induction and well ordering – The basics of counting – The pigeonhole principle – Permutations and combinations – Recurrence relations – Solving linear recurrence relations – Generating functions – Inclusion and exclusion principle and its applications

UNIT III **13 HOURS**

Graphs and graph models – Graph terminology and special types of graphs – Matrix representation of graphs and graph isomorphism – Connectivity – Euler and Hamilton paths.

UNIT IV **13 HOURS**

Algebraic systems – Semi groups and monoids – Groups – Subgroups – Homomorphism's – Normal subgroup and cosets – Lagrange's theorem – Definitions and examples of Rings and Fields.

UNIT V **13 HOURS**

Partial ordering – Posets – Lattices as posets – Properties of lattices – Lattices as algebraic systems – Sub lattices – Direct product and homomorphism – Some special lattices – Boolean algebra.

LECTURE HRS :65

TUTORIAL HRS:25

Books for Study and REFERENCE:

1.Rosen, K.H., "Discrete Mathematics and its Applications", 7th Edition, Tata McGraw Hill Pub. Co. Ltd., New Delhi, Special Indian Edition, 2011.

2. Tremblay, J.P. and Manohar.R, " Discrete Mathematical Structures with Applications to Computer Science", Tata McGraw Hill Pub. Co. Ltd, New Delhi, 30th Reprint, 2011.

3..Grimaldi, R.P. "Discrete and Combinatorial Mathematics: An Applied Introduction", 4th Edition, Pearson Education Asia, Delhi, 2007.

4.. Lipschutz, S. and Mark Lipson., "Discrete Mathematics", Schaum's Outlines, Tata McGraw Hill Pub. Co. Ltd., New Delhi, 3rd Edition, 2010.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –I	
Subject Title : Differential and Integral Calculus	**Pattern : Theory**
No of Credits : 6	**No of Hours : 90**

L	**T**	**P**	**C**
5	**1**	**0**	**6**

Objectives:

1. To enrich with the knowledge of Applied Mathematics.
2. To have a good foundation on Differential Equations.
3. To understand the basic concepts in Partial Differential Equations.
4. To understand the basic concepts in Laplace Transforms and Inverse Laplace Transforms.

UNIT - I **13 HOURS**

Integration by parts – definite integrals & reduction formula

UNIT -II **13 HOURS**

Double integration –change of order of integration- Cartesian coordinates –Area as a double integral – Triple integration.

UNIT- III **13 HOURS**

Particular integrals of second order Differential Equations with constant coefficients- Linear equations with variable coefficients –Method of Variation of Parameters (Omit third & higher order equations)

UNIT- IV **13 HOURS**

PDE of second order homogeneous equation with constant coefficients – Particular Integrals of $F(D, D') z = f(x, y)$, where $f(x, y)$ is of one of the forms e^{ax+by}, $\sin(ax + by)$, $\cos(ax + by)$ & $x^m y^n$

UNIT -V **13 HOURS**

Laplace Transforms –standard formulae –Basic Theorems & simple applications-Inverse Laplace Transform – Use of Laplace Transform in solving ODE with constant coefficients.

LECTURE HRS :65
TUTORIAL HRS:25

TEXT BOOK(S)

[1]. T.K.Manickavasagam Pillai & others, Integral Calculus, SV Publications.
[2] S.Narayanan, Differential Equations, S. Viswanathan Publishers, 1996.
[3] Dr. S. Arumugam and A.T. Isaac, Differential Equations and its Applications**,**New Gamma Publishing House, 2011.

REFERENCE(S)

[1] M.K. Venkataraman, Engineering Mathematics, S.V. Publications, 1985, Revised Edn.
[2] M.L. Khanna, Differential Calculus, Jaiprakashnath and Co., Meerut-2004.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –II		
Subject Title : Basic Physics	**Pattern : Theory**	
No of Credits : 4	**No of Hours : 60**	

L	**T**	**P**	**C**
4	**0**	**0**	**4**

After undergoing this course, the students must be able to:

- Solve difficult problems (walking of man, horse and cart problem, flying of bird/ aircraft, etc.)
- Analyse and design banking of roads/railway tracks and apply conservation of momentum principle
- Derive work, power and energy relationship and solve problems about work and power.
- Apply the physical laws and concepts of gravity, its variation with longitude and latitude and its uses in space satellite etc.
- Understand the concept of elasticity, surface tension, viscosity
- Measure temperature in various processes on different scales (Celsius, Kelvin, Fahrenheit etc.)
- Understand the laws of thermodynamics, Carnot cycle and their applications.

Unit –I Conservation Laws and Energy Sources (12 Hours)

Work and Energy – Potential Energy and kinetic energy-examples – expressions for PE and KE-derivations – Work- Energy theorem – derivation – Law of conservation of energy – case of freely falling body - case of simple pendulum- Non renewable and renewable energy sources – definition and applications (solar cooker, wind mill and biogas) – Green house effect – related problems

Unit - II Mechanics (12 Hours)

Projectile motion – Time of flight and Horizontal range – derivations – Oblique projection – Expression for path of a projectile in oblique projection - Maximum height, Time of ascent, Time of descent, Time of flight and Horizontal range and maximum horizontal range – derivations – Circular motion, angular velocity, time period and frequency of revolutions - Relation between linear velocity and angular velocity – derivation-centripetal force – centrifugal force – angle of banking – related problems

Unit - III Classical theory of Gravitation (12 Hours)

Mass and mean density of the earth - Kepler's laws - Newton's law of gravitation - Determination of gravitational constant – Boy's method - Rocket motion - Principle –Theory – Velocity of rocket –

Rocket propulsion systems - Artificial satellites - Earth–moon system – weightlessness– parking orbit – velocity of escape – satellite potential and kinetic energy.

Unit – IV Properties of Matter (12 Hours)

Elasticity: definition of stress and strain, different types of moduli of elasticity, Hooke's law, significance of stress strain curve - Surface tension - angle of contact, Capillary action and surface tension from capillary rise method - Viscosity and coefficient of viscosity - Poiseuille's formula for the flow of a liquid through a capillary tube - Terminal velocity, Stoke's law

Unit – V Heat and Thermodynamics (12 Hours)

Difference between heat and temperature - Modes of transfer of heat - Different scales of temperature and their relationship - Temperature gradient, Concept of Co-efficient of thermal conductivity, Uses and effects of Heat conduction in Daily life - Isothermal and Adiabatic process - Zeroth, First and second law of thermodynamics, Heat engine (concept Only), Carnot cycle - Application of various systems of thermometry in refrigeration and air-conditioning etc

Books for Study:

1. M.Narayanamurthy and N.Nagarathnam Dynamics – (The national publishers)
2. D.S.Mathur, properties of matter, S.Chand and Co., New Delhi
3. Thermal Physics, R.Murugeshan and Kiruthiga Sivaprasath, S. Chand & Co, (2004).

Books for Reference:

1. D.Halliday and R.Resnick , Physics, Part 1 (Wiley eastern)
2. College Physics Volume I and II, A.B. Gupta, Books and Allied (P) Ltd. (2014)

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –II		
Subject Title : Basic Physics Lab	**Pattern : Practical**	
No of Credits : 2	**No of Hours : 30**	

L	**T**	**P**	**C**
0	**0**	**3**	**2**

List of Experiments

1. To find breadth and thickness of beam by using both vernier calipers and screw gauge.
2. To find the value of acceleration due to gravity on the earth by using a simple pendulum.
3. To determine the coefficient of linear expansion of a metal rod
4. To determine force constant of spring using Hooks law
5. Young's modulus by non uniform bending - Vernier Microscope
6. Rigidity modulus -Torsional pendulum
7. Surface tension and interfacial tension - method of drops
8. Surface tension - capillary rise
9. Viscosity - capillary flow- Poiseuille's method
10. Comparison of viscosities – Burette method
11. Specific heat of liquid - method of mixtures
12. Determination of Thermal Conductivity of a bad Conductor by Lee's disc method.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –II		
Subject Title : Applied Physics	**Pattern : Theory**	
No of Credits : 4	**No of Hours : 60**	

L	**T**	**P**	**C**
4	**0**	**0**	**4**

After undergoing this course, the students must be able to:

- Account for the importance of electricity and magnetism in technological applications
- Realize energy loss in capacitors and working of circuit control and protective devices
- Knowledge should be demonstrated in the areas of: Interference, diffraction and polarization
- Known about optical flatness of glass plates, grating principles and polarimeter construction.
- Analyze how laser light is more powerful than normal light and aware of laser based devices
- Evaluate the advantages of imaging techniques based on different optical principles
- Recognize and classify the structures of Optical fiber and types and analyze various coupling losses.
- Principle, production and properties of Ultrasonic waves and Acoustical grating
- Identify and evaluate crystal structures and other properties of the unit cell by diffraction methods

Unit I - Electricity & Magnetism (12 Hours)

Capacitor – energy of a charged capacitor - loss of energy due to sharing of charges – Capacitors in series and parallel – Types of capacitors - magnetic field due to a current carrying conductor – Biot Savart's Law – Field along the axis of the coil carrying current – magnetic materials - Comparison of dia-, para- and ferro-magnetic materials – circuit control and protective devices – switch and its types – fuses circuit breaker and relays.

Unit II - Physical Optics (12 Hours)

Interference : Colours of thin films –air wedge – determination of diameter of a thin wire by air wedge – test for optical flatness – Diffraction – Fresnel's explanation of rectilinear propagation of light – theory of transmission grating – Normal incidence – polarization – Double refraction of crystals– geometry of Nicol prism - optical activity – polarimeter.

Unit III - Lasers and Optical Fibers (12 Hours)

Spontaneous and Stimulated Emission – Principles of laser– population inversion – meta stable state – conditions for laser actions – solid laser - Ruby Laser – Gas Laser – CO_2 Laser – semiconductor diode

laser (homo junction only)- application of Lasers - Principle of optical fiber – structure and classification of optical fibers – numerical aperture –attenuation & dispersion mechanism in optical fibers (Qualitative only) application of optical fibers - optical communication (block diagram only)

Unit IV - Acoustics and Ultrasonics (12 Hours)

Transverse waves – Expression for the velocity of transverse waves in a stretched string – Sonometer - determination of a.c frequency using sonometer - Introduction to ultrasonics – piezoelectric effect – production of ultrasonic waves by piezoelectric method - magneto striction oscillator method – principle of acoustic grating – application of ultrasonic waves.

Unit V - Crystal Physics (12 hours)

Crystal structures: Introduction – periodic array of atoms – crystal lattice – unit cell – basis –symmetry considerations – classification of crystals – Bravais lattices in three dimensions – crystal planes and Miller indices – simple crystal structures. Crystal diffraction: Bragg's law – experimental X-ray diffraction methods: - Laue method –rotating crystal method – powder method – neutron diffraction.

Books for Study:

1. Allied Physics, R. Murugeshan S. Chand & Co., (2005)
2. Electricity and Magnetism, R. Murugeshan, S. Chand & Co., (2013)
3. A. K. Ghatak and Thyagrajan, Fiber Optics, Oxford University Press.
4. S. O. Pillai, Solid State Physics,Wiley Eastern
5. LASERS: Fundamentals and Applications Thyagarajan and Ghatak (McMillan India)

Books for Reference:

1. D.Halliday and R.Resnick , Physics, Part 1 (Wiley eastern)
2. College Physics Volume I and II, A.B. Gupta, Books and Allied (P) Ltd. (2014)

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –II		
Subject Title : Applied Physics Lab	**Pattern : Practical**	
No of Credits : 2	**No of Hours : 30**	

L	**T**	**P**	**C**
0	**0**	**3**	**2**

List of Experiments

1. Sonometer – Determination of AC frequency
2. Newton's rings - Radius of curvature
3. Air wedge – Thickness of a wire
4. Spectrometer – Grating – Wavelength of Mercury lines – Normal Incidence
5. Potentiometer – Voltmeter Calibration
6. To determine the wavelength of laser source using diffraction
7. Particle size determination- Semiconductor diode laser system
8. P.O. Box – Specific resistance
9. Ultrasonic Interferometer – ultrasonic velocity in liquid and adiabatic compressibility
10. Refractive index of a crystal using Vernier microscope

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –II		
Subject Title : Advanced Physics	**Pattern : Theory**	
No of Credits : 4	**No of Hours : 60**	

L	**T**	**P**	**C**
4	**0**	**0**	**4**

After undergoing this course, the students must be able to:

- Identify the electrostatic boundary problems by application of Poisson's and Laplace's equations
- Understand the depth of time-varying electromagnetic field as governed by Maxwell's equations
- Mastered the concepts of angular momentum and spin, as well as the rules for quantization
- Understand the concept of Frame of references and postulates of the special theory of relativity
- Able to elaborate detectors of radiation, charge accelerators, nuclear reaction along with types of nuclear reactions and their importance in recent technology.
- Able to solve the Schrödinger equation on their own for simple systems
- Analyze the use of zener diode to make a regulated dc power supply
- Understand the basic working of different logic gates and laws of Boolean algebra, De Morgan theorem, NOR & NAND logic for simplification of circuits.
- Understand and design different controlling circuits used in digital electronics

Unit I - Electromagnetic Theory (12 hours)

Motion of Charged Particles in crossed electric & magnetic fields, Velocity Selector & Magnetic focussing, Gauss law, continuity equation, inconsistency in Ampere's Law, Maxwell's equations (differential and integral forms), poynting vector, Poynting Theorem (Statement only), propagation of plane electromagnetic waves in conducting and non-conducting medium

Unit II - Atomic Physics (12 hours)

Atom model – vector atom model – Pauli's exclusion principle – electronic configuration of elements and periodic classification of elements – various quantum numbers – magnetic dipole moment of electron due to orbital and spin motion – Bohr magneton – spatial quantisation – Stern and Gerlach experiment - Photoelectric effect – Laws of photoelectric emission – Einstein's photoelectric equation.

