

**Semester – I**

<b>Mathematical Foundation for Computer Applications</b>			
Course Code	22VMC11	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3
<b>Course objectives:</b>			
CO1: Apply the fundamentals of set theory and matrices for the given problem.			
CO2: Realize different types of distribution, evaluate the mean and variance for the given case study.			
CO3: Model the given problem by applying the concepts of graph theory.			
CO4: Apply the concepts of mathematical logic for drawing inferences			
CO5: Identify and list the different applications of discrete mathematical concepts in computer science.			
<b>Module-1</b>			
Sets and Matrices: Set Theory, Operations on sets, Cardinality of sets, inclusion-exclusion principle, matrices, finding Eigen values and Eigen vectors.			
Teaching-Learning Process	Practice of problems on sets, matrices and Computation of Eigen values and exploring the applications of inclusion-exclusion principle and Eigen values.		
<b>Module-2</b>			
Mathematical Logic: Propositional Logic, Applications of Propositional Logic, Propositional Equivalences, Predicates and Quantifiers, Nested Quantifiers, Rules of Inference, Introduction to Proofs			
Teaching-Learning Process	Understand the mathematical logic to draw inferences .		
<b>Module-3</b>			
Recapitulation of the concept Function: Pigeonhole principle, Relations :Relations and Their Properties, n-ary Relations and Their Application, Representing Relations, Closures of Relations, Equivalence Relations, Partial Orderings			
Teaching-Learning Process	Problems on Pigeon hole principle and understanding it's applications, Applications of Relations, Posets		
<b>Module-4</b>			

Random variable and probability distribution: Concept of random variable, discrete probability distributions, continuous probability distributions, Mean, variance and co-variance and co-variance of random variables. Binomial and normal distribution, Exponential and normal distribution with mean and variables and problems	
Teaching-Learning Process	Solving problems related to different probability distributions and understanding the applications of probability distributions.
<b>Module-5</b>	
Graph Theory: Graphs and Graphs models, Graph Terminology and Special Types of Graphs, Representing Graphs and Graph Isomorphism, Connectivity, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs, Graph Coloring	
Teaching-Learning Process	Solving Graph problems to understand the application of Graph theory .
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>Three Unit Tests each of 20 Marks</li> <li>Two assignments each of 20 Marks or one Skill Development Activity of 40 marks to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be scaled down to 50 marks</p> <p>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> </ol>	
<b>Suggested Learning Resources:</b>	
<b>Books</b>	
<ol style="list-style-type: none"> <li>Kenneth H Rosen, "Discrete Mathematics and its Applications", McGraw Hill publications, 7th edition. (Chapters 2.1,2.2,2.5, 2.6,6.2,8.5,8.6,10.1 to 10.8)</li> <li>Wolpole Myers Ye "Probability and Statistics for engineers and Scientist" Pearson Education, 8th edition.</li> <li>Richard A Johnson and C.B Gupta "Probability and statistics for engineers" Pearson</li> </ol>	

Education. 4. J.K Sharma “Discrete Mathematics”, Mac Millian Publishers India, 3rd edition,2011. 5. Basavaraj S Anami , Venkanna S Madalli, "Discrete Mathematics, A concept-based Approach", Universities Press.		
<b>Web links and Video Lectures (e-Resources):</b>		
<ul style="list-style-type: none"> <li>• <a href="https://www.worldscientific.com/worldscinet/dmaa">https://www.worldscientific.com/worldscinet/dmaa</a></li> <li>• <a href="https://vulms.vu.edu.pk/Courses/">https://vulms.vu.edu.pk/Courses/</a></li> <li>• <a href="http://www.mathily.org/dm-rw.html">http://www.mathily.org/dm-rw.html</a></li> </ul>		
Skill Development Activities Suggested		
<ul style="list-style-type: none"> <li>•</li> </ul>		
<b>Course outcome (Course Skill Set)</b>		
At the end of the course the student will be able to :		
Sl. No.	Description	Blooms Level
CO1		
CO2		
<b>Program Outcome of this course</b>		
Sl. No.	Description	POs

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

<b>Operating System with Unix</b>			
Course Code	22VMC12	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Total Marks	100
Credits	4	Exam Hours	03
<b>Course objectives:</b>			
<ol style="list-style-type: none"> <li>1. To familiarize with the concepts, design, and structure of the UNIX operating system.</li> <li>2. To use basic UNIX Utilities.</li> <li>3. Discuss the principles of UNIX shell programming.</li> </ol>			
<b>MODULE-1</b>			
Introduction to Operating Systems, Computer System Architecture; Operating System Operations; ; Operating System Structure: Operating System Services; System Calls; Types of System Calls; System Programs;; Virtual Machines; System boot. Process Management Process Scheduling: Basic Concepts, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling. Process Synchronization			
<b>Teaching-Learning Process</b>			
<b>MODULE-2</b>			

<p>Deadlocks: System model; Deadlock Characterization, Methods for handling deadlocks; Deadlock Prevention; Deadlock Avoidance; Deadlock Detection and Recovery from deadlock. Memory Management: Memory Management Strategies: Background, Swapping; Contiguous Memory Allocation; Paging; Segmentation; Virtual Memory Management; Demand Paging; Page Replacement; Allocation of Frames; Thrashing.</p>	
<b>Teaching-Learning Process</b>	.
<b>MODULE-3</b>	
<p>The File System: The File, What's in a File name? The Parent-Child Relationship, The HOME Variable: The Home Directory, pwd, cd, mkdir, rmdir, Absolute Pathnames, Relative Pathnames, The Unix File System. The vi Editor: vi Basics, Input Mode, ex Mode and Command Mode. Basic File Attributes: ls options, File Ownership, File Permissions, chmod, Directory Permissions, Changing the File Ownership More File Attributes: File Systems and Inodes, Hard Links, Symbolic Links, The Directory, umask, Modification and Access Times, find. The Shell: The Shell's Interpretive Cycle, Shell Offerings, Pattern Matching-The Wild-cards, Escaping and Quoting, Redirection: The Three Standard Files, Two Special Files: /dev/null and /dev/tty, pipes, tee: Creating a Tee, Command Substitution.</p>	
<b>Teaching-Learning Process</b>	
<b>MODULE-4</b>	
<p>The Process: Process Basics, ps: Process Status, System Processes, Mechanism of Process Creation, Internal and External Commands, Running Jobs in Background, Killing Processes with Signals, Job Control, at and batch, cron. Essential Shell Programming: Shell Variables, Environment Variables, Shell Scripts, read, Using Command Line Arguments, exit and exit status of command, The Logical Operators, The if Conditional, using test and [] to Evaluate Expression, The case Conditional, expr, while: looping, for: looping with a list, set and shift, trap, Debugging Shell Scripts with set -x.</p>	
<b>Teaching-Learning Process</b>	
<b>MODULE 5</b>	
<p>AWK and Advanced Shell Programming Simple AWK Filtering, Splitting a Line into Fields, printf, the Logical and Relational Operators, Number Processing, Variables, The -f option, BEGIN and END positional Parameters, getline, Built-invariables, Arrays, Functions, Interface with the Shell, Control Flow. The sh command, export Command, Conditional Parameter Substitution, Merging Streams, Shell Functions, eval, Exec Statement and Examples</p>	
<b>Teaching-Learning Process</b>	

Sl.NO	Experiments
1	<p>a. Write a shell script that takes a valid directory name as a argument recursively descend all the sub-directors, find the maximum length of any file in that hierarchy and writ the maximum value to the standard output.</p> <p>b. Write a shell script that accepts a path name and creates all the components in that path name as directories. For example, if the script is named as mpc, then the command mpc a/b/c/d should create sub-directories a, a/b, a/b/c, a/b/c/d.</p>
2	<p>a. Write a shell script that accepts two filenames as arguments, checks if the permissions for these files are identical and if the permissions are identical, output common permissions otherwise output each filename followed by its permissions.</p> <p>b. Write a shell script which accepts valid log-in names as arguments and prints their corresponding home directories, if no arguments are specified, print a suitable error message.</p>
3	<p>a. Write a shell script that accept one or more file names as argument and convert all of them to uppercise, provided they exists in current directory.</p> <p>b. Write a shell script that displays all the links to a file specified as the first argument to the script. The second argument, which is optional, can be used to specify in which the search is to begin. If this second argument is not present, the search is to begin in the current working directory. In either case, the starting directory as well as its subdirectories at all levels must be searched. The script need not include error checking.</p>
4	<p>a. Write s a shell script to find a file/s that matches a pattern given as command line argument in the home directory, display the contents of the file and copy the file into the directory ~/mydir.</p> <p>b. Write a shell script to list all the files in a directory whose filename is at least 10 characters. (use expr command to check the length).</p>
5	<p>a. Write a shell script that gets executed and displays the message either “Good Morning” or “Good Afternoon” or “Good Evening” depending upon time at which the user logs in.</p> <p>b. Write a shell script that accepts a list of filenames as its argument, count and report occurrence of each word that is present in the first argument file on other argument files.</p>
6	<p>a. Write a shell script that determine the period for which as specified user is working on a system and display appropriate message.</p>

	b. Write a shell script that reports the logging on of as specified user within one minute after he/she login. The script automatically terminates if specified user does not login during
7	Shell scripts to check various attributes of files and directories
8	Write awk script that uses all of its features.
9	

### Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

### CIE for the theory component of IPCC

1. Two Tests each of **20 Marks**
2. Two assignments each of **10 Marks/One Skill Development Activity of 20 marks**
3. Total Marks of two tests and two assignments/one Skill Development Activity added will be CIE for 60 marks, marks scored will be proportionally scaled down to **30 marks**.

### CIE for the practical component of IPCC

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test at the end /after completion of all the experiment shall be conducted for 50 marks and scaled down to 05 marks.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory

component of IPCC for **20 marks**.

### **SEE for IPCC**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours)

1. The question paper will be set for 100 marks and marks scored will be scaled down proportionately to 50 marks.
2. The question paper will have ten questions. Each question is set for 20 marks.
3. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
4. The students have to answer 5 full questions, selecting one full question from each module.

**The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).**

- The minimum marks to be secured in CIE to appear for SEE shall be the 15 (50% of maximum marks-30) in the theory component and 10 (50% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 40% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50. (Student has to secure an aggregate of 50% of maximum marks of the course(CIE+SEE))

### **Suggested Learning Resources:**

#### **Text Books:**

1. Sumitabha Das: UNIX Concepts and Applications, 4th Edition, Tata McGraw Hill, 2006.
2. Abraham Silberschatz, Peter Baer Galvin, Greg Gagne: Operating Systems Principles, 8th Edition, Wiley – India.

#### **Reference Books:**

1. UNIX: The Complete Reference: Kenneth Roson et al, Osborne/McGraw Hill, 2000.
2. Using UNIX: Steve Montsugu, 2ndEdition, Prentice Hall India, 1999.
3. UNIX and Shell Programming: M G Venkateshmurthy, Pearson Education Asia, 2005
4. Behrouz A Forouzan and Richard F Gilberg
5. 4.D M Dhamdhare: Operating Systems – A Concept Based Approach, 2nd Edition, Tata McGraw –



Hill, 2002.

**Web links and Video Lectures (e-Resources):**

<https://www.digimat.in/nptel/courses/video/106105214/L01.html>

<https://nptel.ac.in/courses/106108101>

**Course outcome (Course Skill Set)**

**At the end of the course the student will be able to :**

Sl. No.	Description	Blooms Level
CO1	Analyse the basic Operating System Structure and concept of Process Management	L3
CO2	Identify the given Synchronization/ Deadlock problem to solve and arrive at valid conclusions.	L2
CO3	Demonstrate the working of basic commands of Unix environment including file processing	L3
CO4	Demonstrate the usage of different shell commands, variable and AWK filtering to the given problem	L3

**Program Outcome of this course**

Sl. No.	Description	POs

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x										x
CO2		x		x								
CO3	x				x							
CO4		x			x							

<b>Data Structures with Algorithms</b>			
Course Code	22VMC13	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	4:0:0	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Learning objectives:</b>			
<ol style="list-style-type: none"> <li>1. To provide the knowledge of basic data structures and their implementations</li> <li>2. To develop skills to apply appropriate data structures in problem solving.</li> <li>3. Ability to devise novel solutions to small scale programming challenges involving data structures and recursion.</li> </ol>			
<b>Module-1</b>			
Classification of Data Structures: Primitive and Non- Primitive, Linear and Nonlinear; Data structure Operations, Stack: Definition, Representation, Operations and Applications: Polish and reverse polish expressions, Infix to postfix conversion, evaluation of postfix expression, infix to prefix, postfix to infix conversion.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content		
<b>Module-2</b>			
Recursion - Factorial, GCD, Fibonacci Sequence, Tower of Hanoi. Queue: Definition, Representation, Queue Variants: Circular Queue, Priority Queue, Double Ended Queue; Applications of Queues. Programming Examples.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content		
<b>Module-3</b>			
Linked List: Limitations of array implementation, Memory Management: Static (Stack) and Dynamic (Heap) Memory Allocation, Memory management functions. Definition, Representation, Operations: getnode() and Freenode() operations, Types: Singly Linked List. Linked list as a data Structure, Inserting and removing nodes from a list, Linked implementations of stacks, Header nodes, Array implementation of lists.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content		
<b>Module-4</b>			
Introduction, Fundamentals of the Analysis of Algorithm Efficiency Notion of Algorithm, Fundamentals of Algorithmic Problem Solving, Important Problem Types, Analysis Framework, Asymptotic Notations and Basic efficiency classes, Mathematical analysis of Recursive and Nonrecursive algorithms.			

<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<b>Module-5</b>	
Brute Force: Selection Sort and Bubble Sort, Sequential Search, Exhaustive search and String Matching. Divide-and-Conquer Mergesort, Quicksort, Binary Search, Binary tree Traversals and related properties. Decrease-and-Conquer Insertion Sort, Depth First and Breadth First Search, Topological sorting. Greedy Technique Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm.	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>3. Three Unit Tests each of <b>20 Marks</b></li> <li>4. Two assignments each of <b>20 Marks</b> or <b>one Skill Development Activity of 40 marks</b> to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b></p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>6. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> </ol>	
<p><b>Suggested Learning Resources:</b></p> <p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. Introduction to the Design and Analysis of Algorithms. Anany Levitin, Pearson Education, 2nd Edition.</li> </ol> <p>Reference Books:</p> <ol style="list-style-type: none"> <li>1. Programming in ANSI C, Balaguruswamy, McGraw Hill Education .</li> <li>2. Data Structures Using C and C++ by Yedidyah Langsam and Moshe J. Augenstein and Aaron M Tenanbanum, 2nd Edition, Pearson Education Asia, 2002.</li> </ol>	

3. Introduction to Data Structure and Algorithms with C++ by Glenn W. Rowe.		
<b>Web links and Video Lectures (e-Resources):</b>		
<a href="https://nptel.ac.in/courses/106102064">https://nptel.ac.in/courses/106102064</a> <a href="https://www.programiz.com/dsa">https://www.programiz.com/dsa</a>		
<b>Skill Development Activities Suggested</b>		
The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.		
<b>Course outcome (Course Skill Set)</b>		
At the end of the course the student will be able to :		
<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
CO1	Demonstrate different data structures, its operations using C programming.	L3
CO2	Analyse the performance of Stack, Queue, Lists, Trees, Hashing, Searching and Sorting techniques.	L2
CO3	Implement some applications of data structures in a high-level language such as C/C++	L3
<b>Program Outcome of this course</b>		
<b>Sl. No.</b>	<b>Description</b>	<b>POs</b>

Mapping of COS and POs												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x	x									
CO2			x	x								
CO3					x	x						
CO4	x											x

Computer Networks				
Course Code	22VMC14		CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3:0:0		SEE Marks	50
Total Hours of Pedagogy	40		Total Marks	100
Credits	03		Exam Hours	03
<b>Course Learning objectives:</b>				
<ul style="list-style-type: none"> <li>Gaining a theoretical knowledge of data communication and computer networks.</li> <li>Ability to implement best practices solutions for network implementation.</li> <li>Explore different components of computer networks, various protocols, modern technologies and their applications.</li> </ul>				
<b>Module-1</b>				
Applications, Requirements, Network Architecture, Implementing Network Software, Performance.				
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content			
<b>Module-2</b>				
Perspectives on Connecting, Encoding (NRZ, NRZI, Manchester, 4B/5B), Framing, Error Detection, Reliable Transmission, Ethernet and Multiple Access Networks (802.3), Wireless.				
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content			
<b>Module-3</b>				

Internetworking and Advanced Internetworking Switching and Bridging, Basic Internetworking (IP), Routing, The Global Internet, Routing among Mobile Devices.	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<b>Module-4</b>	
End-to-End Protocols and Congestion Control Simple Demultiplexer (UDP), Reliable Byte Stream (TCP), Queuing Disciplines, TCP Congestion Control, Congestion-Avoidance Mechanisms.	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<b>Module-5</b>	
Network Security and Applications Cryptographic Building Blocks, Key Pre-distribution, Firewalls, Traditional Applications, Infrastructure Services.	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>5. Three Unit Tests each of <b>20 Marks</b></li> <li>6. Two assignments each of <b>20 Marks</b> or <b>one Skill Development Activity of 40 marks</b> to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b></p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <ol style="list-style-type: none"> <li>11. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</li> </ol>	
<p><b>Suggested Learning Resources:</b></p> <p><b>Text Books</b></p> <ol style="list-style-type: none"> <li>1. “ Computer Networks A Systems Approach” by Larry L Peterson and Bruce S Davie, 5th Edition,</li> </ol>	

MKP – 2012

**Reference Books:**

1. James F. Kurose, Keith W. Ross, “Computer Networking – A Top-Down Approach Featuring the Internet”, Fifth Edition, Pearson Education, 2009.
2. Nader. F. Mir, “Computer and Communication Networks”, Pearson Prentice Hall Publishers, 2010.
3. Ying-Dar Lin, Ren-Hung Hwang, Fred Baker, “Computer Networks: An Open Source Approach”, Mc Graw Hill Publisher, 2011.
4. Behrouz A. Forouzan, “Data Communication and Networking”, Fourth Edition, Tata McGraw – Hill, 2011.

**Web links and Video Lectures (e-Resources):**

- <https://nptel.ac.in/courses/106105081>
- <https://www.javatpoint.com/computer-network-tutorial>

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
CO1	Apply the basic concepts of networking and to analyse different parameters such as bandwidth, delay, throughput of the networks for the given problem.	L3
CO2	Apply different techniques to ensure the reliable and secured communication in wired and wireless communication	L3
CO3	Identify the issues of Transport layer to analyse the congestion control mechanism	L2





<b>Software Engineering</b>			
Course Code	22VMC15	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	4:0:0	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>• To provide an idea of using various process models in the software industry according to given circumstances.</li> <li>• To provide the idea of decomposing the given problem into Analysis, Design, Implementation, Testing and Maintenance phases.</li> <li>• Discuss the software requirements and the SRS documents.</li> </ul>			
<b>Module-1</b>			
Introduction: Professional Software Development Attributes of good software, software engineering diversity, IEEE/ACM code of software engineering ethics, case studies. Software Process and Agile Software Development Software Process models: waterfall, incremental development, reuses oriented, Process activities; coping with change, The Rational Unified Process. Agile Methods, Plan-Driven and Agile Development, Extreme Programming, Agile Project Management, scaling agile methods.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content		
<b>Module-2</b>			
Requirement Engineering: Functional and non-functional requirements, The Software requirements document, Requirements specification, Requirements engineering processes, Requirement elicitation and analysis, Requirement validation, Requirement management.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content		
<b>Module-3</b>			
What is object orientation? What is OO development? OO themes; Evidence for usefulness of OO development; OO modelling history, modelling as design Technique: Modelling; abstraction; the three models. Object and class concepts; Link and associations concepts; Generalization and inheritance; A sample class model; Navigation of class models; Practical tips. Advanced objects and class concepts; Associations ends; N-array association; Aggregation, Abstract class; Multiple inheritance; Metadata; Reification; Constraints; Derived data; packages; practical tips.			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content		
<b>Module-4</b>			

State modelling: Events, States, Transitions and Conditions; State Diagram; State diagram behaviour; Practical tips. Advanced State Modelling: Nested state diagram; Nested states; Signal generalization; Concurrency; A sample state model, Relation of class and state models; practical. Interaction modelling: Use Case models, Sequence models, Activity models, Use case relationships; Procedural sequence models, special constructs for activity models.	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<b>Module-5</b>	
Project Design and planning: Process planning, Effort estimation, project scheduling and staffing, Software configuration Management plan, Quality plan, Risk Management, Project Monitoring plan Design: Design concepts, Function oriented design, detailed design, verification, Metrics.	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <ol style="list-style-type: none"> <li>7. Three Unit Tests each of <b>20 Marks</b></li> <li>8. Two assignments each of <b>20 Marks</b> or <b>one Skill Development Activity of 40 marks</b> to attain the COs and POs</li> </ol> <p>The sum of three tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b></p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <p>16. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</p>	
<b>Suggested Learning Resources:</b>	
<b>Text Books</b>	
<ol style="list-style-type: none"> <li>1. Ian Sommerville: Software Engineering, 9th Edition, Pearson Education Ltd, 2011</li> <li>2. Pankaj Jalote, Software Engineering, Wiley India Pvt Ltd (2010) Paul C Jorgensen Software Testing A CraftMan’s Approach, 2nd edition, CRC Press.</li> <li>3. MichelBlaha, James Rumbaugh: Object-Oriented Modelling and Design with UML, 2nd</li> </ol>	

edition, Pearson, 2007.

Reference Books:

1. Stephan R. Schach, “Object oriented software engineering”, Tata McGrawHill,2008
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education,2005.