Unit III - Nuclear physics (12 hours)

Atomic nucleus – properties and types of nucleus - α, β and γ radiations - Law of radioactive decay - Decay constant - Half- life and mean life - Binding energy and its calculation - Nuclear model – liquid

drop model – magic numbers - shell model – nuclear energy - Radiation detectors – ionization chambers – GM Counter – Fission Controlled and Uncontrolled chain reaction – nuclear reactor – thermonuclear reactions – stellar energy

Unit IV - Quantum Mechanics and Relativity (12 hours)

Postulates of theory of relativity – Lorentz transformation equations – derivation – length contraction – time dilation – mass energy equivalence – uncertainty principle - De-Broglie Hypothesis, Davisson -Germer experiment, wave function and its properties, expectation value Wave Packet, Schrodinger Equation for free Particle, Time Dependent and Independent equations-Particle in a box (1-D)

Unit V - Electronics (12 hours)

Basic Electronics: Zener diode – voltage regulator – LED – Transistor RC coupled amplifier – feedback principle – condition for oscillation – phase shift oscillator – Wien's bridge oscillator - Digital Electronics : NAND and NOR gates – Universal building blocks – Demorgan's theorem – elementary ideas of ICs – SSI , MSI, LSI and VLSI – Half & Full adder, Half & Full subtractor

Books for Study:

1. Introduction to Electrodynamics – D.J. Griffiths (Pearson, 4th edition, 2015)
2. Modern Physics, R.Murugesan and Kiruthiga Sivaprasath, S. Chand & Co, (2012)
3. Principles of Electronics, V.K. Mehta and Rohit Mehta , S. Chand & Co, (2005)
4. Basic Electronics Solid State, B.L. Theraja, S. Chand & Co, (2004)

Books for Reference:

1. College Physics Volume I and II, A.B. Gupta, Books and Allied (P) Ltd (2014)
2. Concepts of Modern Physics-Arthur Beiser (McGrawHill)

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –II		
Subject Title : Advanced Physics Lab	**Pattern : Practical**	
No of Credits : 2	**No of Hours : 30**	

L	**T**	**P**	**C**
0	**0**	**3**	**2**

List of Experiments

1. Table galvanometer – Quantity sensitiveness and voltage sensitiveness
2. Spectrometer – Refractive Index of a solid Prism
3. To study the V-I characteristics of a Zener diode as voltage regulator
4. To measure Voltage and Time period of a periodic waveform using CRO
5. Fundamental applications of multi meter
6. To design a switch using a transistor
7. Basic logic gates – AND, OR and NOT gates using discrete components
8. To verify and design AND, OR, NOT gates using NAND gates
9. To verify and design AND, OR, NOT gates using NOR gates.
10. Verification of De Morgan's theorem

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –III		
Subject Title : Data Mining	**Pattern : Theory**	
No of Credits : 6	**No of Hours : 90**	

OUTCOME:

1. Demonstrate advanced knowledge of data mining concepts and techniques.
2. Apply the techniques of clustering, classification, association finding, feature selection and visualisation on real world data
3. Determine whether a real world problem has a data mining solution
4. Apply data mining software and toolkits in a range of applications
5. Set up a data mining process for an application, including data preparation, modelling and evaluation
6. Demonstrate knowledge of the ethical considerations involved in data mining.

L	**T**	**P**	**C**
6	**0**	**0**	**6**

UNIT- I **16 hours**

Introduction to Data Mining, Understanding Data, Relations to Database, Statistics, Machine Learning

UNIT –II **16 hours**

Association Rule Mining, Level-wise Method, FP-Tree Method, Other Variants

UNIT –III **16 hours**

Classification, Decision Tree Algorithm, CART, PUBLIC, Pruning Classification Tree

UNIT- IV **16 hours**

Clustering Techniques, Clustering of Numeric Data, of Ordinal Data, Efficiency of Clustering, Consensus Clustering, Spectral Clustering

UNIT –V **16 hours**

Rough Set Theory and its Application to Data Mining, ROCAnalysis, Data Mining Trends, Big Data, Data Analytics

TEXT BOOKS

- Data Mining Techniques (4e) Universities Press Arun K Pujari

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –III		
Subject Title : Computer Ethics	**Pattern : Theory**	
No of Credits : 6	**No of Hours : 90**	

OUTCOME:

1. The student will be able to describe and distinguish between the various ethical theories which can be used to form the basis of solutions to moral dilemmas in computing.
2. Identify traditional and current Issues related to Computers, Information Systems, Ethics, Society and Human Values;
3. The student will be able to identify and define the components of a structured plan for solving ethical problems and, in the process, will be able to understand the basis for her/his own ethical system.
4. Given several examples of professional codes of ethics related to computing, the student will be able to compare and contrast these examples, discussing their commonalties, differences, and implications.
5. Develop skills of critical analysis and applying ethical principles to situations and dialectical thinking

L	**T**	**P**	**C**
6	**0**	**0**	**6**

UNIT I: **16 hours**

The Need for Computer Ethics Training and Historical Milestones

UNIT II: **16 hours**

Defining the Field of Computer Ethics, Computer ethics codes, Sample Topics in Computer Ethics i. Computer crime and computer security ii. Software theft and intellectual property rights iii. Computer hacking and the creation of viruses iv. Computer and information system failure
v. Invasion of privacy. Privacy in the Workplace and on the Internet vi. Social implications of artificial intelligence and expert systems vii. The information technology salesman issues

UNIT III: **16 hours**

Transparency and Virtual Ethics, Free Speech, Democracy, Information Access

UNIT IV: **16 hours**

Developing the Ethical Analysis Skills and Professional Values, Privacy, Accountability, Government Surveillance

UNIT V: **16 hours**

Boundaries of Trust, Trust Management, Wikipedia, Virtual Trust, Plagiarism in Online Environment, Intellectual Property, Net neutrality

REFERENCE BOOKS

1. Deborah, J, Nissenbaun, H, Computing, Ethics & Social Values, Englewwod Cliffs, New Jersey, Prentice Hall, 1995.
2. Spinello, R, Tavani, H, T, Readings in Cyberethics, Sudbury, MA, Jones and Bartlett Publishers, 2001.
3. Bynum, T, W; Rogerson, S, Computer Ethics and Professional Responsibility, Blackwell, 2004

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –III		
Subject Title : System Security	**Pattern : Theory**	
No of Credits : 6	**No of Hours : 90**	

OUTCOME:

1. Develop an understanding of information assurance as practiced in computer operating systems, distributed systems, networks and representative applications.
2. Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath.
3. Develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
4. Develop an understanding of security policies (such as authentication, integrity and confidentiality), as well as protocols to implement such policies in the form of message exchanges.

L	**T**	**P**	**C**
6	**0**	**0**	**6**

Unit-I **(16 hours)**

Cryptographic Tools- Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers, Practical Application: Encryption of Stored Data.

Unit-II **(16 hours)**

User Authentication- Means of Authentication, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, Remote User Authentication, Security Issues for User Authentication, Practical Application: An Iris Biometric System, Case Study: Security Problems for ATM Systems

Unit-III **(16 hours)**

Access Control- Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control, Example: UNIX File Access Control, Role - Based Access Control, Case Study: RBAC System for a Bank

Database Security-The Need for Database Security, Database Management Systems, Relational Databases, Database Access Control, Inference, Statistical Databases, Database Encryption, Cloud Security.

Unit-IV **(16 hours)**

Malicious Software-Types of Malicious Software (Malware), Propagation– Infected Content–Viruses, Propagation–Vulnerability Exploit–Worms, Propagation–Social Engineering–SPAM E-mail, Trojans, Payload–System Corruption, Payload–Attack Agent–Zombie, Bots, Payload–Information Theft–Keyloggers, Phishing, Spyware, Payload–Stealthing–Backdoors, Rootkits,, Countermeasures.

Unit-V **(16 hours)**

Denial-of-Service Attacks- Denial-of-Service Attacks, Flooding Attacks, Distributed Denial-of-Service Attacks, Application-Based Bandwidth Attacks, Reflector and Amplifier Attacks, Defenses Against Denial -of-Service Attacks, Responding to a Denial-of-Service Attack.

TEXT BOOKS

1. M. Stamp, "Information Security: Principles and Practice," 2 st Edition, Wiley, ISBN: 0470626399, 2011.
2. M. E. Whitman and H. J. Mattord, "Principles of Information Security," 4 st Edition, Course Technology, ISBN: 1111138214, 2011.
3. M. Bishop, "Computer Security: Art and Science," Addison Wesley, ISBN: 0 -201- 44099-7, 2002.
4. G. McGraw, "Software Security: Building Security In," Addison Wesley, ISBN: 0321356705, 2006.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –IV		
Subject Title : Artificial Intelligence	**Pattern : Theory**	
No of Credits : 4	**No of Hours : 60**	

OUTCOME:

1. Explain what constitutes "Artificial" Intelligence and how to identify systems with Artificial Intelligence.
2. Identify problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
3. Formalise a given problem in the language/framework of different AI methods (e.g., as a search problem, as a constraint satisfaction problem, as a planning problem, etc).
4. Implement basic AI algorithms (e.g., standard search or constraint propagation algorithms).
5. Design and perform an empirical evaluation of different algorithms on a problem formalisation, and state the conclusions that the evaluation supports.
6. Explain the limitations of current Artificial Intelligence techniques.

L	**T**	**P**	**C**
4	**0**	**0**	4

UNIT –I **12 hours**

Introduction to Artificial Intelligence: Definition of AI; Turing Test; Brief History of AI. Problem Solving and Search: Problem Formulation; Search Space; States vs. Nodes; Tree Search: Breadth-First, Uniform Cost, Depth-First, Depth-Limited, Iterative Deepening; Graph Search.

UNIT- II **12 hours**

Informed Search: Greedy Search; A* Search; Heuristic Function; Admissibility and Consistency; Deriving Heuristics via Problem Relaxation. Local Search: Hill -Climbing; Simulated Annealing; Genetic Algorithms; Local Search in Continuous Spaces.

UNIT- III **12 hours**

Playing Games: Game Tree; Utility Function; Optimal Strategies; Minimax Algorithm; Alpha-Beta Pruning; Games with an Element of Chance. Beyond Classical Search: Searching with Nondeterministic Actions; Searching with Partial Observations; Online Search Agents; Dealing with Unknown Environments.

UNIT- IV **12 hours**

Knowledge Representation and Reasoning: Ontologies, Foundations of Knowledge Representation and Reasoning, Representing and Reasoning about Objects, Relations, Events, Actions, Time, and

Space; Predicate Logic, Situation Calculus, Description Logics, Reasoning with Defaults, Reasoning about Knowledge, Sample Applications.

UNIT-V **12 hours**

Representing and Reasoning with Uncertain Knowledge: Probability, Connection to Logic, Independence, Bayes Rule, Bayesian Networks, Probabilistic Inference, and Sample Applications.

TEXT BOOKS

- Elaine Rich, Kevin Knight, Shivashankar B Nair, Artificial Intelligence, Third Edition, McGraw Hill Edition.

REFERENCE BOOKS

- Russell Stuart Jonathan and Norvig Peter, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall, 2010

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : DSE- IV	
Subject Title : Artificial Intelligence Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
0	**0**	**3**	2

The students are expected to explore the foundational skills on AI techniques acquired in theory in solving problems and using sample data sets and various tools prepare themselves for careers in AI industry. The following is an indicative list of assignments for the semester. However students should be encouraged to take-up mini-project using the techniques and tools explored in the lab to understand the true potential

1.Using simple Hill-climbing compute an approximate solution to the travelling salesperson problem.

2.Using Naïve bayes method learn a text classifier using training data and using test set evaluate the quality of the classifier.

3.Implement gradient descent and backpropagation in Python.

4.Using Scikit learn for Logistic regression, Support Vector Machines, Building Neural Networks.

5.Using inbuilt TensorFlow functionality to build a Neural Network and train on MNIST Dataset for classification.

6.Installation of Prolog and practicing queries using Prolog.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –IV	
Subject Title : Internet of Things	**Pattern : Theory**
No of Credits : 6	**No of Hours : 90**

OUTCOME:

1. To learn the concepts of Sensors, Wireless Network and Internet
2. To learn and implement use of Devices in IoT technology.
3. To learn the different IoT Technologies like Micro-controller, Wireless communication like Blue Tooth, GPRS, Wi-Fi and Storage and embedded systems
4. To understand how to program on embedded and mobile platforms including different Microcontrollers like ESP8266, Raspberry Pi, Arduino and Android programming
5. To understand how to make sensor data available on the Internet (data acquisition) and understand how to analyze and visualize sensor data
6. To understand, analysis and evaluate different protocols used in IoT.
7. To learn basic python programming for IoT applications
8. To learn and design different applications in IoT.
9. To design, develop and test different prototypes in IoT.

L	**T**	**P**	**C**
6	**0**	**0**	**6**

UNIT –I **16 hours**

(Introduction to IoT, Sensors and Actuators) Introduction to IoT: Definition, Characteristics, Applications, Evolution, Enablers, Connectivity Layers, Addressing, Networking and Connectivity Issues, Network Configurations, Multi-Homing, Sensing: Sensors and Transducers, Classification, Different Types of Sensors, Errors, Actuation: Basics, Actuator Types- Electrical, Mechanical Soft Actuators

UNIT -II **16 hours**

(Introduction to Networking, Communication Protocols and Machine-to-Machine Communication) Basics of Networking, Communication Protocols, Sensor Network, Machine to Machine Communication (IoT Components, Inter-Dependencies, SoA, Gateways, Comparison Between IoT & Web, Difference Protocols, Complexity of Networks, Wireless Networks, Scalability, Protocol Classification, MQTT & SMQTT, IEEE 802.15.4, Zigbee)

UNIT –III **16 hours**

(Arduino Programming) Interoperability in IoT, Introduction To Arduino Programming, Integration Of Sensors And Actuators With Arduino

UNIT –IV **16 hours**

(Python Programming and Raspberry Pi) Introduction to Python Programming, Introduction to Raspberry Pi, Implementation of IoT with Raspberry Pi, Implementation of IoT with Raspberry Pi

UNIT- V **16 hours**

(Data Analytics and Cloud Computing) Data Handling and Analytics, Cloud Computing Fundamentals, Cloud Computing Service Model, Cloud Computing Service Management and Security, Sensor-Cloud Architecture, View and Dataflow

(FOG Computing and Case Studies) FOG Computing: Introduction, Architecture, Need, Applications and Challenges, Industrial IoT, Case Studies: Agriculture, Healthcare, Activity Monitoring

TEXT & REFERENCE BOOKS

- The Internet of Things: Enabling Technologies, Platforms, and Use Cases", by Pethuru Raj and Anupama C. Raman (CRC Press).
- Internet of Things: A Hands-on Approach", by A Bahga and Vijay Madisetti (Universities Press)

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject :DSE –IV	
Subject Title : Computer Graphics	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

OUTCOME:

1.Acquire familiarity with the concepts and relevant mathematics of computer graphics.
2.Ability to implement various algorithms to scan, convert the basic geometrical primitives, transformations, area filling, clipping.