**Web links and Video Lectures (e-Resources):**

- <https://nptel.ac.in/courses/106101061>
- [https://www.tutorialspoint.com/software\\_engineering/index.htm](https://www.tutorialspoint.com/software_engineering/index.htm)

**Skill Development Activities Suggested**

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Identify and define different requirements for the given problem and present in the IEEE format.	L2
CO2	Use modern tool to create dynamic diagrams to represent the design for the given problem.	L2
CO3	Draw class diagram , analyse the different types of association that exists as per the given problem and represent them using UML notations.	L1
CO4	Analyse the given system to identify actors, use cases to design use case diagrams for the given problem using RSA/open source tool.	L4

**Program Outcome of this course**

Sl. No.	Description	POs

Mapping of COS and POs												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		x		x								
CO2			x		x							
CO3	x			x								
CO4		x										x

Research Methodology and IPR			
Course Code		CIE Marks	50
Teaching Hours/Week (L:P:SDA)		SEE Marks	50
Total Hours of Pedagogy		Total Marks	100
Credits		Exam Hours	
<p><b>Course Learning objectives:</b></p> <ul style="list-style-type: none"> <li>Apply suitable research method for given problem.</li> <li>Carrying out literature survey and documenting it.</li> </ul>			
<b>Module-1</b>			
<p>Research Methodology: Introduction, Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, and Problems Encountered by Researchers in India.</p>			
<b>Teaching-Learning Process</b>	Ppt and case study.		
<b>Module-2</b>			
<p><b>Defining the Research Problem:</b> Research Problem, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration. Reviewing the literature: How to review the literature, searching the existing literature, reviewing the selected literature, Developing a theoretical framework, Developing a conceptual framework, Writing about the literature reviewed</p>			
<b>Teaching-Learning Process</b>	Ppt, case study, show papers published.		
<b>Module-3</b>			

<p>Research Design: Meaning of Research Design, Need for Research Design, Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs</p> <p>Data Collection: Experimental and Surveys, Collection of Primary Data, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method.</p>	
<b>Teaching-Learning Process</b>	Ppt, case study
<b>Module-4</b>	
<p><b>Interpretation and Report Writing:</b> Meaning of Interpretation, Technique of Interpretation, Precaution in Interpretation, Significance of Report Writing, Different Steps in Writing Report, Layout. Types of Reports, Oral Presentation, Mechanics of Writing a Research Report, Precautions for Writing Research Reports.</p>	
<b>Teaching-Learning Process</b>	Ppt, real time examples
<b>Module-5</b>	
<p>Intellectual Property (IP) Acts: Introduction to IP: Introduction to Intellectual Property (IP), different types of IPs and its importance in the present scenario, Patent Acts: Indian patent acts 1970. Design Act: Industrial Design act 2000. Copy right acts: Copyright Act 1957. Trade Mark Act, 1999</p>	
<b>Teaching-Learning Process</b>	Ppt , real time examples
<p><b>Assessment Details (both CIE and SEE)</b></p> <p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p> <p><b>Continuous Internal Evaluation:</b></p> <p>9. Three Unit Tests each of <b>20 Marks</b></p> <p>10. Two assignments each of <b>20 Marks</b> or <b>one Skill Development Activity of 40 marks</b> to attain the COs and POs</p> <p>The sum of three tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b></p> <p><b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b></p> <p><b>Semester End Examination:</b></p> <p>21. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.</p>	

**Suggested Learning Resources:**

Text books

1. Research Methodology: Methods and Techniques, C.R. Kothari, Gaurav Garg New Age International 4th Edition, 2018.
2. Research Methodology a step-by- step guide for beginners. (For the topic Reviewing the literature under module 2) Ranjit Kumar SAGE Publications Ltd 3rd Edition, 2011 Study Material.
3. Intellectual property, Debirag E. Bouchoux, Cengage learning, 2013.

Reference:

1. Research Methods: the concise knowledge base Trochim, Atomic Dog Publishing, 2005.
2. Conducting Research Literature Reviews: From the Internet to Paper Fink A Sage Publications, 2009.

**Web links and Video Lectures (e-Resources):**

<https://youtu.be/E2gGF1rburw>

**Skill Development Activities Suggested**

- Select proper research method for given problem.
- Given problem area, do literature survey and decide problem statement.
- Select a research design and data collection method.
- Write a search paper

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	To select proper research method	
CO2	Do literature survey and data collection	

**Program Outcome of this course**

Sl. No.	Description	POs

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

**Data Structures with Algorithms Lab**

Course Code	<b>22VMCL17</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:3:0	SEE Marks	50
Credits	02	Exam Hours	03

**Course objectives:**

- Develop skills to design and analyze simple linear and non linear data structures.
- Strengthen the ability to identify and apply the suitable data structure for the given real world problem.
- Gain knowledge in practical applications of data structures .

Sl.N O	Experiments
1	Write a C program to Implement the following searching techniques a. Linear Search b. Binary Search.
2	Write a C program to implement the following sorting algorithms using user defined functions: a. Bubble sort (Ascending order) b. Selection sort (Descending order).
3	Write a C Program implement STACK with the following operations a. Push an Element on to Stack b. Pop an Element from Stack
4	Implement a Program in C for converting an Infix Expression to Postfix Expression.
5	Implement a Program in C for evaluating an Postfix Expression.
6	Write a C program to simulate the working of a singly linked list providing the following operations: a. Display & Insert b. Delete from the beginning/end c. Delete a given element
7	Obtain the Topological ordering of vertices in a given graph with the help of a c programming
8	Check whether a given graph is connected or not using DFS method using C programming.

9	From a given vertex in a weighted connected graph, find shortest paths to other vertices Using Dijkstra's algorithm (C programming)
10	Find Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm ( C programming)

**Course outcomes (Course Skill Set):**

At the end of the course the student will be able to:

- Implement sorting / searching techniques, and validate input/output for the given problem.
- Implement data structures (namely Stacks, Queues, Circular Queues, Linked Lists, and Trees), its operations and algorithms.
- Implement the algorithm to find whether the given graph is connected or not and conclude on the performance of the technique implemented.
- Apply appropriate data structures for solving computing problems



**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 40% of maximum marks in the semester-end examination(SEE). In total of CIE and SEE student has to secure 50% maximum marks of the course.

**Continuous Internal Evaluation (CIE):**

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of **scaled-down** marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University.

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 10% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

### Suggested Learning Resources:

- 

<b>Computer Networks Lab</b>			
Course Code	<b>22VMCL28</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:3:0	SEE Marks	50
Credits	02	Exam Hours	03
<b>Course objectives:</b>			
<ul style="list-style-type: none"> <li>• To get practical knowledge of working principles of various communication protocols.</li> <li>• Analyse structure and formats of TCP/IP layer protocols using network tools</li> <li>• To know the concept of data transfer between nodes</li> </ul>			
<b>SLN O</b>	<b>Experiments</b>		
<b>PART A</b>			
<b>Implement the following Computer Networks concepts using C/C++</b>			
1	Write a program for distance vector algorithm to find suitable path for transmission.		
2	Using TCP/IP sockets, write a client-server program to make the client send the file name and to make the server send back the contents of the requested file if present.		
3	Write a program for Hamming code generation for error detection and correction		
4	Write a program for congestion control using leaky bucket algorithm.		
<b>PART B</b>			
<b>(Simulate the following Computer Networks concepts using any network simulators)</b>			
1	Simulate a three nodes point — to — point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped		

2	Simulate the network with five nodes n0, n1, n2, n3, n4, forming a star topology. The node n4 is at the centre. Node n0 is a TCP source, which transmits packets to node n3 (a TCP sink) through the node n4. Node n1 is another traffic source, and sends UDP packets to node n2 through n4. The duration of the simulation time is 10 seconds.
3	Simulate to study transmission of packets over Ethernet LAN and determine the number of packets drop destination.
4	Simulate working of multicasting routing protocol and analyse the throughput of the network/protocol.
5	Simulate the different types of internet traffic such as FTP and TELNET over a wired network and analyze the packet drop and packet delivery ratio in the network.
<p><b>Course outcomes (Course Skill Set):</b>  At the end of the course the student will be able to:</p> <ul style="list-style-type: none"> <li>• Apply the basic concepts of networking and to analyse different parameters such as bandwidth, delay, throughput of the networks for the given problem.</li> <li>• Apply different techniques to ensure the reliable and secured communication in wired and wireless communication</li> <li>• Analyse the networking concepts of TCP/IP for wired and wireless components</li> <li>• Simulate network topology with different protocols and analyse the performance using any simulator</li> </ul>	

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 40% of maximum marks in the semester-end examination(SEE). In total of CIE and SEE student has to secure 50% maximum marks of the course.

**Continuous Internal Evaluation (CIE):**

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of **scaled-down** marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the University.

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 10% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

<b>Basics of Programming &amp; CO</b>			
Course Code	22VMC19BC*	CIE Marks	100
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	--
Total Hours of Pedagogy		Total Marks	100
Credits	--	Exam Hours	--
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>• Gain the Knowledge about concept of a program</li> <li>• Explore the fundamental programming concepts and methodologies</li> <li>• Able to comprehend the concept of a program in a high-level language being translated by a compiler into machine language program</li> </ul>			
<b>Module-1</b>			
<p>C Programming: decision making, control structures and arrays</p> <p>C Structure, Data Types, Input-Output Statements, Decision making with if statement, simple if statement, the if..else statement, nesting of if..else statements, the else.if ladder, the switch statement, the ?: operator, the goto statement, the break statement, programming examples. The while statement, the do...while statement, the for statement, nested loops, jumps in loops, the continue statement, programming examples. One dimensional and two dimensional arrays, declaration and initialization of arrays, reading, writing and manipulation of above types of arrays.</p>			
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content		

<b>Module-2</b>	
Structures Defining a structure, declaring structure variables, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, size of structures.	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<b>Module-3</b>	
Pointers Pointers in C, Declaring and accessing pointers in C, Pointer arithmetic, Functions , Call by value, Call by reference, Pointer as function arguments, recursion, Passing arrays to functions, passing strings to functions, Functions returning pointers, Pointers to functions, Programming Examples	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<b>Module-4</b>	
Binary Systems and Combinational Logic Digital Computers and Digital Systems, Binary Numbers, Number Base Conversion, Octal and Hexadecimal Numbers, subtraction using r's and r-1 complements, Binary Code, Binary Storage and Registers, Binary Logic, Integrated Circuits, Digital Logic Gates	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content
<b>Module-5</b>	
Basic Structure of Computer Hardware and Software Computer Types, Functional Units, Basic Operational Concepts, Bus structure, Software, Performance, Multiprocessing and Multi computers, Machine Instruction: Memory Locations and Addresses, Memory Operations, Instructions and Instruction Sequencing, Addressing Modes, Interrupts.	
<b>Teaching-Learning Process</b>	Chalk and talk/PPT/case study/web content

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

11. Three Unit Tests each of **20 Marks**

12. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

26. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

**Suggested Learning Resources:****Books**

1. Programming in ANSI C, Balaguruswamy, 7th Edition, McGraw Hill Education
2. C : The Complete Reference, Herbert Schild, 4th Edition, McGraw Hill Education
3. Let us C, Yashwant Kanetkar, BPB Publications
4. M. Morris Mano, "Digital Logic and Computer Design", Pearson, 2012.
5. Carl Hamacher, Zvonko Vranesic, Safwat Zaky, "Computer Organization", 5th edition, Tata McGraw-Hill, 2011

**Web links and Video Lectures (e-Resources):**

- <https://nptel.ac.in/courses/106104128>
- <https://www.programiz.com/c-programming>
- <https://www.tutorialspoint.com/cprogramming/index.htm>

**Skill Development Activities Suggested**

- The students with the help of the course teacher can take up relevant technical –activities which will enhance their skill.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Demonstrate the key concepts introduced in C programming by writing and executing the programs	L3
CO2	Demonstrate the concepts of structures and pointers for the given application/problem	L3
CO3	Implement the single/multi-dimensional array for the given problem.	L3

Sl. No.	Description	POs

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	x		x									
CO2		x	x									
CO3	x				x							
CO4						x						x



<b>Database Management System</b>			
Course Code	<b>22VMC21</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	3-2-0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 10-12 Lab slots	Total Marks	100
Credits	4	Exam Hours	3hr
<b>Course objectives:</b>			
<ul style="list-style-type: none"> <li>• Provide a strong foundation in database concepts, technology, and practice.</li> <li>• Practice SQL programming through a variety of database problems.</li> <li>• Demonstrate the use of concurrency and transactions in database.</li> <li>• Design and build database applications for real world problems.</li> </ul>			
<b>MODULE-1</b>			
Introduction: Characteristics of Database approach, Actors on the Scene, Workers behind the scene, Advantages of using DBMS approach, Data models, schemas and instances, Three -schema architecture and data independence, Database languages and interfaces, the database system environment, Centralized and client -server architectures, Classification of Database Management systems, Entity-Relationship Model: Conceptual Database using high level conceptual data models for Database Design, A Sample Database Application, Entity types, Entity sets Attributes and Keys Relationship types, Relationship Sets, Roles and Structural Constraints Weak Entity Types.			
<b>Teaching-Learning Process</b>	Class room Teaching, Active Learning, and Use Digital Portfolios		
<b>MODULE-2</b>			
Relational Model Relational Model and Relational Algebra: Relational Model Concepts, Relational Model Constraints and Relational Database Schema Update Operations, Transactions and Dealing with Constraint violations, Unary Relational operations, Relational Algebra Operations from Set Theory, Binary Relational Operations, JOIN and DIVISION, Additional Relational Operations, Examples of Queries in Relational Algebra Relational Database Design Using ER-toRelational Mapping .			
<b>Teaching-Learning Process</b>	Class room Teaching, Active Learning, and Use Digital Portfolios		
<b>MODULE-3</b>			
Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic structure of SQL Queries, Additional Basic Operations, Null values, Aggregate Functions, nested Sub queries, Modification of the Database, Join Expressions, Views, Transactions, Integrity Constraints, SQL Data Types and Schemas, Authorization.			
<b>Teaching-Learning</b>	Class room Teaching, Active Learning, and Use Digital Portfolios		

<b>Process</b>	
<b>MODULE-4</b>	
Database Design: Informal Design Guidelines for Relation Schemas, Functional Dependencies, Normal Forms based on Primary Keys, General Definitions of 2nd and 3rd Normal Forms, Boyce Codd Normal Forms, Stored Procedures and functions, Triggers.	
<b>Teaching-Learning Process</b>	Class room Teaching, Active Learning, and Use Digital Portfolios
<b>MODULE 5</b>	
Transaction Management: Transaction Concept, A Simple Transaction Model, Transaction Atomicity and Durability, Serializability, Transaction Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels. Concurrency Control: Lock Based Protocols, Deadlock Handling. Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm.	
<b>Teaching-Learning Process</b>	Class room Teaching, Active Learning, and Use Digital Portfolios

**PRACTICAL COMPONENT OF IPCC** *(May cover all / major modules)*

SLO	Experiments
1	Practice session: Students should be allowed to choose appropriate DBMS software, install it, configure it and start working on it. Create sample tables, execute some queries, use SQLPLUS features, Use PL/SQL features like cursors on sample database. Students should be permitted to practice appropriate User interface creation tool and Report generation tool.
2	A college consists of number of employees working in different departments. In this context, create two tables' employee and department. Employee consists of columns empno, empname, basic, hra, da, deductions, gross, net, date-of-birth. The calculation of hra,da are as per the rules of the college. 1. Create tables department and employee with required constraints. 2. Initially only the few columns (essential) are to be added. Add the remaining columns separately by using appropriate SQL command 3. Basic column should not be null 4. Add constraint that basic should not be less than 5000. 5. Calculate hra,da,gross and net by using PL/SQL program.
3	Students may be divided into batches and the following experiments may be given to them to better understand the DBMS concepts. Students should gather the required information, draw ER diagrams, map them to tables, normalize, create tables, triggers, procedures, execute

	<p>queries, create user interfaces, and generate reports.</p> <ul style="list-style-type: none"> <li>• Student information system</li> <li>• KSRTC reservation system</li> <li>• Hostel management</li> <li>• Library management</li> <li>• Indian Railways reservation</li> </ul>
4	<b>Can be Demo experiments for CIE</b>
5	<b>Can be Demo experiments for CIE</b>

#### **Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

#### **CIE for the theory component of IPCC**

4. Two Tests each of **20 Marks**
5. Two assignments each of **10 Marks/One Skill Development Activity of 20 marks**
6. Total Marks of two tests and two assignments/one Skill Development Activity added will be CIE for 60 marks, marks scored will be proportionally scaled down to **30 marks**.

#### **CIE for the practical component of IPCC**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The **15 marks** are for conducting the experiment and preparation of the laboratory record, the other **05 marks shall be for the test** conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to 15 marks.
- The laboratory test at the end /after completion of all the experiments shall be conducted for 50 marks and scaled down to 05 marks.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **20 marks**.

#### **SEE for IPCC**

Theory SEE will be conducted by University as per the scheduled timetable, with common question

papers for the course (duration 03 hours)

5. The question paper will be set for 100 marks and marks scored will be scaled down proportionately to 50 marks.
6. The question paper will have ten questions. Each question is set for 20 marks.
7. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
8. The students have to answer 5 full questions, selecting one full question from each module.

**The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper shall include questions from the practical component).**

- The minimum marks to be secured in CIE to appear for SEE shall be the 15 (50% of maximum marks-30) in the theory component and 10 (50% of maximum marks -20) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included. The maximum of 04/05 questions to be set from the practical component of IPCC, the total marks of all questions should not be more than the 20 marks.
- SEE will be conducted for 100 marks and students shall secure 40% of the maximum marks to qualify in the SEE. Marks secured will be scaled down to 50. (Student has to secure an aggregate of 50% of maximum marks of the course(CIE+SEE))

**Suggested Learning Resources:**

**Books**

1. RamezElmasri, Shamkant B. Navathe, Fundamentals of Database Systems ,7th Edition, Pearson Education, 2017
2. Silberschatz, Korth and Sudharshan Data base System Concepts,6th Edition, Tata McGraw Hill, 2011.

**Web links and Video Lectures (e-Resources):**

**NPTEL Video Course:**

<https://www.youtube.com/watch?v=EUzsy3W4I0g>

<https://www.youtube.com/playlist?list=PL52484DF04A264E59>

**Activity Based Learning (Suggested Activities in Class)/ Practical Based learning**

- Make a Group of Students and assign the simple application development using above concept learnt.

<b>Course outcome (Course Skill Set)</b>												
At the end of the course the student will be able to :												
<b>Sl. No.</b>	<b>Description</b>										<b>Blooms Level</b>	
CO1	Apply the basic concepts of database management in designing the database for the given problem										Application( Level 2)	
CO2	Design entity-relationship diagrams to the given problem to develop database application with appropriate fields and validations.										Analyze, Create ( Level 4, Level 6)	
CO3	Implement a database schema for the given problem domain.										Remember( Level 1)	
CO4	Formulate and execute SQL queries to the given problem.										Application(	
<b>Sl. No.</b>	<b>Description</b>										<b>POs</b>	
1	Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems										PO1	
2	Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.										PO2	
3	Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies										PO3	
4	Conduct Investigations of Complex Computing Problems: Ability to devise and conduct experiments, interpret data and provide well informed conclusions.										PO4	
5	Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions										PO5	
6	Innovation and Entrepreneurship: Identify opportunities, entrepreneurship										PO12	
<b>Mapping of COS and POs</b>												
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	<b>3</b>	<b>2</b>	<b>1</b>	-	-	-	-	-	-	-	-	<b>2</b>
<b>CO2</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>3</b>	-	-	-	-	-	-	<b>1</b>
<b>CO3</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>1</b>	<b>2</b>	-	-	-	-	-	-	<b>1</b>
<b>CO4</b>	<b>2</b>	<b>3</b>	-	-	<b>1</b>	-	-	-	-	-	-	<b>2</b>
<b>CO5</b>	<b>1</b>	<b>1</b>	<b>2</b>	-	-	-	-	-	-	-	-	<b>1</b>

### Object Oriented Programming with Java

Course Code	22VMC22	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	4:0:0	SEE Marks	50
Total Hours of Pedagogy	48	Total Marks	100
Credits	4	Exam Hours	03

**Course Learning objectives:**

At the end of the course, the students will be able to:

- Understand object oriented programming concepts- and apply them in problem solving.
- To introduce the principles of inheritance and polymorphism; and demonstrate how they relate to the design of abstract classes.
- Understand the implementation of packages and interfaces
- Understand the concepts of exception handling and multithreading.
- Understand the concepts of Collection Framework.
- Describe the byte streams and character streams for file management

**Module-1**

**Introduction to Java:** Features of Java, Object Oriented Concepts, A First Simple Program, Lexical Issues, The Java Keywords, Identifiers in Java,

**Introducing Data Types and Operators :** Java's Primitive Types, Literals, Variables, The Scope and Lifetime of Variables, Operators , Shorthand Assignments, Type Conversion and Casting, Arrays

**Control Statements:** if, Nested ifs, if-else-if Ladder, switch, Nested switch Statements. Iteration Statements: while, do-while, for, Enhanced for, Nested Loops, Jump Statements: break, continue, return.

**Introducing Classes:** Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Returning a Value, Constructors, Parameterized Constructors, The this Keyword, Garbage Collection, The finalize( ) Method

**Teaching-Learning Process**

Lectures, Presentations, Quiz's, Assignments

**Module - 2**

**A Closer Look at Methods and Classes :** Overloading Methods, Overloading Constructors, , Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Introducing Nested and Inner Classes. Using Command-Line Arguments, Varargs: Variable-Length Arguments, Overloading Vararg Methods.

**Inheritance:** Inheritance Basics, Member Access and Inheritance, Using super: Using super to Call Superclass Constructors, A Second Use for super, Creating a Multilevel Hierarchy, When Constructors Are Executed, Method Overriding, Using Abstract Classes, Using final with Inheritance, The Object Class.

**String Handling:** The String Constructors, String Length, Special String Operations, Character Extraction:charAt( ), getChars( ), getBytes( ), toCharArray( ). String Comparison: equals( ) and equalsIgnoreCase( ), regionMatches( ), startsWith( ) and endsWith( ), equals( ) Versus ==, compareTo( ). Searching Strings, Modifying a String: substring( ), concat( ), replace( ), trim( ). Data Conversion Using valueOf( ), Changing the Case of Characters Within a String, Joining Strings, Additional String Methods, StringBuffer: length( ) and capacity( ), ensureCapacity( ), setLength( ), charAt( ) and setCharAt( ), getChars( ), append( ), insert( ), reverse( ), delete( ) and deleteCharAt( ), replace( ), substring( ), Additional StringBufferMethods, StringBuilder

<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz's, Assignments
<b>Module-3</b>	
<p><b>Packages and Interfaces:</b>  <b>Packages</b>, Defining a Package, Finding Packages and CLASSPATH, Access Protection, Importing Packages.  <b>Interfaces:</b> Interfaces, Defining an Interface, Implementing Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces, Interfaces Can Be Extended Default Interface Methods, Default Method Fundamentals, Multiple Inheritance Issues, Use static Methods in an Interface.  <b>Exception Handling:</b> Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions, Creating Your Own Exception Subclasses</p>	
<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz's, Assignments
<b>Module-4</b>	
<p><b>Multithreaded Programming :</b> The Java Thread Model, The Thread Class and the Runnable Interface, The Main Thread, Creating a Thread, Implementing Runnable, Extending Thread, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming, and Stopping Threads, Obtaining A Thread's State.  <b>Stream based I/O(java.io)</b> – The Stream classes-Byte streams and Character streams, Reading console Input and Writing Console Output, File class, Reading and writing Files, Enumerations: Enumeration Fundamentals, The values( ) and valueOf( ) Methods, auto boxing, generics. Type Wrappers, Autoboxing, Annotations (Metadata)</p>	
<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz's, Assignments
<b>Module-5</b>	
<p><b>The Collections Framework (java.util)-</b> Collections Overview, Recent Changes to Collections, The Collection Interfaces, The Collection Classes, Accessing a collection Via an Iterator, Storing User Defined Classes in Collections, The Random Access Interface, Working With Maps, Comparators, The Collection Algorithms, Why Generic Collections?, The legacy Classes and Interfaces, Parting Thoughts on Collections.  <b>Networking with Java.net</b>  Networking fundamentals, The Networking classes and Interfaces, The Inet Address class, The Socket Class, The URL class, The URLConnection Class, The HttpURLConnection Class. TCP/IP Server Sockets</p>	
<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz's, Assignments

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

13. Three Unit Tests each of **20 Marks**

14. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks** CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**Semester End Examination:**

31. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

32. The question paper will have ten full questions carrying equal marks.

**Suggested Learning Resources:****Books**

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.