3. Describe the importance of viewing and projections.
4. Ability to design basic graphics application programs.
5. Familiarize with fundamentals of animation and Virtual reality technologies
6. Be able to design applications that display graphic images to given specifications.
7. To understand a typical graphics pipeline.

L	**T**	**P**	**C**
4	**0**	**0**	4

UNIT- I **12 hours**

Application Areas of Computer Graphics, Overview of Graphics Systems and Devices. Points and Lines, Line Drawing Algorithms, Mid-Point Circle and Ellipse Algorithms. Filled Area Primitives, Polygon Filling Algorithms. Curve Generation: Bezier and B-Spline Curves.

UNIT- II **12 hours**

2-D Geometrical Transforms: Translation, Scaling, Rotation, Reflection and Shear Transformations Composite Transforms, Transformations between Coordinate Systems. 2-D Viewing: The Viewing Pipeline, Viewing Coordinate Reference Frame, Window to Viewport Coordinate Transformation, Viewing Functions.

UNIT- III **12 hours**

Line Clipping Algorithms- Cohen-Sutherland and Cyrus Beck Line Clipping Algorithms, Sutherland–Hodgeman Polygon Clipping Algorithm. 3-D Object Representation: Polygon Surfaces, Quadric Surfaces, Spline Representation

UNIT -IV **12 hours**

3-D Geometric Transformations: Translation, Rotation, Scaling, Reflection and Shear Transformations, Composite Transformations, 3-D Viewing: Viewing Pipeline, Viewing Coordinates, View Volume, General Projection Transforms and Clipping.

UNIT- V **12 hours**

Visible Surface Detection Methods: Classification, Back -Face Detection, Depth- Buffer, Scanline, Depth Sorting, BSP-Tree Methods, Area Sub-Division and Octree Methods Illumination Models and Surface Rendering Methods: Basic Illumination Models, Polygon Rendering Methods Computer Animation: Design of Animation Sequence, General Computer Animation Functions Key

Frame Animation, Animation Sequence, Motion Control Methods, Morphing, Warping (Only Mesh Warping)

TEXTBOOKS

- Donald Hearn and M. Pauline Baker, "Computer Graphics with Open GL", Prentice Hall.
- R. K Maurya, "Computer Graphics with Virtual Reality", Wiley

REFERENCE BOOKS

- "Computer Graphics Principles & practice", Foley, Van Dam, Feiner and Hughes, Pearson Education.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : DSE- IV	
Subject Title : Computer Graphics Lab	**Pattern : Practical**
No of Credits : 2	**No of Hours : 30**

L	**T**	**P**	**C**
0	**0**	**3**	2

The students are required to create interactive graphics applications in C using graphics application programming interfaces and demonstrate geometrical transformations. The lab material includes implementation of line drawings, circle drawing, ellipse drawing as well as different geometrical transformations.

Experiment 1: Line Drawing Using DDA and Bresenham
Experiment 2: Circle Drawing Using Midpoint Algorithm .
Experiment 3: Ellipse Drawing Using Mipoint Algorithm.
Experiment 4: Performing the basic 2D transformations such as translation, Scaling, Rotation, shearing and reflection for a given 2D object.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : DSE- V	
Subject Title : Project Work - Dissertation	**Pattern : Theory**
No of Credits :6	**No of Hours : 90**

L	**T**	**P**	**C**
6	**0**	**0**	6

OUTCOME:

- This option is to be offered only in 6th Semester.
- The students will be allowed to work on any project based on the concepts studied in core/elective or skill based elective courses.
- The group size should be maximum of three (03) students.
- Each group will be assigned a teacher as a supervisor who will handle both their theory as well lab classes.
- A maximum of Four (04) projects would be assigned to one teacher.
- Theory classes will cover project management techniques.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : Office Automation Tool	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Objective	**:**	**1.** To make students understand and learn various Office Automation Tools like MS Word, MS Excel & MS PowerPoint.

L	**T**	**P**	**C**
2	**0**	**2**	**4**

Introduction to open office/MS office/Libreoffice (2L)

Word Processing: Formatting Text, Pages, Lists, Tables (5L)

Spreadsheets: Worksheets, Formatting data, creating charts and graphs, using formulas and functions, macros, Pivot Table (6L)

Presentation Tools: Adding and formatting text, pictures, graphic objects, including charts, objects, formatting slides, notes, hand-outs, slide shows, using transitions, animations (4L)

Books Recommended:

1. SushilaMadan , Introduction to Essential tools,JBA,2009.
2. Anita Goel, Computer Fundamentals, Pearson, 2012

Computer Lab Based on Office Automation:

Practical List for WORD:

1. Create a **telephone directory**.

- The heading should be 16-point Arial Font in bold
- The rest of the document should use 10-point font size
- Other headings should use 10-point Courier New Font.
- The footer should show the page number as well as the date last updated.

2. Design a time-table form for your college.

- The first line should mention the name of the college in 16-point Arial Font and should be bold.
- The second line should give the course name/teacher's name and the department in 14point Arial.
- Leave a gap of 12-points.
- The rest of the document should use 10-point Times New Roman font.

- The footer should contain your specifications as the designer and date of creation.

3. Create the following one page documents.

   (a) Compose a note inviting friends to a get-together at your house, including a list of things to bring with them.

   (b) Design a certificate in landscape orientation with a border around the document.

4. Create the following document: A newsletter with a headline and 2 columns in portrait orientation, including at least one image surrounded by text.

5. Convert following text to a table, using comma as delimiter

   Type the following as shown (do not bold).
   Color, Style, Item

   Blue, A980, Van
   Red, X023, Car
   Green, YL724, Truck

   Name, Age, Sex
   Bob, 23, M
   Linda, 46, F
   Tom, 29, M

6. Prepare a grocery list having four columns (Serial number, the name of the product, quantity and price) for the month of April, 06.
   - Font specifications for Title (Grocery List): 14-point Arial font in bold and italics.
   - The headings of the columns should be in 12-point and bold.
   - The rest of the document should be in 10-point Times New Roman.
   - Leave a gap of 12-points after the title.
7. XYZ Publications plans to release a new book designed as per your syllabus. Design the first page of the book as per the given specifications.
   (a) The title of the book should appear in bold using 20-point Arial font.
   (b) The name of the author and his qualifications should be in the center of the page in 16point Arial font.
   (c) At the bottom of the document should be the name of the publisher and address in 16point Times New Roman.
   (d) The details of the offices of the publisher (only location) should appear in the footer.
8. Create the following one page documents.
   a) Design a Garage Sale sign.
   b) Make a sign outlining your rules for your bedroom at home, using a numbered list.

9.Enter the following data into a table given on the next page.

Salesperson	Dolls	Trucks	Puzzles

Amit	1327	1423	1193
Shivi	1421	3863	2934
Om	5214	3247	5467
Ananya	2190	1278	1928
Anupama	1201	2528	1203
Maharshi	4098	3079	2067

Add a column Region (values: S, N, N, S, S, S) between the Salesperson and Dolls columns to the given table Sort your table data by Region and within Region by Salesperson in ascending order:

Practical List for EXCEL

Q1. Create a student worksheet containing roll numbers, names and total marks. Open a document in Word and insert the excel worksheet using:- i)Copy/Paste ii)Embedding iii)Linking

Q2. The term wise marks for APS class of 20 students are stored in 3 separate sheets named term1, term2 and term3. Create 4th worksheet that contains student names and their total and average marks for the entire year. Give proper headings using headers. Make the column headings bold and italic. The 4th worksheet should contain college name as the first line. Make it bold, italic and center it.

Q3. Using a simple pendulum, plot 1-T and 1-T^2 graph.

2

I	t1	t2	t3	Mean(t)	T=t/20	T
70						
80						
90						
100						

Q4. Consider the following employee worksheet:-

Full Name (First Last)	Grade 1/2/3	Basic Salary	HRA	PF	Gross	Net	(VA) Vehicle Allowance

HRA is calculated as follows:

Grade	HRA %(of Basic)
1	40%
2	35%

3 30%

Gross = Basic + HRA + VA

Net = Gross –PF

PF is 8% for all Grades

VA is 15000, 10000 and 7000 for Grades 1, 2 and 3.

i) Find max, min and average salary of employees in respective Grade ii) Count no. of people where VA>HRA iii) Find out most frequently occurring grade.

iv) Extract records where employee name starts with "A" has HRA>10000

v) Print Grade wise report of all employees with subtotals of net salary and also grand totals. Use subtotal command.

vi) Extract records where Grade is 1 or 2 and salary is between 10000 and 20000 both inclusive.

Q5. In a meeting of a marketing department of an organization it has been decided that price of selling an item is fixed at Rs40. It was resolved to increases the sell of more of more items and getting the profit of Rs40,000/.Use Goal Seek of find out how many items you will have to sell to meet your profit figure.

Q6. To study the variation in volume with pressure for a sample of an air at constant temperature by plotting a graph for P – V and P-I/V. Sample observations are:-

Pressure(P)	Volume (V)	I/V	PV	P/V
75	20			
78.9	19			
83.3	18			
88.2	17			

Q7. Plot the chart for marks obtained by the students (out of 5) vs. frequency (total number of students in class is 50).

Q8. Create the following worksheet(s) containing an year wise sale figure of five salesmen in Rs.

Salesman	2002	2003	2004	2005
MOHAN	10000	12000	20000	50000
MITRA	15000	18000	50000	60000
SHIKHA	20000	22000	70000	70000
ROHIT	30000	30000	100000	80000
MANGLA	40000	45000	125000	90000

Apply the following Mathematical & Statistical functions:

i) Calculate the commission for each salesman under the condition :-

a) If total sales is greater than Rs. 3, 00,000/-, then commission is 10% of total sale made by the salesman.

b) Otherwise, 4% of total sale.

ii) Calculate the maximum sale made by each salesman.

iii) Calculate the maximum sale made in each year.

iv) Calculate the minimum sale made by each salesman. v)Calculate the minimum sale made in each year.

vi)Count the no. of sales persons. vii)Calculate the cube of sales made by Mohan in the year 2002.

viii) Find the difference in sales by salesman Mitra between the year 2002 and 2003. Find the absolute value of difference.

ix) Also calculate the Mode, Stddev, Variance, Median for the sale made by each salesman.

ix)Calculate the year wise Correlation coefficient between the sales man Mohan and Mitra year wise

Q9. The following table gives an year wise sale figure of five salesmen in Rs.

Salesman	2000	2001	2002	2003
S1	10000	12000	20000	50000
S2	15000	18000	50000	60000
S3	20000	22000	70000	70000
S4	30000	30000	100000	80000
S5	40000	45000	125000	90000

v)Calculate total sale year wise.

vi)Calculate the net sales made by each salesman

vii) Calculate the commission for each salesman under the condition :-

c) If total sales is greater than Rs. 4, 00,000/-, then commission is 5% of total sale made by the salesman.

d) Otherwise, 2% of total sale.

viii) Calculate the maximum sale made by each salesman.

ix) Calculate the maximum sale made in each year.

x) Draw a bar graph representing the sale made by each salesman. xi)Draw a pie graph representing the sale made by salesmen in year 2001.

Q10. Consider the following worksheet for APS 1st year students:-

S.No.	Name	PH	CH	BY	MT	CS	Total Marks	%	Grade
1									
2									

Grade is calculated as follows:-

If %>=90 Grade A If % >=80 &<90 Grade B

If %>=70 &<80 Grade C

If % >=60 &<70 Grade D

Otherwise students will be declared fail.

i)Calculate Grade using if function ii)Sort the data according to total marks iii)Apply filter to display the marks of the students having more than 65% marks. iv)Draw a pie chart showing % marks scored in each subject by the topper of the class. v)Draw the doughnut chart of the data as in (iv) vi)Enter the S.No. of a student and find out the Grade of the student using VLOOKUP. vii)Extract all records where name

a) Begins with "A"
b) Contains "A"
c) Ends with "A"

Practical List for Power Point:

1. Create five Power point slides. Each slide should support different format. In these slides explain areas of applications of IT. Make slide transition time as 10 seconds.
2. Create five Power Point slides to give advantages/disadvantages of computer, application of computers and logical structure of computer.
3. Create five Power Point slides detailing the process of internal assessment. It should be a self-running demo.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : Programming in SCILAB	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Objective	**:**	1. To provide students with sound foundation in applied mathematics to solve real life problems in industry. 2. To provide hands on experience in using Scilab software to handle real life problems.

L	**T**	**P**	**C**
2	**0**	**2**	**4**

Unit I- Introduction to Programming: Components of a computer, working with numbers, Machine code, Software hierarchy. (2L)

Unit II- Programming Environment: SCILAB Environment, Workspace, Working Directory, Expressions, Constants, Variables and assignment statement, Arrays. (3L)

Unit III- Graph Plots: Basic plotting, Built in functions, Generating waveforms, Sound replay, load and save. (2L)

Unit IV-Matrices and Some Simple Matrix Operations, Sub- Matrices. (2L)

Unit IV- Procedures and Functions: Arguments and return values (2L)

Unit V-Control Statements: Conditional statements: If, Else, Else-if, Repetition statements:While, for loop. (3L)

Unit VI- Manipulating Text: Writing to a text file, Reading from a text file, Randomising and sorting a list, searching a list. (2L)

Recommended Books:

1. M.Affouf, SCILAB by Example ,CreateSpace Independent Publishing Platform,2012
2. H. Ramchandran, A.S. Nair, SCILAB , S.Chand, 2011

Software Lab Based on SCILAB:

1. Write a program to assign the following expressions to a variable A and then to print out the value of A.
   a. (3+4)/(5+6)
      $2\pi^2$
      $\sqrt{2}$
   b.

c. d. $(0.0000123 + 5.67\times10^{-3}) \times 0.4567\times10^{-4}$

2. Celsius temperatures can be converted to Fahrenheit by multiplying by 9, dividing by 5, and adding 32. Assign a variable called C the value 37, and implement this formula to assign a variable F the Fahrenheit equivalent of 37 Celsius.
3. Set up a vector called N with five elements having the values: 1, 2, 3, 4, 5. Using N, create assignment statements for a vector X which will result in X having these values:
   a. 2, 4, 6, 8, 10
   b. 1/2, 1, 3/2, 2, 5/2
   c. 1, 1/2, 1/3, 1/4, 1/5
   d. 1, 1/4, 1/9, 1/16, 1/25
4. A supermarket conveyor belt holds an array of groceries. The price of each product (in pounds) is [0.6, 1.2 ,0.5, 1.3] ; while the numbers of each product are [3, 2 ,1 ,5]. Use MATLAB to calculate the total bill.
5. Thesortrows(x) function will sort a vector or matrix X into increasing row order. Use this function to sort a list of names into alphabetical order.
6. The "identity" matrix is a square matrix that has ones on the diagonal and zeros elsewhere. You can generate one with theeye() function in MATLAB. Use MATLAB to find a matrix B, such that when multiplied by matrix A=[1 2; -1 0] the identity matrix I=[1 0; 0 1] is generated. That is A*B=I.
7. Create an array of N numbers. Now find a single MATLAB statement that picks out from that array the $1,4,9,16,\ldots,\sqrt{N}$thentries, i.e. those numbers which have indices that are square numbers.
8. Draw a graph that joins the points (0,1), (4,3), (2,0) and (5,-2).
9. The seeds on a sunflower are distributed according to the formula below. Plot a small circle at each of the first 1000 co-ordinates :

$$r_n = \sqrt{n}$$

$$\theta_n = \frac{137.51}{180}\pi n$$

10. Calculate 10 approximate points from the function y=2x by using the formulae: i. $x_n = n$
    ii. $y_n = 2n + rand - 0.5$

    Fit a line of best fit to these points using the function polyfit() with degree=1, and generate co-ordinates from the line of best fit using polyval(). Use the on-line help to find out how to use these functions. Plot the raw data and the line of best fit.

11. Calculate and replay 1 second of a sinewave at 500Hz with a sampling rate of 11025Hz. Save the sound to a file called "ex35.wav". Plot the first 100 samples.
12. Calculate and replay a 2 second chirp. That is, a sinusoid that steadily increases in frequency with time, from say 250Hz at the start to 1000Hz at the end.
13. Build a square wave by adding together 10 odd harmonics: 1f, 3f, 5f, etc. The amplitude of the nthharmonic should be 1/n. Display a graph of one cycle of the result superimposed on the individual harmonics.
14. Write a function called FtoC (ftoc.m) to convert Fahrenheit temperatures into Celsius. Make sure the program has a title comment and a help page. Test from the command window with: i.FtoC(96)
    ii. lookfor Fahrenheit
    iii. help FtoC

15. Write a program to input 2 strings from the user and to print out (i) the concatenation of the two strings with a space between them, (ii) a line of asterisks the same length as the concatenated strings, and (iii) the reversed concatenation. For example:
    i. Enter string 1: Mark
    ii. Enter string 2: Huckvale
    iii. Mark Huckvaleiv.
    iv. **********
    v. elavkcuHkraM

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : Multimedia	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Outcomes :	Upon successful completion of this lab course, students will be able to 1. Develop Applications using Flash 2. Create and design image using Photoshop 3. Develop applications using Dream weaver

L	**T**	**P**	**C**
2	**0**	**2**	**4**

Unit 1: **6 Hrs**

Introductory Concepts: Multimedia – Definitions, CD-ROM and the Multimedia Highway, Uses of Multimedia, Introduction to making multimedia – The Stages of project, the requirements to make good multimedia, Multimedia skills and training, Training opportunities in Multimedia. Motivation for multimedia usage, Frequency domain analysis, Application Domain.

Unit 2: **6 Hrs**

Multimedia-Hardware and Software: Multimedia Hardware – Macintosh and Windows production Platforms, Hardware peripherals – Connections, Memory and storage devices, Media software – Basic tools, making instant multimedia, Multimedia software and Authoring tools, Production Standards.

Unit 3: **6 Hrs**

Multimedia – making it work – multimedia building blocks – Text, Sound, Images, Animation and Video, Digitization of Audio and Video objects, Data Compression: Different algorithms concern to text, audio, video and images etc., Working Exposure on Tools like Dream Weaver, Flash, Photoshop Etc.,

Unit 4: **6 Hrs**

Multimedia and the Internet: History, Internet working, Connections, Internet Services, The World Wide Web, Tools for the WWW – Web Servers, Web Browsers, Web page makers and editors, Plug-

Ins and Delivery Vehicles, HTML, VRML, Designing for the WWW – Working on the Web, Multimedia Applications – Media Communication, Media Consumption, Media Entertainment, Media games.

Unit 5 : **6 Hrs**

Multimedia-looking towards Future: Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Assembling and delivering a project-planning and costing, Designing and Producing, content and talent, Delivering, CD-ROM technology.

Recommended Texts:

1. S. Heath, 1999, Multimedia & Communication Systems, Focal Press, UK.
2. T. Vaughan, 1999, Multimedia: Making it work, 4th Edition, Tata McGraw Hill, New Delhi.
3. K. Andleigh and K. Thakkar, 2000, Multimedia System Design, PHI, New Delhi.

Reference Books

1) Keyes, "Multimedia Handbook", TMH, 2000.

2) R. Steinmetz and K. Naharstedt, 2001, Multimedia: Computing, Communications & Applications, Pearson, Delhi.

3) S. Rimmer, 2000, Advanced Multimedia Programming , PHI, New Delhi..

Website and e-Learning Source :1) http://www.cikon.de/Text_EN/Multimed.html

Objective of the course: This course gives practical training in various multimedia software.

Multimedia programs

Flash:

1) To Move an object in the path.

2) Text flip, Text color change,

3) Creating a link using texts and objects, change the color of the object.

4) Shape Tweening and Using shape hints, Motion tweening, hybrid tweening.

5) Character Animation, Object Animation, Drawing Images

6) An application to show the masking effect.

7) Slide show presentation.

Photoshop:

1. To create a greeting card, Create background picture
2. Text effects, photo effects

3. Color , Buttons
4. Editing Images
5. Designing web page

Dream weaver

1. Text Management
2. Tables – Layers
3. Creating menu bar
4. Creating Pages and sites
5. Animation in images

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : Desktop Publishing (DTP)	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Outcomes :	Upon successful completion of this lab course, students will be able to 1. Know and use every MS Paint available option for professional or personal use 2. Use Photoshop as a premier graphic design and image editing tool Productively utilize the Photoshop environment 3. Create a page maker Documents and Templates, add text into documentsusing various methods, and apply different formatting styles to characters and paragraphs. 4. Conceptualize and create Logos, various types of print designs. Design Pamphlets, Posters, Invitation cards, Greeting cards, Wrappers, Advertisements, Banners and Package. 5. Apply design process for realization of the required design/product. Design and develop various graphics, text etc

L	**T**	**P**	**C**
2	**0**	**2**	**4**

1. MS Paint **(6L)**

Introduction About the limits of MS Paint - Presentation and setup of user interface and help - Open and save an image -Knowledge of available file types (JPG, TIFF, ICO, PNG, GIF...) - Set opened image as desktop wallpaper -Display options (zoom, miniature, grid, etc.) Define or resize the size of an image (nonfunctional transparency) -Drawing tools overview

2. Photoshop**:** **(6L)**

Getting Acquainted with Photoshop - Basic Image Manipulation -Color Basics

Painting Tools -Brush Settings -Making Selections -Filling and stroking -Layers - Advanced Layers - Text - Drawing - Using Channels and Masking - Manipulating images - Getting to know the work area

3. PageMaker**:** **(6L)**

- Getting Started with PageMaker, PageMaker Interface, Creating a New Document, Managing Document Layer, Creating & Editing Text, Working with Edit Story, ManagingText as an Object - Working with Text and Graphics, Using Graphics, Applying Colors to Graphics, Framing Graphics, Cropping and masking Graphics, Working with Layers, Working with Master pages, Working with Plugins, Using Text Wrap - Using Advanced Features, Creating a PDF Document in PageMaker, Working with Data Merger, Using Scripts, Using Object Linking and Embedding, Color Separation Capabilities, Printing

4. Coral Draw **:** **(6L)**

- Getting started with Corel Draw, Introduction to Corel Draw, Features of Corel Draw, Corel Draw Interface, Tool Box, Moving from Adobe Illustrator to Corel Draw, Common Tasks - Drawing and Coloring, Selecting Objects, Creating Basic Shapes, Reshaping Objects, Organizing objects, Applying color fills and Outlines - Mastering with Text, Text Tool Artistic and paragraph text, Formatting Text, Embedding Objects into text, Wrapping Text around Object, Linking Text toObjects

5. Project work**:** **(6L)**

Design Process - Designing Aids - Printing and presentation

Lab for DTP

MS Paint

Display options (zoom, miniature, grid, etc.) -
Define or resize the size of an image (nonfunctional transparency)
Drawing tools overview
Colors selection with right click/left click in the palette
Copy/Paste from selection with or without transparency
Insert an external image in a composition
Colors number selection and color inversion

Photoshop

Painting Tools
Brush Settings - Making Selections
Filling and stroking
Layers - Advanced Layers
Text -Drawing - Using Channels and Masking
Manipulating images

Page Maker

Create Documents and Templates, add text into documentsusing various methods, and apply different formatting styles to characters and paragraphs.
Import graphics, create objects using various tools, add effects to objects
Create a book and export it into PDF

Coral Draw

Conceptualize and create Logos, various types of print designs.
Design Pamphlets, Posters, Invitation cards, Greeting cards, Wrappers, Advertisements, Banners and Package.

Create multifaceted drawings with several layers and details
Add a great degree of dimensional effect and richness to drawings

Project Work

Apply design process for realization of the required design/product. Design and develop various graphics, text etc.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : Content Management Software	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Outcomes :	Upon successful completion of this lab course, students will be able to 1. Install Joomla, Overview of Joomla Architecture. 2. Working with Control Panel to access the functions of Joomla through clickable icons. 3. To know about the various toolbar options in Joomla. Create custom menus for your website. 4. Studying the menus present under Joomla content, Component Menu, Banners. To know about Extension Manager, Module Manager, Plugin Manager, Template Manager. 5. Creating Menus, adding menu items, Modifying menu items, Creating submenus. 6. Creating Modules in Joomla.Create Templates, Banners.Add Forums, Web links, Creating Real world Examples

L	T	P	C
2	0	2	4

UNIT : I **12 Hours**

Overview of Joomla, Manage media files, Working with extension manager, Working with Breadcrumb module in Joomla, Add template in Joomla, Add template in Joomla, Manage menus, Display the location and function of modules, Working with Random Image Module , Create template in Joomla

UNIT : II **12 Hours**

Create store Database, Working with details tab, Set default language for your Website, Working with debug settings, Create contact details of the company

UNIT : III **12 Hours**

Joomla Admin Panel, Working with Page display, metadata, Joomla Translations, Working with media manager, Use Newsfeed in Joomla Real World Applications.

UNIT : IV **12 Hours**

How to create article page, Add New Article using Article manager, Create Menus in Joomlausing Menu Manager, Working with Joomla media settings, Create corporate intranets and extranets

UNIT : V **12 Hours**

Create standard pages, Create categories for the article using category manager, Add New Menu Items, Working with Joomla Language Manager, Create on-line magazines

Text and Reference Books :

1. Stephen Burge, "Joomla 3 Explained: Your step-by-step Guide to Joomla3",
2. Independently published
   Eric Tiggeler, "Joomla! 3 Beginner's Guide", 2nd Edition, Packt Publishers
3. Tim Plummer," Learning Joomla3 Extension Development", 3rd Edition, Packt Publishers

Website : URL: https://www.tutorialspoint.com/joomla/joomla_overview.htm

CONTENTMANAGEMENT SOFTWARE LAB

1. System Requirements for Joomla
2. Using Toolbar options , Creating Store Database
3. Create aTemplate
4. Creating Menus for website
5. Content Menu in Joomla
6. Component menu in Joomla
7. Working with modules, Implementation of Templates
8. Working with plugin Manager
9. Modules in Joomla
10. Joomla Global Settings, Media settings
11. Configure Joomla site with personal settings
12. Joomla Language Manager
13. Template Manager
14. Adding forums, web Links
15. Creation of Web sites and Personal home pages

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : Web Programming	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Outcome	**:**	3. To learn basic skill to develop responsive web applications 4. To understand different web extensions and web services standards 5. To understand basic concepts of Search Engine Basics. 6. To learn Web Service Essentials. 7. To learn Rich Internet Application Technologies. 8. To understand and get acquainted with Web Analytics 2.0

L	**T**	**P**	**C**
2	**0**	**2**	**4**

UNIT I **4 hrs**

Internet Standards, Introduction to WWW and WWW Architecture, Internet Protocols, Overview of HTTP, HTTP request – response, Generations of dynamic web pages

UNIT II **4hrs**

Introduction to HTML and HTML5, TML Tags, Formatting and Fonts, Commenting Code, Anchors, Backgrounds, Images, Hyperlinks, Lists, Tables, Frames, HTML Forms. The need for CSS, Introduction to CSS, Basic syntax and structure, Inline Styles, Embedding Style Sheets, Linking External Style, Backgrounds, Manipulating Text, Margins and Padding, Positioning using CSS.

UNIT III **4 hrs**

Java Script, Introduction, Core features, Data types and Variables, Operators, Expressions, Functions, Objects, Array, Date and Math related Objects. JAVA Networking classes, TCP/IP Protocol Suite, File Transfer Protocol (FTP), Java Environment |Setup for Web Applications, JavaBean, Application Builder Tool, Bean Developer Kit (BDK), The Java Beans API, Introduction to EJB

UNIT IV **4hrs**

Database basics, SQL, MySQL, PostgreSQL, JDBC API, Driver Types, Two-tier and Three-tier Models, Connection Overview, Transactions, Driver Manager Overview, Statement Overview, Result Set Overview, Types of Result Sets, Concurrency Types, Prepared Statement Overview

UNIT V **4hrs**

Java Web Programs and Applets, Web Application, Servlet, Servlet Life Cycle, Servlet Programming, Introduction to JSP, Life Cycle of a JSP Page, Translation and Compilation, Creating Static Content, Response and Page Encoding, Creating Dynamic Content, Using Objects within JSP Pages, JSP Programming

REFERENCE BOOKS

● J2EE: The complete Reference by James Keogh.

● Java EE and HTML5 Enterprise Application Development (Oracle Press) by John Brock, Arun Gupta, GeertjanWielenga
● Struts: The Complete Reference, 2nd Edition by James Holmes 77
● ASP.NET Unleashed by Stephen Walther, Kevin Scott Hoffman, Nate Dudek
● Microsoft Visual C# 2013 Step by Step by John Sharp

Software lab on WEB PROGRAMMING:

HTML & CSS Practical list

1. Create a webpage to illustrate text formatting tags, order and unordered list
2. Develop a web page to display table and frames
3. Create a web page to embed an image map in a webpage.
4. Create a web page with all types of Cascading style heets.
5. Design a web page using different CSS properties like border, background, text, and font.