**Web links and Video Lectures (e-Resources):**

The Java Tutorials: <http://docs.oracle.com/javase/tutorial/>  
<https://www.w3schools.com/java/>

**NPTEL Web Course:**

<https://nptel.ac.in/courses/106106147/3>

<https://nptel.ac.in/courses/106106147/2>

<https://nptel.ac.in/courses/106106147/5>

<http://nptel.iitm.ac.in/video.php?subjectId=106106093>

**NPTEL Video Course:**

<https://www.youtube.com/watch?v=50qVLKubX2w>

[https://www.youtube.com/watch?v=zTpqC\\_Ivkck](https://www.youtube.com/watch?v=zTpqC_Ivkck)



## Skill Development Activities Suggested

### 1. Number Guessing Game

-The computer generates a random number, and the user must guess the number. The computer will then let the user know that their guess is too high, too low, or correct. This can be free-form, allowing an unlimited number of guesses, or give the user a set number of guesses before the game ends.

Number guessing games involve some Java programming basics like accepting inputs from the user, creating classes, and using conditional statements.

### 2. Address Book

This project is a great option to illustrate your skills in developing applications that can interact with databases. Your application should keep track of contacts, their details (e.g., address, phone, email), and notes about each contact in a simple database.

### 3. Creating a Calculator

#### Course outcome (Course Skill Set)

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the concept of OOP as well as the purpose and usage principles of inheritance, polymorphism, encapsulation and method overloading	Application ( Level 2)
CO2	Identify classes, abstract classes, objects, members of a class and the Relationships among them needed for a specific problem.	Remember ( Level 1)
CO3	Able to understand the use of Packages and Interface in java.	Application ( Level 2)
CO4	Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifies, automatic documentation through comments, error exception handling multithreaded applications with Synchronization).	Create ( Level 6)
CO5	Able to develop and understand exception handling, multithreaded applications	Create ( Level 6)
CO6	Able to understand the use of Collection Framework.	Application ( Level 2)

Program Outcome of this course		
Sl. No.	Description	POs
1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems	PO1 ( Level 3)
2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	PO2 ( Level 2)
3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations	PO3 ( Level 3)
4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4 ( Level 3)
5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations	PO5 ( Level 3)
6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice	PO6
7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	PO8
9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	PO10
11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments	PO11
12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and	PO12

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO1	3	2	3	3	1	2	2	1	-	2	-	2
CO2	3	2	3	2	3	2	2	2	-	2	-	1
CO3	2	3	2	2	3	2	2	1	-	1	-	1
CO4	2	3	2	2	3	2	2	1	-	1	-	1
CO5	2	3	2	2	3	2	2	1	-	1	-	1
CO6	2	3	2	2	3	2	2	1	-	1	-	1

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) - : None

<b>Cloud Computing</b>			
Course Code :	22VMC23	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	4:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	4	Exam Hours	03
<p><b>Course Learning objectives:</b> At the end of the course students will be able to</p> <ul style="list-style-type: none"> <li>• Classify various cloud services and their providers</li> <li>• Differentiate various types of computing environments</li> <li>• Compare various cloud deployment models</li> </ul>			
<b>Module-1</b>			
<p>Introduction ,Cloud Computing at a Glance, The Vision of Cloud Computing, Defining a Cloud, A Closer Look, Cloud Computing Reference Model, Characteristics and Benefits, Challenges Ahead, Historical Developments, Distributed Systems, Virtualization, Web 2.0, Service-Oriented Computing, Utility-Oriented Computing, Building Cloud Computing Environments, Application Development, Infrastructure and System Development, Computing Platforms and Technologies, Amazon Web Services (AWS), Google AppEngine, Microsoft Azure, Hadoop, Force.com and Salesforce.com, Manjrasoft Aneka Virtualization, Introduction, Characteristics of Virtualized, Environments Taxonomy of Virtualization Techniques, Execution Virtualization, Other Types of Virtualization, Virtualization and Cloud Computing, Pros and Cons of Virtualization.</p>			
<b>Teaching-Learning Process</b>	Power point presentation, Black board teaching.		

<b>Module-2</b>	
<b>Data Intensive Computing:</b>	
Map-Reduce Programming, What is Data-Intensive Computing?, Characterizing Data-Intensive Computations, Challenges Ahead, Historical Perspective, Technologies for Data-Intensive Computing, Storage Systems, Programming Platforms, Aneka MapReduce Programming, Introducing the MapReduce Programming Model, Example Application	
<b>Teaching-Learning Process</b>	Power point presentation, class room teaching.
<b>Module-3</b>	
<b>Cloud Platform Architecture over Virtualized Data Centers</b>	
Cloud Computing and Service Models, Data-Center Design and Interconnection Networks, Architectural Design of Compute and Storage Clouds, Public Cloud Platforms: GAE, AWS, and Azure, Cloud Security and Trust Management	
<b>Teaching-Learning Process</b>	Power point presentation, Black board teaching.
<b>Module-4</b>	
<b>Cloud Programming and Software Environments</b>	
Features of Cloud and Grid Platforms, Programming Support of Google App Engine, Programming on Amazon AWS and Microsoft Azure, Emerging Cloud Software Environments.	
<b>Teaching-Learning Process</b>	Power point presentation, Black board teaching.
<b>Module-5</b>	
Cloud Platforms in Industry, Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google AppEngine, Architecture and Core Concepts, Application Life-Cycle, Cost Model, Observations, Microsoft Azure, Azure Core Concepts, SQL Azure, Windows Azure Platform Appliance. Cloud Applications Scientific Applications, Healthcare: ECG Analysis in the Cloud, Biology: Protein Structure Prediction, Biology: Gene Expression Data Analysis for Cancer Diagnosis, Geoscience: Satellite Image Processing, Business and Consumer Applications, CRM and ERP, Productivity, Social Networking, Media Applications, Multiplayer Online Gaming	
<b>Teaching-Learning Process</b>	Power point presentation, Black board teaching.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

15. Three Unit Tests each of **20 Marks**

16. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

36. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

**Suggested Learning Resources:****Books**

1. "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Kai Hwang, Geoffrey C. Fox. Jack J Dongarra, MK Publishers, 2012.
2. "Rajkumar Buyya, Christian Vecchiola, and Thamarai Selvi Mastering Cloud. Computing McGraw Hill Education

**Web links and Video Lectures (e-Resources):**

- <https://www.youtube.com/watch?v=RWgW-CgdIk0>
- <https://www.youtube.com/watch?v=-8O32k26RWA>

**Skill Development Activities Suggested**

- Cloud service platform expertise
- Cloud security
- Network management
- Development and operations (DevOps)



<b>Web Technologies</b>			
Course Code	<b>22VMC24</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	04	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03
<p><b>Course Learning objectives:</b></p> <ul style="list-style-type: none"> <li>• <b>Understand</b> the fundamental concept of www and <b>Create</b> XHTML documents using XHTML tags like images, hyperlink, lists, tables, Forms, Frames.</li> <li>• <b>Outline</b> CSS stylesheets and <b>learn</b> the fundamentals of HTML5</li> <li>• <b>Understand</b> the fundamentals of JavaScript</li> <li>• <b>Summarize</b> static and dynamic XHTML documents using JavaScript and <b>Outline</b> the concepts of XML</li> <li>• <b>Understand</b> cookies using PHP and <b>implement</b> session tracking using PHP</li> </ul>			
<b>Module-1: Fundamentals of Web and Introduction to XHTML</b>			
<p><b>Web Fundamentals</b> Internet, WWW, Web Browsers and Web Servers, URLs, MIME, HTTP, Security, the Web Programmers Toolbox.</p> <p><b>Introduction to XHTML</b> Basic syntax, Standard structure, Basic text markup, Images, Hypertext Links. Lists, Tables, Forms, Frames, Syntactic differences between HTML and XHTML.</p>			
<b>Teaching-Learning Process</b>		1. Lecture, 2. Power-Point Presentation, 3. Videos	
<b>Module-2: Introduction to HTML5 and Cascading Style Sheets</b>			
<p><b>Introduction to HTML5</b> New features of HTML5, HTML5 DocType, HTML5 Structure, Tags- nav, section, article, aside, header, footer, HTML5 Form Elements- Search, tel, url, email, number and range, HTML5 Media tags- Audio and video.</p> <p><b>Cascading Style Sheets</b> Introduction, Levels of style sheets, Style specification formats, Selector forms, Property value forms, Font properties, List properties, Color, Alignment of text, The box model, Background images, The &lt;span&gt; and &lt;div&gt; tags, Conflict resolution.</p>			
<b>Teaching-Learning Process</b>		1. Lecture, 2. Power-Point Presentation, 3. Videos	
<b>Module-3: The basics of JavaScript and JavaScript &amp; XHTML Documents</b>			

<b>The basics of JavaScript</b>	
Overview of JavaScript, Object orientation and JavaScript, general Syntactic characteristics, Primitives, operations, and expressions, Screen output and keyboard input, Control statements, Object creation and modification, Arrays, Functions, Constructors, Pattern matching using regular expressions, Errors in scripts.	
<b>JavaScript and XHTML Documents</b>	
The JavaScript Execution Environment, The Document Object Model, Elements Access in JavaScript, Events and Event Handling, Handling Events from Body Elements, Handling Events from Text Box and password Elements, The DOM2 Model, The navigator Object, Dom Tree Traversal and Modification.	
<b>Teaching-Learning Process</b>	1. Lecture, 2. Power-Point Presentation, 3. Videos
<b>Module-4: Dynamic Documents with JavaScript and Introduction to XML</b>	
<b>Dynamic Documents with JavaScript</b>	
Introduction, Positioning Elements, Moving Elements, Element Visibility, Changing Colors and Fonts, Dynamic Content, Stacking Elements, Locating the Mouse Cursor, Reacting to a Mouse Click, Slow Movement of Elements, Dragging and Dropping Elements	
<b>Introduction to XML</b>	
Introduction, Syntax of XML, XML Document Structure, Document type definitions, Namespaces, XML schemas, displaying raw XML documents, Displaying XML documents with CSS, Web services.	
<b>Teaching-Learning Process</b>	1. Lecture, 2. Power-Point Presentation, 3. Videos
<b>Module-5: Introduction to PHP</b>	
<b>Introduction to PHP</b>	
Introduction to PHP: Origins and uses of PHP, Overview of PHP. General syntactic characteristics, Primitives, operations and expressions, Output, Control statements, Arrays, Functions, Pattern matching, Form handling, Files, Cookies; Session Tracking.	
<b>Teaching-Learning Process</b>	1. Lecture, 2. Power-Point Presentation, 3. Videos



**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

17. Three Unit Tests each of **20 Marks**
18. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

41. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

**Suggested Learning Resources:****TextBooks:**

1. Robert W. Sebesta: Programming the World Wide Web, 8<sup>th</sup> Edition, Pearson education, 2015.
2. HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, 2ed DT Editorial Services.

**ReferenceBooks:**

1. ChrisBates:WebProgrammingBuildingInternetApplications,3rdEdition,WileyIndia,2009.
2. Deitel,P.J.Deitel,A.B.Goldberg:Internet&WorldWideWebHowtoprogram,3<sup>rd</sup>Edition,PearsonEducation/ PHI, 2004.
- 3.LukeWelling,LauraThomson,“PHPandMySQLWebDevelopment”,5<sup>th</sup>Edition,PearsonEducation, 2016.

**Web links and Video Lectures (e-Resources):**

<https://www.w3schools.com/>  
[https://onlinecourses.swayam2.ac.in/nou20\\_cs05/preview](https://onlinecourses.swayam2.ac.in/nou20_cs05/preview)  
<https://www.javatpoint.com/html-tutorial>  
<https://www.geeksforgeeks.org/web-technology/>  
<https://www.tutorialride.com/html/html-tutorial.htm>  
<https://www.tutorialspoint.com/>

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up activities which will enhance their activity based learning like Quizzes, Assignments and Seminars.

<b>Course outcome (Course Skill Set)</b>											
At the end of the course the student will be able to :											
Sl. No.	Description									Blooms Level	
CO1	Explain the fundamentals of web and Solve the problems using XHTML tags .									L 3	
CO2	Develop presentation web page using CSS tags.									L 4	
CO3	Implementational domains in JavaScript									L 6	
<b>Program Outcome of this course</b>											
Sl. No.	Description									POs	
1.	Postgraduates will demonstrate an ability to design and conduct experiments, analyze and interpret data									3	
2.	Postgraduates will demonstrate an ability to analyze and build computer applications for multiple domains									5	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	<b>Mapping of COS and POs</b>
CO1											
CO2											
CO3											
CO4											
CO5											

<b>Cyber Security</b>			
Course Code	<b>22VMC251</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03 Hours
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>• Explain Cybercrime, Cyber criminals and Cyber Offences.</li> <li>• Illustrating cybercrime with respect to Mobile and wireless devices.</li> <li>• Discussing different tools and methods of cybercrime.</li> <li>• Understanding about Phishing, Identity theft and Digital forensics.</li> <li>• Explain Network defence tools and understanding Block Chain technology.</li> </ul>			
<b>Module-1</b>			
<b>Introduction to Cybercrime:</b> Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals?, Classifications of Cybercrimes, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes <b>Cyberoffenses:How Criminals Plan Them:</b> How Criminals			

Plan the Attacks, Cybercafe and Cybercrimes, Botnets: The Fuel for Cybercrime, Attack Vector	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation
<b>Module-2</b>	
<b>Cybercrime: Mobile and Wireless Devices:</b> Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing, Security Challenges Posed by Mobile Devices, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for organizations.	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation
<b>Module-3</b>	
<b>Tools and Methods Used in Cybercrime:</b> Introduction, Proxy Servers and Anonymizers, Phishing, Password Cracking, Keyloggers and Spywares, Virus and Worms, Trojan Horses and Backdoors, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Overflow.	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation
<b>Module-4</b>	
<b>Phishing and Identity Theft</b> Introduction, Phishing – Methods of Phishing, Phishing Techniques, Phishing Toolkits and Spy Phishing. Identity Theft – PII, Types of Identity Theft, Techniques of ID Theft. <b>Digital Forensics Science</b> , Need for Computer Cyber forensics and Digital Evidence, Digital Forensics Life Cycle.	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation
<b>Module-5</b>	
<b>Network Defense tools and block chain technology</b> Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding, the basic of Virtual Private Networks, Linux Firewall, Windows Firewall, Snort: Intrusion Detection System, introduction to block chain technology (definition, tools used for implementation) and its applications.	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

19. Three Unit Tests each of **20 Marks**
20. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

46. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
47. The question paper will have ten full questions carrying equal marks.

**Suggested Learning Resources:****Books**

- Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and SunitBelpure, Publication Wiley.
- Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication McGraw Hill.

**Reference Books**

1. Marjie T. Britz - Computer Forensics and Cyber Crime: An Introduction – Pearson.
2. Chwan-Hwa (John) Wu,J. David Irwin - Introduction to Computer Networks and Cyber securityCRCPress.
3. Bill Nelson, Amelia Phillips, Christopher Steuart - Guide to Computer Forensics and Investigations Cengage Learning.

**Web links and Video Lectures (e-Resources):**

<http://elearning.vtu.ac.in/index.php#>

<https://www.vturosource.com/>

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up technical activities which will enhance their skill or the students should interact with industry (small, medium and large), understand their problems or foresee what can be undertaken for study in the form of research/testing/projects, and for

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
CO1	Apply IT ACT (Cyber law) to the given case/problem and infer from the given case and analyze the gap if exists.	
CO2	Analyze the working of cyber security principles in designing the system.	
CO3	Analyze the given problem (cybercrime, vulnerability, threat), develop a strategy (physical, logical or administrative controls) to mitigate the problem and articulate consequences on Society and National Economy.	
CO4	Examine relevant network defence / web application tool to solve given cyber security problem and evaluate its suitability.	
CO5	Evaluate provisions available in Indian cyber law to handle infringement of	

**Program Outcome of this course**

<b>Sl. No.</b>	<b>Description</b>	<b>POs</b>
1	An ability to independently carry out research /investigation and development work to solve practical problems.	PO1
2	An ability to write and present a substantial technical report / document.	PO2
3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor.	PO3
4	Protect and defend computer systems and networks from cybersecurity attacks.	PO4
5	Diagnose and investigate cybersecurity events or crimes related to computer systems and digital evidence.	PO5
6	Effectively communicate in a professional setting to address information security issues.	PO6
7	Define the security controls sufficient to provide a required level of confidentiality, integrity, and availability in an organization's computer systems and networks.	PO7
8	Identify vulnerabilities critical to the information assets of an organization.	PO8

Mapping of COS and POs										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

Data Mining and Business Intelligence			
Course Code	22VMC252	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting edge technology for building competitive advantage.</li> <li>To enable students to effectively identify sources of data and process it for data mining.</li> <li>To impart skills that can enable students to approach business problems analytically by identifying opportunities to derive business value from data.</li> <li>Learning how to gather and analyse large sets of data to gain useful business understanding.</li> </ul>			
<b>Module-1</b>			
Introduction to Data Warehousing and Business Intelligence: Reporting and Analysing data, Lifecycle of Data - What is Business Intelligence - BI and DW in today's perspective - What is data warehousing - The building Blocks: Defining Features - Data warehouses and data marts - Overview of the components - Metadata in the data warehouse - Need for data warehousing - Basic elements of data warehousing - trends in data warehousing. The Architecture of BI and DW BI and DW architectures and its types - Relation between BI and DW - OLAP (Online analytical processing) definitions - Difference between OLAP and OLTP - Dimensional analysis - What are cubes? Drill-down and roll-up - slice and dice or rotation - OLAP models - ROLAP versus MOLAP - defining schemas: Stars, snowflakes and fact constellations.			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation/ Group discussion of case study		
<b>Module-2</b>			

Introduction to Data Mining (DM): Motivation - Definition and Functionalities – Classification of DM Systems - DM task primitives - Integration of a Data Mining system with a Database or a Data Warehouse - Issues in DM – KDD Process Data Pre-processing: Why to pre-process data? - Data cleaning: Missing Values, Noisy Data - Data Integration and transformation - Data Reduction: Data cube aggregation, Dimensionality reduction - Data Compression - Numerosity Reduction - Data Mining Primitives - Languages and System Architectures: Task relevant data - Kind of Knowledge to	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation
<b>Module-3</b>	
Concept Description and Association Rule Mining What is concept description? - Data Generalization and summarization-based characterization - Attribute relevance - class comparisons Association Rule Mining: Market basket analysis - basic concepts - Finding frequent item sets: Apriori algorithm - generating rules – Improved Apriori algorithm – Incremental ARM – Associative Classification – Rule Mining.	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation
<b>Module-4</b>	
Classification and prediction: Introduction and Definition – Issues regarding Classification and prediction: Classification methods: Decision tree, Bayesian Classification, Rule based, CART, Neural Network Prediction methods: Linear and nonlinear regression, Logistic Regression. Introduction of tools such as DB Miner /WEKA/ DM Tools.	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation/ Case study Solving - Tutorials
<b>Module-5</b>	
Data Mining for Business Intelligence Applications: Data mining for business Applications like Balanced Scorecard, Fraud Detection, Click stream Mining, Market Segmentation, retail industry, telecommunications industry, banking & finance and CRM etc., Data Analytics Life Cycle: Introduction to Big data Business Analytics - State of the practice in analytics role of data scientists Key roles for successful analytic project - Main phases of life cycle - Developing core deliverables for stakeholders.	
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation
<b>Assessment Details (both CIE and SEE)</b>	
<b>Suggested Learning Resources:</b>	
<b>Text Books:</b>	
1. J. Han, M. Kamber, “Data Mining Concepts and Techniques”, Morgan Kaufmann	
2. M. Kantardzic, “Data mining: Concepts, models, methods and algorithms, John Wiley & Sons Inc.	

3. PaulrajPonnian, “Data Warehousing Fundamentals”, John Willey.

**Skill Development Activities Suggested**

- The students with the help of the course teacher can take up technical –activities which will enhance their skill or the students should interact with industry (small, medium and large), understand their problems or foresee what can be undertaken for study in the form of research/testing/projects, and for creative and innovative methods to solve the identified problem. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Analyse the concept of data warehouse, Business Intelligence and OLAP.	
CO2	Demonstrate data pre-processing techniques and application of association rule mining Algorithms.	
CO3	Apply various classification algorithms and evaluation of classifiers for the given Problem.	
CO4	Apply various classification algorithms and evaluation of classifiers for the given Problem.	