JAVASCRIPT Practical list

6. Develop a simple calculator using JavaScript
7. Designing a digital clock using JavaScript
8. Demonstrate string and math objects predefined methods available in JavaScript
9. Write JavaScript to validate the following fields of the above registration page.
    a. Name (Name should contains alphabets and the length should not be less than 6 characters).
    b. Password (Password should not be less than 6 characters length).
    c. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com)
    d. Phone number (Phone number should contain 10 digits only).

    Note: You can also validate the login page with these parameters.

JDBC Practical list

10. Create a table 'Student' and 'Teacher' in 'College' database and insert two rows in this newly created table using JDBC API and do the following:
    a. Update an already created table 'Teacher' in 'College' database by updating a teacher's name, with "Dr." appended before the name, whose name is "Rita".
    b. Repeat the same thing for all the teachers using PreparedStatement.
    c. Delete the student with ID=3 from 'Student' database.
    d. Insert two students to the ResultSet returned by the query which selects all students with FirstName="Ayush". The database must also get updated along with ResultSet.
11. Create a procedure in MySQL to count the number of Rows in table 'Student'. Use Callable Statement to call this method from Java code.

JSP Practical list

12. Display the pattern:

    1
    1 2
    1 2 3

    Take 'n' in a textbox from user. Display this pattern using
    - Scriptlets
    - <c:forEach> loop
13. Make two files as follows:
    a. main.html: shows 2 text boxes and 3 radio buttons with values "addition", "subtraction" and "multiplication"

b. operate.jsp: depending on what the user selects perform the corresponding function (Give two implementations: using request.getParameter() and using expression language)

14. Validate User input entered in a form. The input must include Name, DOB, Email ID, Lucky Number, Favorite food etc. (Refer Chapter 8)

15. Display Good Morning <uname>, Good Afternoon <uname> or Good Evening <uname> based on the current time of the day.

16. Create your custom library which contains two tags: <hello>, <choco>.

Usage of the tags:

a. <hello name="Ajay">: Output should be Hello Ajay. It contains a mandatory attribute 'name' which can accept Dynamic value.

b. <choco texture="Chewy">: Output should be FiveStar, BarOne.

<choco texture="Crunchy">: Output should be Munch. KitKat.

That means the mandatory attribute must accept a value, and based on the attributes value, it should give output. You must use a bean ChocoBean for this purpose.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : R Programming	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Outcome	**:**	1. Understand the basics in R programming in terms of constructs, control statements, string functions 2. Apply the R programming from a statistical perspective

L	**T**	**P**	**C**
2	**0**	**2**	**4**

Introduction: Overview and History of R,Getting Help,Data ypes,Subsetting,Vectorized Operations, Reading and Writing Data. **(5L)**

Control Structures, Functions,lapply,tapply, split,mapply, apply, Coding Standards.**(5L)**

Scoping Rules, Debugging Tools, Simulation,R Profiler. **(5L)**

Reference Book

W. N. Venables, D. M. Smith, An Introduction to R, R-core team,2015

Software Lab Based on R Programming:

1. Write a program that prints 'Hello World' to the screen.
2. Write a program that asks the user for a number n and prints the sum of the numbers 1 to n
3. Write a program that prints a multiplication table for numbers up to 12.
4. Write a function that returns the largest element in a list.
5. Write a function that computes the running total of a list.
6. Write a function that tests whether a string is a palindrome.
7. Implement the following sorting algorithms: Selection sort, Insertion sort, Bubble Sort
8. Implement linear search.
9. Implement binary search.
10. Implement matrices addition , subtraction and Multiplication

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : MATLab	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Outcome	**:**	1. Understand the fundaments of procedural and functional programming 2. Understand Matlab data types and structures 3. Be able to setup simple real-life numerical problem such that they can be solved and visualized using basic codes in Matlab; 4. Be ready to use advanced coding in Matlab in their subsequent studies

L	**T**	**P**	**C**
2	**0**	**2**	**4**

UNIT 1. Introduction to MATLAB Programming- Basics of MATLAB programming, Array operations in MATLAB, Loops and execution control, Working with files: Scripts and Functions, Plotting and program output

UNIT 2. Approximations and Errors- Defining errors and precision in numerical methods, Truncation and round-off errors, Error propagation, Global and local truncation errors

UNIT 3. Linear Equations- Linear algebra in MATLAB, Gauss Elimination, LU decomposition and partial pivoting, Iterative methods: Gauss Siedel Method

UNIT 4. Regression and Interpolation- Introduction, Linear least squares regression (including lsqcurvefit function), Functional and nonlinear regression (including *lsqnonlin* function), Interpolation in MATLAB using spline and *pchip*

UNIT 5. Nonlinear Equations- Nonlinear equations in single variable, MATLAB function fzero in single variable, Fixed-point iteration in single variable, Newton-Raphson in single variable, MATLAB function *fsolve* in single and multiple variables, Newton-Raphson in multiple variables

TEXT BOOKS

1. Fausett L.V.(2007) Applied NumericalAnalysis Using MATLAB, 2nd Ed.,Pearson Education

2. Essential MATLAB for Engineers and Scientists, 6th Edition, Brian Hahn; Daniel T. Valentine, Academic Press, Web ISBN-13: 978-0-12-805271-6,

Software Lab Based on MATLAB:

1. Find the roots of the equations $6x_5 -41x_4 +97x_3 -97x_2 +41x-6$
2. Find the values of x,y,z of the equations x+y+z=3,x+2y+3z=4,x+4y+9z=6
3. For $f(x)=8x_8 -7x_7 +12x_6 -5 x_5 +8 x_4 +13 x_3 -12x+9$ compute f(2),roots of f(x) and plot for $0 \le x \le 20$
4. MATRICES
   i. Find the addition, subtraction and multiplication of 3x3 matrix
   ii. Find the transpose of a matrix

iii. Find the inverse of a matrix

5. Solve any linear equation using a) Guass Elimination Method b) Guass Seidal Method

6. **INTERPOLATION AND CURVE FITTING**
   i. Find the lagrange's polynomial for the following data (0,2),(1,3),(2,12),(5,147)
   ii. Fit a straight line for the following data (0,12),(5,15),(10,17),(15,22),(20,24),(25,30)
   iii. Fit a polynomial curve for the following data (0,1),(1,1.8),(2,1.3),(3,2.5),(4,6.3)

7. write a program to find the root of the equation by using x3-5x+3 using Newton Raphson Method

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : VISUALIZATION TOOLS	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Objectives :	The purpose of learning this course is to Analyze and visualize data, Analyze and visualize data, Create visualizations that accurately represent the source dataset, Use Tableau to perform various types of analysis on data sets, Data visualizations that demonstrates an understanding of data, Use various methods for data visualization.

Outcomes :	Upon successful completion of this lab course, students will be able to 1. Design effective data visualizations in order to provide new insights 2. Find and select appropriate data visualization in order to create a better understanding of the data 3. Create Heat map, word cloud and different type of charts as visualization 4. Cite data from other sources in visualizations and documentation 5. Properly document and organize data and visualizations 6. Create dashboard for data visualization

L	**T**	**P**	**C**
2	**0**	**2**	**4**

UNIT : I **12 Hours**

Introduction to Tableau What is Tableau, Data Connection Details – Connecting to various data source, Top 10 Chart Types – Bar chart, Tableau maps –Geo-coded Fields – Geographic Hierarchies and Ambiguity, Creating Dashboards- Creating a simple Dashboards – Tiled Placement, Tableau User Interface –The data window, Adding multiple tables from the same database, Line / Area chart – Tableau forecasting, Custom Geo-coding, Floating Placement, Associated Dashboard elements.

UNIT : II **12 Hours**

Shelves & Cards, Joining multiple tables from the same database, Pie chart, text table / cross tab, Background Maps and Layers : Maps options, Advanced Dashboard elements – Layout Container, Blank, Basic Tableau Design Flow, Customizing your view of the data, Scatter plot , Bubble Chart, Web map Services, Text , Image , Webpage.

UNIT : III **12 Hours**

Basic Visualization Design using show me, Modifying Tableaus default field, Bullet Group, Box Plot, Mapping and Mark types, Setting Dashboards and Element size, Choosing Mark Types, Assignments, Tree map, Custom Background Images, Dashboards Action.

UNIT : IV **12 Hours**

Color,Size,Shapes and Label options – Choosing color options, Hiding, Renaming and Combining fields, Word cloud, Calculating fields, Table Calculations and Statistics – Creating Calculate fields, Distributing and Sharing your Visualization – Exporting worksheets and DashboardsPrinting to PDF format, Setting Mark Size Text tables Mark Labels, Changing default field appearance, Interacting with the viewer - Filtering data, Basics of filtering, Interactive filtering, Numeric calculations, String Manipulations, Date calculations, Exporting Worksheet Data.

UNIT : V **12 Hours**

Choosing shapes, Using Hierarchies , Groups and Sets, Quick filtering , Parameters – Creating parameters, Logic Constructs, Creating Binned fields, Exporting Worksheet Image, Saving and Sharing Metadata, Displaying a parameters – Using a parameter in a worksheet, Table Calculations, Exporting Dashboards Images.Formatting Options, Extracting data, Data Blending, Worksheet Actions – Filter Actions, Reference Lines, Bands & Distributions, Using Tableau Reader, Moving from text to production databases, Highlight Actions , URL Actions, Trend Lines, Publishing to the Web.

TOTAL : 60 HOURS

Text and Reference Books :

1.George Peck," Tableau 8 : The Official Guide ",First edition, McGraw Hill Professional, 2013.

1.Website: www.tableaureferenceguide.com

VISUALIZATION TOOLS LAB

Exercises to be performed using data visualization tool.

1. Create a bar chart for the given data
2. Create a pie chart for the given data
3. Create a scatter chart for the given data
4. Create a time series chart for the given data
5. Create a bullet chart for the given data
6. Create a area chart for the given data
7. Create a heat map for the given data
8. Create a geo map for the given data
9. Create a filled map for the given data
10. Create a dashboard and format it

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : XML Programming	**Pattern : Practical**
No of Credits : 4	**No of Hours : 60**

Objectives :	The student will acquire a knowledge of key features of the most common languages in the XML standard family. The student will fully understand the definition and structure of the Extensible Markup Language (XML), and tree structures in data organisation. Understanding functional programming based on XSLT.

L	**T**	**P**	**C**
2	**0**	**2**	**4**

Introduction: Understanding Mark-up Languages, Introduction to XML and its Goals. (3L)

XML Basics: XML Structure and Syntax, Document classes and Rules. (5L)

Other XML Concepts: Scripting XML, XML as Data, Linking with XML. (4L)

XML with Style: XSL –Style Sheet Basics, XSL basics, XSL style sheets. (3L)

Books Recommended

1. William J. Pardi , XML in action web technology, Microsoft Press, 1999
2. Michael J. Young ,Step by Step XML , Microsoft Press, 2002

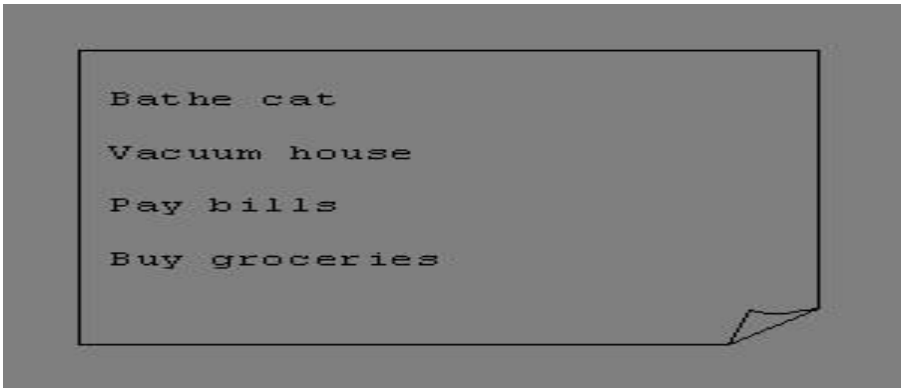
Software Lab Based on XML:

Exercise #1 – Information Structure

In this exercise, student will practice identifying the structure of an information object. For the sample document provided below:

Label the information structures you see, including containing structures.

12.Draw a tree representation of the structure.



Exercise 2# Deconstructing an XML Document

In this exercise, student will practice identifying the explicit structure within an XML document. In a sense, this is the reverse of what you did in Exercise #1. For the sample XML markup below, create a document-like representation (or a simple drawing) for the content contained within the XML tags:

<book>

<coverInfo>

<title>The XML Handbook</title>

<author>Charles F. Goldfarb</author>

<author>Paul Prescod</author>

<edition>Second</edition>

<description>The definitive XML resource: applications, products, and technologies. Revised and expanded—over 600 new pages.

</description>

</coverInfo>

</book>

Exercise #3 – Creating XML Markup

In this exercise, create some XML markup based on the tree representation from Exercise #1 above, and the content from the original sample document.

Exercise #4 – Well-Formedness

This exercise checks your understanding of the constraints for well-formedness. Are the following document instances well-formed? Explain any NO answers.

<list><title>The first list</title><item>An item</list>

<item>An item</item><item>Another item</item>

<para>Bathing a cat is a <emph>relatively</emph> easy task as long as the cat is willing.</para>

<bibl><title>How to Bathe a Cat<author></title>Merlin Bauer<author></bibl>

Exercise #5-Well Formedness

This exercise is a bit more challenging than the previous example. Here is a fragment of an XML document instance. Identify all the places where it fails to match the constraints for wellformedness.