<b>Program Outcome of this course</b>		
<b>Sl. No.</b>	<b>Description</b>	<b>POs</b>
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.	PO10

<b>Enterprise Resource Planning</b>			
Course Code	<b>22VMC253</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	02:00:02	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
<b>Course Learning objectives:</b>			
<ol style="list-style-type: none"> <li>1. To impart a basic understanding of how ERP enriches the business organizations in achieving a multidimensional growth.</li> <li>2. To help build an understanding of the fundamental concepts of ERP systems</li> <li>3. To provide a basic understanding of the modules used in ERP systems.</li> <li>4. To provide an understanding of the roles of various people involved in the implementation and use of ERP systems</li> <li>5. To provide an understanding of the managerial issues involved in the design and implementation of ERP Systems and focus on the benefits that may be realized from an ERP system and on the management of benefits from the ERP system.</li> </ol>			
<b>Module-1</b>			
Introduction to ERP: Introduction, Common ERP myths, Reasons for the growth of ERP market, Advantages of ERP. Justifying ERP investments: Quantifiable benefits from an ERP system, Intangible benefits of ERP. ERP and related technologies: Business Process Reengineering, Business Intelligence, Data Warehousing.			
<b>Teaching-Learning Process</b>	1. Lecture, 2. Power-Point Presentation, 3. Videos		
<b>Module-2</b>			
ERP implementation life cycle: Objectives of ERP implementation, different phases of ERP implementation, ERP implementation-the hidden costs. Vendors and Consultants: Inhouse implementation pros and cons, Vendors, role of vendors, Consultants, role of consultants, Employee and employee resistance: Reasons for employee resistance.			
<b>Teaching-Learning Process</b>	1. Lecture, 2. Power-Point Presentation, 3. Videos		
<b>Module-3</b>			
Business modules of an ERP package: Functional modules of ERP software, Financials, Human Resource management, Plant maintenance, Marketing, Quality Management.			
<b>Teaching-Learning Process</b>	1. Lecture, 2. Power-Point Presentation, 3. Videos		
<b>Module-4</b>			
ERP – Present and Future: Turbo Charge the ERP System, EIA, ERP and E–Commerce, ERP and Internet			

<b>Teaching-Learning Process</b>	1. Lecture, 2. Power-Point Presentation, 3. Videos
<b>Module-5</b>	
ERP Market and ERP vendors: ERP Market Place, SAP AG, PeopleSoft, Baan Company, JD Edwards	
<b>Teaching-Learning Process</b>	1. Lecture, 2. Power-Point Presentation, 3. Videos
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p>	
<b>Continuous Internal Evaluation:</b>	
<p>21. Three Unit Tests each of <b>20 Marks</b>  22. Two assignments each of <b>20 Marks</b> or <b>one Skill Development Activity of 40 marks</b> to attain the COs and POs</p>	
<p>The sum of three tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b></p>	
<p><b>CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.</b></p>	
<b>Semester End Examination:</b>	
<p>51. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.  52. The question paper will have ten full questions carrying equal marks</p>	
<b>Suggested Learning Resources:</b>	
<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>1. Alexis Leon ERP Demystified, Tata McGraw Hill, Third edition.</li> <li>2. Joseph A. Brady, Ellen F. Monk, Bret J. Wangner, Concepts in Enterprise Resource Planning, Thomson Learning, 2001.</li> <li>3. Vinod Kumar Garg and N.K .Venkata Krishnan, Enterprise Resource Planning concepts and Planning, Prentice Hall, 1998.</li> </ol>	
<b>Web links and Video Lectures (e-Resources):</b>	
<ol style="list-style-type: none"> <li>1. <a href="https://www.coursera.org/learn/enterprise-systems">https://www.coursera.org/learn/enterprise-systems</a></li> <li>2. <a href="http://www.elibrary.in.pearson.com">www.elibrary.in.pearson.com</a></li> <li>3. <a href="https://jgateplus.com">https://jgateplus.com</a></li> <li>4. <a href="https://search.ebscohost.com">https://search.ebscohost.com</a></li> <li>5. <a href="https://www.capitaline.com/SiteFrame.aspx?id=1">https://www.capitaline.com/SiteFrame.aspx?id=1</a></li> </ol>	

**Skill Development Activities Suggested**

The students with the help of the course teacher can take up technical –activities which will enhance their skill or the students should interact with industry (small, medium and large), understand their problems or foresee what can be undertaken for study in the form of research/testing/projects, and for creative and innovative methods to solve the identified problem. The prepared report shall be evaluated for CIE marks.

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	<b>Examine</b> the basic concepts in Enterprise Systems.	L 4
CO2	<b>Identify</b> the challenges associated with implementing enterprise systems and their impacts on organizations.	L 3
CO3	<b>List</b> the different ERP modules in detail.	L 4
CO4	<b>Assess</b> the present and future of ERP and its integration with ECommerce and internet.	L 5
CO5	<b>Analyze</b> the ERP market place and the several popular ERP packages to support business operations and decision-making.	L 4

**Program Outcome of this course**

Sl. No.	Description	POs
1.	Postgraduates will demonstrate knowledge of mathematics, computer applications, and management.	1
2.	Postgraduates will demonstrate knowledge of professional and ethical responsibilities.	7
3.	Postgraduates will show the understanding of impact of engineering solutions on the society as a successful entrepreneur or IT professional.	9

**Mapping of COS and POs**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

<b>User Interface Design</b>			
Course Code	22VMC254	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2-0-2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3hr
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>The objective of this course is to learn the fundamentals of user experience design and interface design. Basic theories, methods and techniques from user experience design and interface design are applied in group design exercises.</li> </ul>			
<b>Module-1</b>			
Introduction Usability of Interactive Systems: Introduction, Usability Goals and Measures, Usability Motivation, Universal Usability, Goals for our profession. Guideline, principles, and theories: Introduction, Guidelines, principles, Theories.			
<b>Teaching-Learning Process</b>	Class room Teaching and Use Digital Portfolios		
<b>Module-2</b>			
Development Processes Managing Design Processes: Introduction, Organizational Design to support Usability, The Four Pillars of Design, Development methodologies: Ethnographic Observation, Participatory Design, Scenario Development, Social Impact statement for Early Design Review, Legal Issues.			

<b>Teaching-Learning Process</b>	Class room Teaching and Use Digital Portfolios
<b>Module-3</b>	
Direct Manipulation and Virtual Environments: Introduction, Examples of Direct Manipulation, Discussion of direct manipulation, 3D Interfaces, Tele-operation, Virtual and Augmented Reality Menu Selection, Form Filling and Dialog Boxes: Introduction, Task-Related Menu Organization, Single Menus, Combination of Multiple Menus, Content Organization, Fast Movement Through Menus, Data Entry With Menus, Form Filling, Dialog Boxes and Alternatives, Audio Menus and Menus for Small Displays.	
<b>Teaching-Learning Process</b>	Class room Teaching and Use Digital Portfolios
<b>Module-4</b>	
Command and Natural Languages Introduction, Command-organization functionality strategies and structure, Naming and Abbreviations, Natural Language in computing. Interaction Devices: Introduction, Keyboards and Keypads, Pointing Devices, Speech and Auditory interfaces, Displays-Small and Large.	
<b>Teaching-Learning Process</b>	Class room Teaching and Use Digital Portfolios
<b>Module-5</b>	
User Documentation and Online Help : Introduction, Online versus paper documentation, Reading from paper versus Displays, Shaping the content of the Manuals, Accessing the Documentation, Online Tutorials and animated demonstrations, Online Communities for User Assistance, The Development Process.	
<b>Teaching-Learning Process</b>	Class room Teaching and Use Digital Portfolios

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

23. Three Unit Tests each of **20 Marks**

24. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

56. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

**Suggested Learning Resources:****Books**

- BenShneiderman, Plaisant, Cohen, Jacobs: Designing the User Interface, 5th Edition, Pearson ,Education, 2010.

**Web links and Video Lectures (e-Resources):****NPTEL Video Course:**

- <https://www.digimat.in/nptel/courses/video/124107008/L01.html>
- <http://acl.digimat.in/nptel/courses/video/124107008/lec1.pdf>

**Skill Development Activities Suggested**

In this course, the students will learn the fundamentals of user experience design and interface design

Like

- GUI Requirement Gathering
- User Analysis
- Task Analysis
- GUI Design & implementation

<b>Course outcome (Course Skill Set)</b>												
At the end of the course the student will be able to :												
<b>Sl. No.</b>	<b>Description</b>										<b>Blooms Level</b>	
CO1	Analyse the new technologies that provide interactive devices and interfaces.											
CO2	Apply the guidelines to develop the UID and evaluate for the given problem.											
CO3	Apply the development methodologies with an analysis of the social impact and legal issues Understand Direct Manipulation and Virtual Environment											
CO4	Discuss the command, natural languages and issues in design for maintaining QoS											
CO5	Demonstrate techniques for information search and visualization for the											
<b>Program Outcome of this course</b>												
<b>Sl. No.</b>	<b>Description</b>										<b>POs</b>	
1	Computational Knowledge: Understand and apply mathematical foundation, computing and domain knowledge for the conceptualization of computing models from defined problems.										PO1	
2	Problem Analysis: Ability to identify, critically analyze and formulate complex computing problems using fundamentals of computer science and application domains.										PO2	
3	Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies										PO3	
4	Design / Development of Solutions: Ability to transform complex business scenarios and contemporary issues into problems, investigate, understand and propose integrated solutions using emerging technologies										PO4	
5	Modern Tool Usage: Ability to select modern computing tools, skills and techniques necessary for innovative software solutions										PO5	
6	Individual & Team Work: Ability to work as a member or leader in diverse teams in multidisciplinary environment										PO11	
<b>Mapping of COS and POs</b>												
	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>
<b>CO1</b>	2		-	-	-	-	-	-	-	-	-	-
<b>CO2</b>	-	2	1	-	-	-	-	-	-	-	-	-
<b>CO3</b>	-	-	3	-	-	-	-	-	-	-	-	-
<b>CO4</b>	-	-	2	1	-	-	-	-	-	-	-	-
<b>CO5</b>	-	-	-	-	1	-	-	-	-	-	3	-



<b>Optimization Techniques</b>			
Course Code	<b>22VMC255</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	3
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>• Apply problem solving techniques through OR approaches.</li> <li>• Formulate the problem using linear programming technique.</li> <li>• Analyze the optimal solution for the given problem by applying Transportation problems.</li> <li>• Analyze the strategies with different players through game theory approach.</li> <li>• Analyze the sequence of jobs to be executed by machines for the given problem.</li> </ul>			
<b>Module-1</b>			
<b>Linear programming problem(LPP):</b> introduction, structure of linear programming model, advantages, general model of Linear programming problem(LPP), examples of LP formulation, graphical solutions of LP problem and Solution of LPP by simplex method:			
<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation		
<b>Module-2</b>			
<b>Linear programming problem(LPP):</b> Artificial variables-two-phase method, Big M method. Duality in linear programming, formulation of dual linear programming and examples.			
<b>Teaching-Learning Process</b>	. Black Board Teaching , Presentation		
<b>Module-3</b>			
<b>Transportation and Assignment Problems:</b> Mathematical model of transportation problem, methods of finding initial solution (Northwest corner rule, Least cost method, Vogel's approximation method), test for optimality in TP using MODI Method. Mathematical model of assignment problem, Hungarian method for solving assignment problem.			
<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation		
<b>Module-4</b>			
<b>Metaheuristics:</b> The nature of metaheuristics, Tabu Search, Simulated annealing, Genetic Algorithm			
<b>Theory of games:</b> introduction, two-person zero sum games, pure strategies (MinMax and MaxMin principles), mixed strategies. The rules of principles of dominance, algebraic method to solve games without saddle point, graphical methods to solve games.			