<PROCEDURE><TITLEHow to Bathe a Cat</TITLE>

<OVERVIEW>

This procedure tells you how to bathe a cat. <WARNING></OVERVIEW>Cats don't like to take baths. You could get hurt doing this. Be sure to obtain all the required protective gear before you start. </WARNING><EQUIPEMENT><ITEM>Hockey Mask <ITEM>Padded Full-body Kevlar Armor</ITEM><ITEM>Tub full of warm water</ITEM><ITEM>Towels </ITEM><ITEM>First Aid kit</ITEM><ITEM>Cat Shampoo</ITEM>

<EQUIPMENT><INSTRUCTIONS><STEP> Locate the cat, who by now is hiding under the bed.</STEP><STEP>Place the cat in the tub of water.</STEP><ITEM>Using the First Aid kit, repair the damage to your head and arms.</STEP><STEP>Place the cat back in the tub and hold it down.</STEP><STEP>Wash it really fast, then make an effort to dry it with the towels.</STEP><STEP>Decide not to do this again. </STEP></INSTRUCTIONS>

Note: Cover more exercises based on XML Programming theory concepts.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title :MOBILE APPLICATION DEVELOPMENT	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcome	**:**	1. To learn activity creation and Android User Interface designing. 2. To learn basics of Intent, Broadcast and Internet services. 3. To learn about different wireless mobile data transmission standards. 4. To understand and learn how to integrate basic phone features, multimedia, camera and Location based services in Android Application. 5. To learn about different systems for mobile application development, deployment and distribution in Mobile market place (Android, IoS). **6.** To understand and carry out functional test strategies for mobile applications.

L	**T**	**P**	**C**
2	**0**	**2**	**4**

UNIT I **4 hrs**

What is Android, Android Versions and its Feature Set, Various Android Devices on the Market, Android Market Application Store, Android Development Environment System Requirements, Android SDK, Installing Java, and ADT bundle - Eclipse Integrated Development Environment (IDE), Creating Android Virtual Devices (AVDs)

UNIT II **4 hrs**

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, Creating a New Android Project ,Defining the Project Name and SDK Settings, Project Configuration Settings, Configuring the Launcher Icon, Creating an Activity, Running the Application in the AVD, Stopping a Running Application, Modifying the Example Application, Reviewing the Layout and Resource Files

UNIT III **4hrs**

Understanding Java SE and the Dalvik Virtual Machine, The Directory Structure of an Android Project, Common Default Resources Folders, The Values Folder, Leveraging Android XML, Screen Sizes , Launching Mobile Application: The AndroidManifest.xml File, Android Application Components, Android Activities: Defining the UI, Android Service s: 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

UNIT IV **4 hrs**

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 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, Adjusting Progress with Seek Bar, Working with Menus using views, Gallery, Image Switcher, Grid View, and Image View views to display images, Creating Animation

UNIT V. **4 hrs**

Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, sending email, Introduction to location-based service, configuring the Android Emulator for Location -Based Services, Geocoding and Map-Based Activities Multimedia: Audio, Video, Camera: Playing Audio and Video, Recording Audio and Video, Using the Camera to Take and Process Pictures

REFERENCE BOOKS

1. Android Programming Unleashed (1 st Edition) by Harwani.
2. Beginning Mobile Application Development in the Cloud (2011), Richard Rodger.

Software Lab Based on MOBILE APPLICATION DEVELOPMENT :

1. Installing Android Environment
2. Create Hello World Application
3. Sample Application about Android Resources
4. Sample Application about Layouts
5. Sample Application about Intents
6. Sample Application I about user interfaces
7. Sample Application about Animations
8. Make a Project based on above labs
9. Sample Application about Android Data
10. Sample Application about SQLite I
11. Sample Application about SQLite II
12. Project Presentation

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Subject : SKILL ENHANCEMENT COURSES	**Subject Code :**
Subject Title : Cloud Computing	**Pattern : Theory**
No of Credits : 4	**No of Hours : 60**

Outcome	**:**	1. Deploy applications over commercial cloud computing infrastructures such as Amazon Web Services, Windows Azure, and GoogleAppEngine. 2. Program data intensive parallel applications in the cloud. 3. Analyze the performance, scalability, and availability of the underlying cloud technologies andsoftware. 4. Identify security and privacy issues in cloudcomputing. 5. Explain recent research results in cloud computing and identify their prosand cons. 6. Solve a real-world problem using cloud computing through groupcollaboration.

L	**T**	**P**	**C**
2	**0**	**2**	**4**

Unit I **4 hrs**

Definition, characteristics, components, Cloud service provider, the role of networks in Cloud computing, Cloud deployment models- private, public & hybrid, Cloud service models, multitenancy, Cloud economics and benefits, Cloud computing platforms - IaaS: Amazon EC2, PaaS: Google App Engine, Microsoft Azure,SaaS.

Unit II **4 hts**

Virtualization concepts , Server virtualization, Storage virtualization, Storage services, Network virtualization, Service virtualization, Virtualization management, Virtualization technologies and architectures, virtual machine, Measurement and profiling of virtualized applications. Hypervisors: KVM, Xen, VMware hypervisors and their features.

Unit III **4 hrs**

Relational databases, Cloud file systems: GFS and HDFS, BigTable, HBase and Dynamo. MapReduce and extensions: Parallel computing, the map-Reduce model, Parallel efficiency of MapReduce, Relational operations using Map-Reduce, Enterprise batch processing usingMapReduce.

Unit IV **4 hrs**

Cloud security fundamentals, Vulnerability assessment tool for cloud, Privacy and Security in cloud. Cloud computing security architecture: General Issues, Trusted Cloud computing, Secure Execution Environments

and Communications, Micro - architectures; Identity Management and Access control, Autonomic security, Security challenges : Virtualization security management - virtual threats, VM Security Recommendations, VM - Specific Security techniques, Secure Execution Environments and Communications incloud.

Unit V **4 hrs**

Implementing real time application over cloud platform, Issues inInter-cloud environments, QOS Issues in Cloud, Dependability, data migration, streaming in Cloud. Quality of Service (QoS) monitoring in a Cloud computingenvironment. Cloud Middleware. Mobile Cloud Computing. Inter Cloud issues. A grid of clouds, Sky computing, load balancing, resource optimization, resource dynamic reconfiguration, Monitoring in Cloud

TEXT BOOK:

1. Enterprise Cloud Computing by Gautam Shroff,Cambridgepublication

REFERENCE BOOK:

1. Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley-India
2. Dr. Kumar Saurabh,"Cloud Computing", WileyPublication.

Software Lab Based on CLOUD COMPUTING:

1. Create virtual machines that access different programs on same platform.
2. Create virtual machines that access different programs on different platforms.
3. Exploring Google cloud for the following
    a) **Storage**
    b) **Sharing of data**
    c) manage your calendar, to-do lists,
    d) a document editing tool
4. Exploring Microsoft cloud
5. Exploring Amazon cloud

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Course Type	Value added	L	T	P	Credits
Title of the Paper	**1. Women Studies**	3	0	0	2
Pattern	**Theory**	No of Hours			30

Objectives:

1. This paper aims to familiarize students with key concepts, issues, and debates in Women's Studies

2. To make them aware of the Women's exclusion from knowledge and need for Women's Studies

3. As an academic discipline. It deliberates on the prevailing strategies of the growth of Women's Studies in India and abroad

Course Outcomes: Upon successful completion of this course, students should be able to:

1. Understand and engage with central debates in the field of Women's and Gender Studies.

2. Define and apply basic terms and concepts central to this field.

3. Apply a variety of methods of analyzing gender in society, drawing upon both primary and secondary sources.

4. Apply concepts and theories of Women's and Gender Studies to life experiences and historical events and processes.

5. Communicate effectively about gender issues in both writing and speech, drawing upon Women's and Gender Studies scholarship and addressing a public audience.

Unit I – Introduction to Women's Studies **6 hours**

Key concepts in Gender studies - Need, Scope and challenges of Women's Studies – Women's Studies as an academic discipline - Women's Studies to Gender Studies, Need for Gender Sensitization - Women's Movements – global and local: Pre-independence, Post-independence and Contemporary Debates - National Committees and Commissions for Women.

Unit II – Women and Health **6 hours**

Life Cycle Approach to Women's Health – Health status of women in India, factors influencing health and Nutritional status. Maternal and Child Health (MCH) to Reproductive and Child health approaches.

Issues of declining Child Sex Ratio, Widowhood and old age. Occupational and mental health. Health, Hygiene and Sanitation. National Health and Population Policies and Programmes.

Unit III – Women Empowerment and Development 6 hours

Theories of Development, Alternative approaches – Women in Development (WID), Women and Development (WAD) and Gender and Development (GAD). Empowerment- Concept and indices: Gender Development Index (GDI), Gender Inequality Index (GII), Global Gender Gap Index (GGGI). Women Development approaches in Indian Five – Year Plans. Women and leadership– Panchayati Raj and Role of NGOs and Women Development. Sustainable Development Goals, Policies and Programmes.

Unit IV – Women Law and Governance 6 hours

Rights: Gender Equality, Gender Discrimination, Women's Rights as Human Rights. Constitutional provisions for Women in India. Personal laws, Labour Laws, Family Courts, Enforcement machinery – Police and Judiciary. Crime against Women and Child: Child Abuse, Violence, Human Trafficking, Sexual Harassment at Workplace Act, 2013 – Legal protection International Conventions and Legislations Related to Women's Rights.

Unit V – Gender and Media

Discourse on Women and Media Studies- Mainstream Media, Feminist Media. Coverage of Women's issues and issues of women in Mass Media and Media Organizations (Audio-Visual and Print media). Digital Media and legal protection. Alternative Media – Folk Art, Street Play and Theatre. Indecent Representation of Women (Prohibition) Act, 1986, Impact of media on women.

Recommended Reading Text Books / Reference Books

- Khullar, Mala. Writing the Women's Movement: A Reader ed. New Delhi: Zubaan, 2005.
- Jain, Devaki and Pam Rajput. Narratives from the Women's Studies Family: Recreating knowledge. New Delhi: Sage, 1942.
- Programme of Women's Studies. New Delhi: ICSSR, 1977. Desai, Neera and Maithrey Krishnaraj. Women and Society in India. Delhi: Ajantha, 1987.
- Women in Contemporary India. Ed. Alfred De Souza Delhi: Ajanta, 1987.
- Mies, Maria Indian Women and Patriarchy. Delhi: Concept, 1980. Nanda, B.R. Indian Women: From Purdah to Modernity. Delhi: Vikas, 1976.
- Women's Studies in India: A Reader. Ed. Mary John. Penguin: New Delhi, 2008.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Course Type	Value added	L	T	P	Credits
Title of the Paper	**2. Indian Constitution – Configurable Structure**	3	0	0	2
Pattern	**Theory**	No of Hours			30

Objective	To provide the basic knowledge of the development and of principles enshrined in the Constitution of India
Outcome	It frames fundamental political principles, procedures, practices, rights, powers, and duties of the government

Unit – I **6 hours**

Introduction: Significance of the Constitution; Making of the Constitution- Role of the Constituent Assembly, Salient features, the preamble, Citizenship, procedure for amendment of the Constitution.

Unit – II **6 hours**

Fundamental Rights: Right to Equality, the Right to Freedom, the Right against Exploitation, the Right to Freedom of Religion, Cultural and Educational Rights and Right to Constitutional Remedies.

Unit – III **6 hours**

Nature of the Directive principles of State Policy: Difference between of Fundamental Rights and Directive Principles of State Policy – Implementation of Directive Principles of State Policy, Fundamental Duties.

Unit – IV **6 hours**

Union Government – Powers and Functions of the President, the Prime Minister, Council of Ministers. Composition, Powers and functions of the Parliament, Organisation of Judiciary, The Supreme Court: Powers and Functions. LokSabha and RajyaSabha - Powers and Functions.

Unit – V **6 hours**

State Government – Powers and Functions of Governor, Chief Minister, Council of Minister. Composition, Powers and functions of state Legislature, Local Government and the Constitution, Relation between the Union and the States. The High Court: Powers and Functions.

Text Books

1. M. V. Pylee – An Introduction to Constitution of India, Vikas Publications, New Delhi-2005.
2. Subhash C. Kashyap – Our Constitution: An Introduction to India's Constitution & Constitutional Law, National Book Trust, New Delhi-2000.
3. Durga Das Basu – Introduction to the Constitution of India, PHI, New Delhi-2001.
4. D. C. Gupta – Indian Government & Politics, Vikas Publications, New Delhi-1994, VIII Edition.
5. J. C. Johari – Indian Government & Politics, Sterling Publishers, Delhi-2004.

Reference Books

1. V. D. Mahajan – Constitutional Development & National Movement in India, S. Chand & Company, New Delhi.
2. Constituent Assembly Debates, Lok-Sabha Secretariat, New Delhi-1989.
3. Granville Austin – Working of a Democratic Constitution: The Indian Experience, Oxford University Press, New Delhi-1999.
4. A. P. Avasthi – Indian Government & Politics, Naveen Agarwal, Agra-2004.
5. S. A. Palekar – Indian Constitution, Serials Publication, New Delhi-2003.

BOS - SCIENCE BOARD-2021

B.Sc Computer Science

Course Type	Value added	L	T	P	Credits
Title of the Paper	**3. Basic Life Support and First Aid**	3	0	0	2
Pattern	**Demonstration**	No of Hours			30

Course Description

This course is designed to help students develop and understanding of community emergencies and be able to render first aid services as and when need arises.

General Objectives: Upon completion of this course, the students shall be able to:

a. Describe the rules of first aid.

b. Demonstrate skills in rendering first aid in case of emergencies.

Unit	Learning Objectives	Content	Hr	Teaching learning activities	Assessment Methods
I	Describe the importance and principle of first aid	**Introduction** a) Definition, Aims and Importance of first aid b) Rules/ General principles of First Aid c) Concept of emergency	6	Lecture cum discussions	Short answer Objective type
II	Demonstrate skill in first aid techniques	**Procedures and Techniques in First Aid** a) Preparation of First Aid kit. b) Dressing, bandaging and splinting (spiral, reverse spiral, figure of 8 spica, shoulder, hip, ankle, thumb, finger, stump, single and double eye, single and double ear, breast, jaw, capelin), triangle bandage uses, abdominal binder and bandage, breast binder, T and many tail bandage, knots reef, clove. c) Transportation of the	10	Lecture cum discussions Demonstration Videos Simulation Exercises.	Short answer Objective type Return demonstration

		injured d) CPR : Mouth to mouth, Sylvester, Schafer, External cardiac massage			
III	Describe first aid in common emergencies	**First Aid in emergencies** a) Asphyxia, drowning, shock b) Wounds and Bleeding c) Injuries to the Bones, Joints and Muscle - fractures, sprains, strains, hanging, falls d) Burns and scalds e) Poisoning – ingestion, inhalation, bites and stings f) Foreign body in eye, ear, nose and throat.	8	Lecture cum discussions. Videos Demonstration	Short answer Objective type Return Demonstration
IV	List various community emergencies and community resources.	**Community Emergencies & Community Resources** a) Fire, explosion, floods, earth-quakes, famines etc b) Role of nurses in disaster management c) Rehabilitation d) Community Resources - Police, Ambulance services - Voluntary agencies-local, state national and international	6	Lecture cum discussions. Videos Mock drill Simulation exercise Videos Field visit to voluntary agencies.	Short answer Objective type Essay type

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Course Type	Value added	L	T	P	Credits
Title of the Paper	**4. Fire Safety**	3	0	0	2
Pattern	**Demonstration**	No of Hours			30

INSTRUCTIONAL OBJECTIVES

a) To expand awareness on the fire accidents.
b) To know the minimum requirement of the industrial establishment
c) To identify the sources of fire accidents in various places

SUBJECT OUTCOMES

- Understand basic fire safety and what to do in the event of an emergency.
- Understand the values of fire risk control.
- Understand the generic necessities of a Fire Marshal
- Have the skills to initiate emergency processes and promote a positive answer from others
- Be able to detect fire safety hazards and risks in the workplace and public sector.
- Be able to ensure the availability and usage of fire safety equipment's.
- Know how to establish alternative evacuations and fire movements in the workplace and report on their effectiveness

UNIT – IINTRODUCTION ABOUT FIRE SOURCES 6 hours

Fire reasons and sources in institutions, shopping mall, theatres, industries, electrical and forest, types of fuels, fire safety symbols

UNIT – II IMPACT OF FIRE ACCIDENTS 6 hours

Various impact of fire accidents in industries, petrol bunks and public sector places (Economic loss, resettlement, and reconstruction)

UNIT – III FIRE SAFETY RULES 6 hours

Fire safety rules for machinery industries, schools, vehicles, commercial places, and petrochemical industries.

UNIT – IV FIRE ACCIDENTS CONTROL METHODS 6 hours

First aid for Industrial fire accidents, petrol bunk accidents, vehicle fire accidents, school fire accidents, complex fire accidents, and forest fire accidents

UNIT – V FIRE SAFETY LAWS **6 hours**

Various fire safety laws for establishing academic institutions, industries, and public sector places

Text Book

1. Manual of Fire Safety, Seshaprakash, cbs publishers and distributors pvt ltd.
2. Fire Safety in Buildings 2nd Edition (English, Hardcover, Shri V. K. Jain), Publisher: New Age International, ISBN: 9788122430837, 812243083X, Edition: 2ndEdition, 2010, Pages: 652.
3. Fire Safety Management Handbook, 3rd Edition, Daniel E. Della-Giustina, CRC Press, Published February 7, 2014, Reference - 279 Pages - 40 B/W, llustrations, ISBN 9781482221220.

Reference books

1. Evaluation of Fire Safety, Author(s): D. Rasbash, G. Ramachandran, B. Kandola, J. Watts, M. Law Publisher: Wiley, Year: 2004, ISBN: 9780471493822, 0471493821.
2. Fire Risk: Fire Safety Law and Its Practical Application, Author(s): Allan Grice, Publisher: Thorogood Publishing, Year: 2009, ISBN: 1854186035, 9781854186034.
3. Introduction to Fire Safety Management: The handbook for students on NEBOSH and other fire safety courses, Author(s): Andrew Furness, Martin Muckett, Year: 2007, ISBN: 0750680687, 9780750680684, 9780080 551 791.

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Course Type	Value added	L	T	P	Credits
Title of the Paper	**5. Industrial Safety**	3	0	0	2
Pattern	**Theory**	No of Hours			30

INSTRUCTIONAL OBJECTIVES

a) To enable students to conduct safety audit reports effectively.
b) To have awareness about sources of information for safety promotion and training.
c) To train students with estimation of safety performance.
d) To know about the different kinds of industries and their operations.
e) To know the minimum requirement of the industry establishment
f) To identify the sources of accidents in various places.
g) To achieve and understand the principles of safety management.

SUBJECT OUTCOMES

- Design, Establish and Implement the industrial system to improve safety.
- Manner of investigations on unwanted incidents or accidents using root cause analysis
- Achieve the comfort of industry, worker and machine safety.
- Develop communication system effectively on health and safety among the employees and with society at large.
- Demonstrate sensitivity of the safety and legal issues regarding accidents.
- Understand the impact of Fire safety and environment safety whiles the productivity for society at large.

UNIT – ICONCEPTS AND TECHNIQUES 6 hours

Types of industries (construction, machinery, chemical, petrochemical, textile, and cracker), Evolution of modern safety concept- Safety policy - Safety Organization - line and staff functions for safety- Safety Committee. Incident Recall Technique (IRT), safety survey, safety inspection, safety sampling, evaluation of performance of supervisors on safety.

UNIT – II INDUSTRIAL SAFETY EDUCATION AND TRAINING 6 hours

Safety training, needs of Training methods – programme, seminars, conferences, competitions – method of promoting safe practice - motivation – communication - role of government agencies and private consulting agencies in safety training – creating awareness, awards, celebrations, safety posters, safety displays, safety pledge, safety incentive

UNIT – III HAZARDOUS WASTE MANAGEMENT 6 hours

Hazardous waste management in India-waste identification, characterization and classification-technological options for collection, treatment and disposal of hazardous waste, Health hazards-toxic and radioactive wastes-incineration and verification.

UNIT – IV POLLUTION CONTROL IN PROCESS INDUSTRIES 6 hours

Pollution control in process industries like cement, paper, petroleum-petroleum products-textile-tanneries-thermal power plants – dying and pigment industries - eco-friendly energy

UNIT – V INDUSTRIAL FIRE PROTECTION SYSTEMS 6 hours

Sprinkler – hydrants-special fire suppression systems like deluge and emulsifier, selection criteria of the above installations and maintenance– alarm and detection systems. Other suppression systems –CO_2 system, foam system, Dry chemical powder (DCP) system, halon system – need for halon replacement – smoke venting.

Text Book

1. Dan Petersen, "Techniques of Safety Management", McGraw-Hill Company, Tokyo, 1981.
2. Relevant Indian Standards and Specifications, BIS, New Delhi.
3. "Safety and Good House Keeping", N.P.C., New Delhi, 1985.
4. T Miller, Environmental Science: Working with the Earth, 11th Edition, Wadsworth Publishing Co., Belmont, CA, 2006
5. S. P. Mahajan, "Pollution control in process industries", Tata McGraw Hill Publishing Company, New Delhi, 1993.
6. V., Subramanian. The Factories Act 1948 with Tamilnadu factories rules 1950, Madras, Book Agency, 21st ed., Chennai, 2000.
7. C.RayAsfahl , Industrial Safety and Health management, Pearson Prentice Hall,2003.
8. N.V Krishnan. Safety Management in Industry Jaico Publishing House, Bombay, 1997

Reference books

1. "Accident Prevention Manual for Industrial Operations", N.S.C.Chicago, 1982.
2. Blake R.B., "Industrial Safety" Prentice Hall, Inc., New Jersey, 1973.
3. Heinrich H.W. "Industrial Accident Prevention" McGraw-Hill Company, New York, 1980
4. John Ridley, "Safety at Work", Butterworth and Co., London, 1983

Course Type	Value added	L	T	P	Credits
Title of the Paper	**6. Computer Networking and Interface**	3	0	0	2
Pattern	**Theory**	No of Hours			30

Objectives:

• To understand the protocol layering and physical level communication.

• To analyze the performance of a network.

• To understand the various components required to build different networks.

• To learn the functions of network layer and the various routing protocols.

• To familiarize the functions and protocols of the Transport layer.

Outcomes: On Completion of the course, the students should be able to:

- Understand the basic layers and its functions in computer networks.
- Evaluate the performance of a network.
- Understand the basics of how data flows from one node to another.
- Analyze and design routing algorithms.
- Design protocols for various functions in the network.
- Understand the working of various application layer protocols.

UNIT I INTRODUCTION **6 Hours**

Networking - Network Types – Wired LANs: Ethernet - Wireless LANs – Introduction – IEEE 802.11, Bluetooth – Connecting Devices.

UNIT II NETWORK LAYER **6 Hours**

Network Layer Services – Packet switching – Performance – IPV4 Addresses – Forwarding of IP Packets - Network Layer Protocols: IP, ICMP v4 – Unicast Routing Algorithms – Protocols – Multicasting Basics – IPV6 Addressing – IPV6 Protocol.

UNIT III TRANSPORT LAYER **6 Hours**

Introduction – Transport Layer Protocols – Services – Port Numbers – User Datagram Protocol – Transmission Control Protocol – SCTP-

UNIT IV APPLICATION LAYER **6 Hours**

WWW and HTTP – FTP – Email –Telnet –SSH – DNS – SNMP

UNIT VINTERFACING

Hard Disk: Introduction – Construction – Working Principle – File Systems – Formatting and Troubleshooting. Removable Storage and Special Devices: DVD-ROM – Recordable DVD - Rewritable DVD. Blu-ray: Introduction - Blu-ray Disc Parameters - Recording and Playback Principles. Special drives: External drives, Memory stick, USB flash drive, Solid state drive.

TEXT BOOK:

1. Behrouz A. Forouzan, Data Communications and Networking, Fifth Edition TMH, 2013.

REFERENCES

2. Larry L. Peterson, Bruce S. Davie, Computer Networks: A Systems Approach, Fifth Edition, Morgan Kaufmann Publishers Inc., 2012.
3. William Stallings, Data and Computer Communications, Tenth Edition, Pearson Education, 2013.
4. Nader F. Mir, Computer and Communication Networks, Second Edition, Prentice Hall, 2014.
5. Ying-Dar Lin, Ren-Hung Hwang and Fred Baker, Computer Networks: An Open Source Approach, McGraw Hill Publisher, 2011.
6. James F. Kurose, Keith W. Ross, Computer Networking, A Top-Down Approach Featuring the Internet, Sixth Edition, Pearson Education, 2013.

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Course Type	Value added	L	T	P	Credits
Title of the Paper	**7. Campus To Corporate**	3	0	0	2
Pattern	**Theory**	No of Hours			30

Objectives:

1. To develop Self-Confidence to perform and produce
2. To understand the Strengths and Weaknesses
3. To learn the art of building Interpersonal Relationships
4. To understand and develop Working in a Team
5. Aligning the Goals with the Organization's Vision
6. Understanding the basics of Corporate and Business Etiquette
7. To develop the skill of Business Communication and Presentation

Outcomes:

1. To develop Self-Confidence to perform and produce
2. To understand the Strengths and Weaknesses
3. To learn the art of building Interpersonal Relationships
4. To understand and develop Working in a Team
5. Aligning the Goals with the Organization's Vision
6. Understanding the basics of Corporate and Business Etiquette
7. To develop the skill of Business Communication and Presentation

Module 1 Communication Skills: **3 Hours**

Verbal & Non-Verbal

Listening Skills

Writing Skills

Questioning Skills

Module 2 Business Etiquette: **3 Hours**

Making the First Impression

Importance of Handshakes

Business Card Etiquette

Grooming and Personal Hygiene

Body Language

Telephone and email Etiquette

Module 3 Presentation Skills: **4 Hours**

Fundamentals of an Effective Presentation

5 P's of an Effective Presentation

Importance of Visual Aids

Understanding and Overcoming Fear

Public Speaking

Importance of Managing Voice and Language

Managing Question and Answer Session

Module 4 Goal Setting: **3 Hours**

Establishing SMART Goals

Importance of Mission Statement

Formulation of Goals

Procrastination

Visualization of Goals

Module 5 Time Management: **3 Hours**

Prioritization

Dealing with Difficult Tasks

Getting Organized

How to get away from Distractions

Work-Life Balance

Module 6 Conflict Management: **4 Hours**

Creating a Win-Win situation

Negotiation and Persuasion

Dealing with Aggressive Behavior

Different Styles of Handling Conflicts

Dealing with Emotions

Conflict Resolution Strategies

Tools and Techniques for Conflict Management

Module 7 Interpersonal and Team Skills: **4 Hours**

Initiating Small Talks

Managing Relationships

Understanding the Cultural Diversity

Teambuilding Process and Techniques

Coordination in Teams

Assertive Communication while Dealing with Teams

Balancing Team Needs and Individual Needs

Importance of Feedback in Team Building

Module 8 Facing Interview: **3 Hours**

Preparing to face interviews

Group Discussion

Resume Building

Body language, Grooming & Dressing

Module 9 Role of Attitude: **3 Hours**

Positive mental attitude

Career Planning

Stress management

Anger management

References:

1. From Campus to Corporate: Soft Skills and Etiquette Tips to Transition with Confidence Paperback – Import, 23 June 2015, By Marla Harr.

2. Campus to Corporate: Rojgaarkshamta Vruddhicha Yashomaarg (India) Paperback – 1 June 2017, Marathi Edition by Gangadhar Joshi (Author).

3. C2C: Campus to Corporate (A Career Navigation Manual) Paperback – 1 January 2018.

4. Campus to Corporate: Job Placements & Handling Early Work Challenges Paperback – 1 January 2012 by Ashutosh Sharma (Author)

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Course Type	Value added	L	T	P	Credits
Title of the Paper	**8. Gandhian Thoughts**	3	0	0	2
Pattern	**Theory**	No of Hours			30

MODULE I - Introduction to Gandhian Thought **4 Hours**

The early 20th century political scenario in India and World (with special reference to Great Britain, South Africa) - Non – Violent techniques (Conflict Resolution, Social Justice and Reform, Self Rule, Nation Building).

MODULE II - Influences on Gandhiji's Thought **4 Hours**

Influence of the Oriental Culture - Impact of the Western thought - Influence of different religions.