<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation
<b>Module-5</b>	
<b>Network Analysis:</b> PERT and CPM, Network construction and determination of critical path, Calculation of ES, EF, LS, LF, TF, FFand IF, Crashing of a project, Scheduling of a project and resourcelevelling	
<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p>	
<b>Continuous Internal Evaluation:</b>	
25. Three Unit Tests each of <b>20 Marks</b>	
26. Two assignments each of <b>20 Marks</b> or <b>one Skill Development Activity of 40 marks</b> to attain the COs and POs	
The sum of three tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b>	
<b>CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.</b>	
<b>Semester End Examination:</b>	
61. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50	
<b>Suggested Learning Resources:</b>	
<b>Books</b>	
<ul style="list-style-type: none"> <li>• Operations Theory and Applications, J.K. Sharma, 5th edition, MacMillan publisher India(Chapter 1,2,3,4,5,9,10,11,12,20).</li> <li>• Operations Research S.D Sharma, Kedarnath, Ramnath and Co, 2002.</li> <li>• Operations Research – An Introduction Taha H A- Low price edition 7th edition,2006.</li> <li>• Introduction to operation Research, Hiller and Liberman, Mc GRawHill , 5th edition ,2001.</li> <li>• Operation Research, Prem Kumar Gupta, D S Heera, S Chand Pub., New Delhi, 2007.</li> <li>• An Introduction to Optimization: Foundations and Fundamental Algorithms Niclas Andr´easson, Anton Evgrafov, and Michael Patriksson.</li> </ul>	
<b>Web links and Video Lectures (e-Resources):</b>	



<b>Cryptography and Network Security</b>			
Course Code	<b>22VMC261</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	3
<p><b>Course Learning objectives:</b></p> <ul style="list-style-type: none"> <li>• Encryption techniques for the given problem and analyse the results.</li> <li>• Design for the Cipher technique and analyse the functioning of Cipher for the given problem.</li> <li>• Implementation of the Public and Private key based cryptography algorithms and investigate the results of algorithm based on output.</li> <li>• Design and implement the cryptographic algorithms using programming languages/ tools for the given problem/context.</li> <li>• Design the security planning for the given case study for data classification, access control and propose technical solution, and submit the detailed report with plagiarism check.</li> </ul>			
<b>Module-1</b>			
<p><b>Introduction:</b>OSI Security Architecture, Security Attacks, Security Services, Security Mechanism, model for Network Security.</p> <p><b>Classical Encryption Technique:</b>Symmetric Cipher Model, Substitution Techniques, Transposition Techniques.</p>			
<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation		
<b>Module-2</b>			
<p><b>Data Encryption and advanced encryption techniques</b> Block Ciphers, Data Encryption Standard and Advanced Encryption Standard Block Cipher Principles, The Data Encryption Standard, Block Cipher Design Principles and Modes of operation, Evaluation Criteria for AES, AES Cipher-Encryption and Decryption, Data Structure, Encryption Round.</p> <p><b>Public Key Cryptography and Key Management:</b> Principles of Public Key Cryptosystem, RSA algorithm, Key management, Diffie Hellman Key exchange.</p>			
<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation		
<b>Module-3</b>			
<p><b>Message Authentication and Hash Function:</b> Authentication Requirement, Authentication Functions, Message Authentication Code, Hash Functions, Digital Signatures, Digital Signature Standard.</p> <p><b>Authentication Applications:</b> Kerberos, X.509 Authentication Service</p>			
<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation		
<b>Module-4</b>			

<b>Electronic Mail Security:</b> Pretty Good Privacy (PGP), S/MIME	
<b>IP Security:</b> IP Security Overview; IP Security Architecture; Authentication Header; Encapsulating Security Payload; Combining Security Associations; Key Management.	
<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation
<b>Module-5</b>	
<b>Web Security:</b> Web security Considerations; Secure Socket layer (SSL) and Transport layer Security (TLS); Secure Electronic Transaction (SET).	
<b>System Security:</b> Intruders, Intrusion Detection, Firewall Design Principles- Characteristics, Types of Firewall and Firewall Configuration.	
<b>Teaching-Learning Process</b>	Black Board Teaching , Presentation
<b>Assessment Details (both CIE and SEE)</b>	
<p>The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.</p>	
<b>Continuous Internal Evaluation:</b>	
27. Three Unit Tests each of <b>20 Marks</b>	
28. Two assignments each of <b>20 Marks</b> or one <b>Skill Development Activity of 40 marks</b> to attain the COs and POs	
The sum of three tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b>	
<b>CIE methods /question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.</b>	
<b>Semester End Examination:</b>	
66. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.	
<b>Suggested Learning Resources:</b>	
<b>Books</b>	
<ul style="list-style-type: none"> <li>• William Stallings, “Cryptography and Network Security – Principles and Practices”, 4th Edition, Pearson Education, 2009. (Chapters: 1, 2.1-2.3, 3.1,3.2,3.5, 5.1,5.2, 6.2, 9.1,9.2, 10.1,10.2, 11.1-11.4, 13.1, 13.3, 14.1, 4.2, 15.1, 15.2, 16.1-16.6, 17.1-17.3, 18.1, 18.2, 20.1; Exclude the topic not mentioned in the syllabus)</li> <li>• Behrouz A. Forouzan and Debdeep Mukhopadhyay: “Cryptography and Network Security”, 2nd Edition, Tata McGraw-Hill, 2010.</li> <li>• Atul Kahate, “Cryptography and Network Security” 2nd Edition TMH.</li> </ul>	

Web links and Video Lectures (e-Resources):										
<ul style="list-style-type: none"> <li>• <a href="https://onlinecourses.nptel.ac.in/noc21_cs16/preview">https://onlinecourses.nptel.ac.in/noc21_cs16/preview</a></li> <li>• <a href="https://www.cryptool.org/en/links">https://www.cryptool.org/en/links</a></li> </ul>										
Skill Development Activities Suggested										
<ul style="list-style-type: none"> <li>• <a href="https://onlinecourses.nptel.ac.in/noc21_cs16/preview">https://onlinecourses.nptel.ac.in/noc21_cs16/preview</a></li> <li>• <a href="https://www.cryptool.org/en/links">https://www.cryptool.org/en/links</a></li> <li>• <a href="https://ict.iitk.ac.in/courses/cryptography-and-network-security-2/">https://ict.iitk.ac.in/courses/cryptography-and-network-security-2/</a></li> </ul>										
Course outcome (Course Skill Set)										
At the end of the course the student will be able to :										
Sl. No.	Description									Blooms Level
CO1	Apply encryption techniques for the given problem and analyse the results.									
CO2	Design the Cipher technique and analyse the functioning of Cipher for the given problem.									
CO3	Implement the Public and Private key based cryptography algorithms and investigate the results of algorithm based on output.									
CO4	Design and implement the cryptographic algorithms using programming languages/ tools for the given problem/context									
CO5	Design the security planning for the given case study for data classification, access control and propose technical solution and submit									
Program Outcome of this course										
Sl. No.	Description									POs
Mapping of COS and POs										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										
CO1: CO2: CO3CO4: CO5:										

<b>Artificial Intelligence</b>			
Course Code	<b>22VMC262</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	03
<b>Module-1</b>			
<b>INTRODUCTION TO AI AND PRODUCTION SYSTEMS:</b> Introduction to AI- Problem Definition and formulation -Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics - Specialized productions system- Problem solving methods – Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Measure of performance and analysis of search algorithms.			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-2</b>			
<b>REPRESENTATION OF KNOWLEDGE:</b> Introduction to Game playing – Knowledge representation, Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-3</b>			
<b>KNOWLEDGE INFERENCE:</b> Knowledge representation -Production based system, Frame based system. Inference – Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning – Certainty factors, Bayesian Theory-Bayesian Network-Dempster			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-4</b>			
<b>PLANNING AND MACHINE LEARNING:</b> Basic plan generation systems – Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.			
<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation		
<b>Module-5</b>			
<b>EXPERT SYSTEMS</b> Introduction to Expert systems – Architecture of expert systems, Roles of expert systems – Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems – MYCIN, DART, XOON, Expert systems shells.			

<b>Teaching-Learning Process</b>	Chalk and talk method / PowerPoint Presentation	
<b>Assessment Details (both CIE and SEE)</b>		
<b>Suggested Learning Resources:</b>		
<b>Text Books:</b>		
1. Kevin Night and Elaine Rich, Nair B., “Artificial Intelligence (SIE)”, Mc Graw Hill- 2008. (Modules-I,II,VI & V)		
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education, 2007. (Module-III).		
<b>Reference books:</b>		
1. Peter Jackson, “Introduction to Expert Systems”, 3rd Edition, Pearson Education, 2007.		
<b>Web links and Video Lectures (e-Resources):</b>		
<b>Skill Development Activities Suggested</b>		
<ul style="list-style-type: none"> <li>The students with the help of the course teacher can take up technical –activities which will enhance their skill or the students should interact with industry (small, medium and large), understand their problems or foresee what can be undertaken for study in the form of research/testing/projects, and for creative and innovative methods to solve the identified</li> </ul>		
<b>Course outcome (Course Skill Set)</b>		
At the end of the course the student will be able to :		
<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
CO1	Identify problems that are amenable to solution by AI methods.	
CO2	Identify appropriate AI methods to solve a given problem.	
CO3	Formalize a given problem in the language/framework of different AI methods	
CO4	Implement basic AI algorithms for the given problem.	



<b>Program Outcome of this course</b>		
<b>Sl. No.</b>	<b>Description</b>	<b>POs</b>
1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and computer science and business systems to the solution of complex engineering and societal problems.	PO1
2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering and business problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	PO2
3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.	PO3
4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations	PO5
6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering and business practices.	PO6
7	Environment and sustainability: Understand the impact of the professional engineering solutions in business societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering and business practices.	PO8
9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such	PO10

<b>Advanced Web Programming</b>			
Course Code	<b>20VMC263</b>	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory	Total Marks	100
Credits	3	Exam Hours	
<p><b>Course Learning objectives:</b></p> <ul style="list-style-type: none"> <li>• Use the basic JavaScript syntax needed for Ajax scripting</li> <li>• Demonstrate a solid foundation in Ajax scripting</li> <li>• Write HTML documents that include asynchronous client/server communication</li> <li>• Write a final project that demonstrates the use of several Ajax techniques</li> </ul>			
<b>Module-1</b>			
<p><b>Rich Internet Applications With Ajax:</b> Limitations of Classic Web application model, AJAX principles, Technologies behind AJAX, Examples of usage of AJAX; Asynchronous communication and AJAX application model.</p> <p><b>Ajax with XMLHttpRequest object:</b> Part 1 Creating Ajax Applications: An example, Analysis of example ajax.html, Creating the JavaScript, Creating and opening the XMLHttpRequest object, Data download, Displaying the fetched data, Connecting to the server, Adding Server-side programming, Sending data to the server using GET and POST</p>			
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, BlackBoard teaching, Implementation demo</b>		
<b>Module-2</b>			
<p><b>Ajax with XMLHttpRequest object:</b> Part 2 Handling multiple XMLHttpRequest objects in the same page, Using two XMLHttpRequest objects, Using an array of XMLHttpRequest objects, AJAX Patterns – Predictive Fetch, Multi-stage download, Periodic Refresh and Fallback patterns, Submission throttling.</p>			
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching, Implementation demo</b>		
<b>Module-3</b>			
<p><b>Introduction to Bootstrap:</b> What Is Bootstrap? Bootstrap File Structure, Basic HTML Template, Global Styles, Default Grid System, Basic Grid HTML, Offsetting Columns, Nesting Columns, Fluid Grid System, Container Layouts, Responsive Design. Typography, Emphasis Classes, Lists, Code, Tables, Optional Table Classes, Table RowClasses, Forms, Buttons, Images, Icons.</p>			

<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching, Implementation demo</b>
<b>Module-4</b>	
<b>Introduction to JQuery:</b> Introduction to JQuery, Syntax, selectors, events, JQuery HTML, JQuery Effects, JQuery CSS, JQuery Effects, JQuery Traversing, JQuery AJAX.	
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching, Implementation demo</b>
<b>Module-5</b>	
<b>Introduction to React and UI Design:</b> . Welcome to React, Your first React Web Application :Setting up your development environment , What's a component? , Making Product data-driven , Refactoring with the Babel plugin transform-class-properties . Advanced Component Configuration with props, state, and children : Components , Context , state , Stateless Components , Talking to Children Components with props.children .	
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching, Implementation demo</b>
<b>Assessment Details (both CIE and SEE)</b> The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together. <b>Continuous Internal Evaluation:</b> 29. Three Unit Tests each of <b>20 Marks</b> 30. Two assignments each of <b>20 Marks</