MODULE III - Fundamental Concepts in Gandhian Thought **4 Hours**

Sadhya-sadhanShuchita - Ahimsa - Satya

MODULE IV - Gandhiji's Thoughts on Social Transformation **3 Hours**

Religious Harmony - Removal of Untouchability - Women's Emancipation

MODULE V - Gandhiji's Thoughts on Education **4 Hours**

The Purpose and Meaning of Education - Functions of a Teacher - Basic Education and Knowledge(NayiTalim)

MODULE VI - Political Thought of Gandhiji **3 Hours**

Nationalism - Democracy, Decentralisation of Power - Concept of Ramrajya

MODULE VII - Economic Thought of Gandhiji **4 Hours**

Value Based Approach - Critique of Modern Civilization - Swadeshi and Khadi – Self-sufficient Village System

MODULE VIII - Relevance of Gandhian Thought in the Indian and Global Context
4 Hours

Impact of Gandhian Thought on the Constitution of India - VinobaBhave and Bhoodan Movement - Martin Luther King and Movement against Racism

Suggested references:

1. Bhave, Vinoba. SwarajSastra. Akhil Bharat Sarva-Seva-Sangh Pub., 1955.
2. Dalton, Dennis. Mahatma Gandhi: Nonviolent power in action. Columbia University Press, 2012.
3. Fischer, Louis. The essential Gandhi: his life, work, and ideas: an anthology. Random House Inc, 1962.
4. Fox, Richard Gabriel. Gandhian utopia: Experiments with culture. Boston, MA: Beacon Press, 1989.
5. Gangal, Anurag. "The Gandhian concept of Human security and peace." 2007.
6. Gangurde,K.D. "Gandhi's Autobigraphy: Moral Lessons'', Gandhi Smriti and DarshanSamiti, New Delhi.
7. Gandhi, Mahatma. *Towards new education*. Ed. BharatanKumarappa. Ahmedabad: Navajivan Publishing House, 1953.
8. Gandhi, Mahatma. *Village swaraj*. Ahmedabad: Navajivan Publishing House,1963.
9. Gandhi, Mohandas Karamchand. *Village industries*. Ahmedabad: Navajivan Publishing House, 1960.
10. Gandhi, M. K., and Jitendra T. Desai. "Ruskin: Unto This Last." *A Paraphrase,translated from the Gujarati by Valji Desai (Ahmedabad: Navajivan,1989)* (1956).
11. Gandhi, Mohandas Karamchand. *Trusteeship*. Navajivan Publishing House,1960.
12. Ghosh, B. N. *Gandhian political economy: Principles, practice and policy*. Ashgate Publishing, Ltd., 2007.
13. Guha, Ramachandra. *India after Gandhi: The history of the world's largest democracy*. Pan Macmillan, 2011.
14. Kelkar, Ravindra. "MK Gandhi on Trusteeship." *Published by Jitendra T. Desai NavajivanMudranalaya, Ahmedabad, India. Retrieved on June* 14 (1960): 1914.
15. Kumarappa, Joseph Cornelius, and Joseph Chelladurai Cornelius. *Gandhian economic thought*. Bombay (Mumbai): Vora, 1951.
16. Nazareth, P.A. "Gandhian perspective on International Security", Center of Advanced Strategic Studies, 2013.
17. Pandey, Janardan. *Gandhi and 21st century*. No. 12. Concept Publishing Company, 1998.
18. Parekh, Bhikhu, *Gandhi: a very short introduction*, Oxford University Press,2001.
19. Scalmer, Sean. *Gandhi in the West: The Mahatma and the rise of radical protest*.

Cambridge University Press, 2011.
20. S. K. Joseph & B. Mahodaya (Eds.), "Continuing Relevance of Swadeshi". Maharashtra: Institute Of Gandhian Studies.
21. "Success stories of Panchayati Raj" compiled by Sunita Sharma and Sharbani Das Gupta, Indian Environmental Society, 2007.
22. Varma, Ravindra. "Gandhi's theory of trusteeship: An essay in understanding." *Contextualizing Gandhian thought: Essays in honor of and by RavindraVarma. Wardha: Institute of Gandhian Studies. Retrieved October* 16(2012): 2014.

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Course Type	Value added	L	T	P	Credits
Title of the Paper	**9. Effective Academic Writing and Presentation**	3	0	0	2
Pattern	**Theory**	No of Hours			30

Course Outcomes: Upon completing the course, the student will be able

- To differentiate between various kind of academic writings.
- To identify and avoid the plagiarism.
- To practice the basic skills of performing quality literature review.
- To practice the basic skills of research paper, review paper and thesis writing.
- To target the research work to suitable journal and communicate for publication
- To practice digital writing or develop Open Educational Resources (OER).
- To write research proposals, conference abstract and book chapters/ book proposals.

Unit I **6 Hours**

Academic & research writing: Introduction; Importance of academic writing; Basic rules of academic writing - English in academic writing - Styles of research writing - Plagiarism: Introduction; Tools for the detection of plagiarism; Avoiding plagiarism

Unit II **6 Hours**

Journal Metrics - Author Metrics, Literature review: Introduction, Source of literature - Process of literature review - Online literature databases; Literature management tools

Unit III **6 Hours**

Review Paper Writing, Research paper writing - Referencing and citation; Submission and Post submission

Unit IV **6 Hours**

Thesis Writing - Empirical Study - Challenges in Indian research & writing - Team management (mentor and collaborators) - Time Management

Unit V **6 Hours**

Research proposal writing; Abstract/ Conference Paper/ Book/ Book Chapter writing; OERs: basic concept and licenses - Open Educational Resources (OERs) for learning, Research and development

REFERENCES

1. Kothari, C.R., 1990. Research Methodology: Methods and Techniques. New Age International.
2. Sinha, S.C. and Dhiman, A.K., 2002. Research Methodology, Ess Ess Publications. 2 volumes.
3. Trochim, W.M.K., 2005. Research Methods: the concise knowledge base, Atomic Dog Publishing.

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Course Type	Value added	L	T	P	Credits
Title of the Paper	**10. Yoga & Meditation Lab**	3	0	0	2
Pattern	**Lab**	No of Hours			30

Objective: To study Yoga and Meditation

UNIT – I SURYA NAMASKAR AND ASANAS **6 Hours**

Surya namaskar, Padmasana, Vajrasana, Bhujangasana, Tadasana, Konasana, Uttakatasana, NindraEkaPadhasana, PiraiAsana,PadhaHasthasana, Savasana.

UNIT – II PRANAYAMA **6 Hours**

Surya pranayama, Chandra Pranayama, AnulomVilom, Sheetali, Sheetkari.

UNIT – III MUDRA **6 Hours**

Chin mudra, Rughi mudra, Yoga mudra, Maha mudra, Shanmukhi mudra.

UNIT – IV KRIYA **6 Hours**

Kapalabathi, Bhastrika.

UNIT – V MEDITATION **6 Hours**

Simple, Vibrational, Mantra, Yoga Nitra

References:

1. Dr.V.Krishnamoorthy, *Simple Yoga for Health*, Sri MathiNilayam, 2012.
2. Dr.Ananda Balayogi Bhavanani, *A Primer of Yoga Theory*, Dhivyananda Creations,2008.

3. Dr.S.Hema, Easy *Yoga for Beginners*, Tara yoga Publications,2008.
4. Dr.AsanaAndiappan, *Ashtanga Yoga*, Asana Publications, 2009.
5. YogacharyaSundaram, *Sundra Yoga Therapy*, Asana Publications, 2009
6. Dr.JohnB.Nayagam, *Mudumaikku Mutrupulli Vaikkum Muthiraigal*, Saaru Prabha Publications, 2010.

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Course Type	Value added	L	T	P	Credits
Title of the Paper	**11. ICT Tools and Techniques- Virtual Lab**	3	0	0	2
Pattern	**Lab**	No of Hours			30

Unit I: Information and Communication Technology (ICT) for Learning: 6 Hours

Introduction of Massive Open Online Course (MOOC)-Open source learning management system (LMS)-Activities and resources-MOOC (NPTEL, Swayam, Spoken tutorials) and Virtual labs.

Unit II: Virtual lab: 6 Hours

Introduction of Virtual Lab -Objectives - The Philosophy - Salient Features - Broad Areas of Virtual Labs – Types of Virtual lab – virtual simulation based laboratory, animation based virtual labs.

Unit III: Virtual Lab for Chemistry: 6 Hours

Acid Base Titration-Theory of Acid-Base indicators-Precipitation titration-Complexometric titration-Mechanism of action of Indicator-Application of complexometric titration-Redox titration-Water analysis (Physical parameters)-Water analysis (Chemical parameters)-Spectrophotometry-Types-Application-Detection of Functional Groups-Reactions of amides-Reactions of carboxylic acids-Reactions of phenols-Reactions of primary amines-Reactions of aldehydes- Reactions of ketones.

Unit III: Virtual Lab for Physics: 6 Hours

Crystal structure-Unit cell-Hall effect-Resistivity by four probe method-Characteristics of Zener diode-Characteristics of Thermistor-Tangent Galvanometer-Thermo Couple-Seebeck Effect- Black Body Radiation- Photoelectric effect- Determination of Planck's Constant- Millikan's oil drop experiment.

Unit V: Virtual Lab for Computer Science: 6 Hours

Introduction to wireless sensor network-nesC programming-Send and receive-Range & connectivity VsAntenna Power-Sensor Data Acquisition- Data Collection Frequency and Tx. vs. Power Consumption-Wireless Propagation-Wireless Sensor Network-Wireless Sensor Network Data Acquisition-Transmission and Aggregation-Clustering Algorithms.

References

Topic	Reference Link
MOOC	https://www.indiaeducation.net/online-education/all-about-moocsmassive-open-online-courses-india-abroad.html https://www.mooc.org/about-moocs
LMS	https://elearningindustry.com/what-is-an-lms-learningmanagement-system-basic-functions-features https://moodle.org/ https://docs.moodle.org/38/en/Activities https://www.youtube.com/watch?v=DsQNAprWBfg https://www.youtube.com/watch?v=BENxpst5yM8
Creative Commons	https://creativecommons.org/about/ https://www.youtube.com/watch?v=4dxBa_GlpRo https://www.youtube.com/watch?v=srVPLrmlBJY
Digital Initiative of government of India in higher education	https://www.education.gov.in/en/ict-initiatives https://www.lisportal.com/en/lis-result/3720-digital-initiative-of-govt-of-india-in-higher-education
Open Educational Resources	https://www.oercommons.org/oer
FOSS	https://eric.ed.gov/?id=EJ1179515
NPTEL	https://www.education.gov.in/en/ict-initiatives
Virtual Lab for	https://vlab.amrita.edu/?sub=2

Chemistry	https://www.vlab.co.in/broad-area-chemical-sciences
Virtual Lab for Physics	https://vlab.amrita.edu/?sub=1 https://www.vlab.co.in/broad-area-physical-sciences
Virtual Lab for Computer Science	https://vlab.amrita.edu/?sub=78 https://vlab.amrita.edu/index.php?sub=78

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Ability Enhancement Compulsory Courses

Semester	Sub. Code	Title of the Paper	L	T	P	Credits
I	U19AE1ES	**Environmental Science**	4	0	0	4

OBJECTIVES

a. To expand awareness on the significance of natural resources and energy.
b. To comprehend the structure and function of an ecosystem
c. To understand an aesthetic value with respect to biodiversity, aware of the threats and its conservation and realize the concept of interdependence
d. To identify with the source of kind of pollution and disaster management

OUTCOMES

- Understand core concepts and methods from ecological and physical sciences and their application in environmental problem-solving.
- Realize key concepts from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions.
- Understand the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems.
- Appreciate that one can apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
- Reflect critically about their roles and identities as citizens, consumers and environmental actors in a complex, interconnected world.

Total: 60 Hours

Unit I **12 Hours**

The multidisciplinary nature of environmental studies. Definition, scope and importance need for public awareness

Unit II Natural resources **12Hours**

Renewable and non-renewable resources: natural resources and associated problems.

a. Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effect on forests and tribal people.
b. Water resources: use and over utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems
c. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, case studies.
d. Food resources: world food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer- pesticide problems, water logging, salinity, case studies.

e. Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, case studies.

f. Land resources: land as a resource, land degradation, man induced landslides, soil erosion and desertification.

Role of individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles

Unit III: Ecosystems **12 Hours**

Concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers – energy flow in the ecosystem – ecological succession – food chains, food webs and ecological pyramids – introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystem (ponds, streams, lakes, rivers, oceans, estuaries)

Unit IV: Bio-diversity and its conservation **12Hours**

Introduction – definition: genetic, species and ecosystem biodiversity – biogeographical classification of India – value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and optional values – biodiversity at global, national and local levels.

India as a mega diversity nation – hot-spots of biodiversity – threats to biodiversity: Habitat loss, poaching of wild life, man – wildlife conflicts – endangered and endemic species of India – conservation of biodiversity: in situ and Ex-situ conservation of biodiversity.

Unit V: Environmental pollution **12 Hours**

Definition, causes, effects and control measures of;

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid waste management: causes, effects and control measures of urban and industrial wastes – role of an individual in prevention of pollution – pollution case studies – disaster management: floods, earthquake, cyclone and landslides.

Reference books

1. Environmental Studies, N. Nandini, N. Sunitha and SucharitaTandon,Sapna Book House, 2007.
2. Text book of Environmental Science, RagavanNambiar, Scitech Publications, 2009.
3. Text book of Environmental Chemistry and Pollution Control, S.S.Dara, S.Chand and Co., 2002.
4. Environmental Chemistry, Colin Baird, W.H.Freeman and company, New York,1999.
5. Environmental Chemistry, Gary W. Van Loon and Stephen J. Duffy, Oxford University Press, 2000.

6. New Trends in Green Chemistry, V.K. Ahluwalia and M. Kidwai, Anamaya Publishers, 2006.
7. Perspectives in Environmental studies – Anubhakaushik and CP kaushik, New age international publishers, 4th edition, 2014.
8. Text Book of Environmental Studies for under gradute courses By ErachBharucha Reprinted in 2006, Orient Longman Private Limited /Universities Press India Pvt. Ltd

COURSE CODE	COURSE NAME	CATEGORY	CREDIT	L	T	P
	ENGLISH FOR COMMUNICATION	THEORY	4	60	4	-

UNIT I- Introduction (12hours)
Introduction of communication
Theory of Communication,
Types of communication
Modes of Communication

UNIT II- Language of Communication (12 hours)
Verbal Communication and Non-verbal Communication
Personal, Social and Business
Barriers and Strategies
Intra-personal Communication
Inter-personal Communication
Group communication

UNIT III- Speaking Skills (12hours)
Monologue
Dialogue
Group Discussion
Effective Communication/ Mis- Communication
Interview Techniques
Public Speech

UNIT IV- Reading and Understanding (12hours)
Close Reading
Comprehension
Summary Paraphrasing
Analysis and Interpretation
Translation (from Indian language to English and vice-versa) Literary/Knowledge Texts

UNIT V- Writing Skills (12hours)
Documenting
Report Writing
Making notes
Letter writing (Formal & Informal)
Resume Writing

Reference:
1. *Fluency in English* - Part II, Oxford University Press, 2006.
2. *Business English*, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. *Language through Literature* (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas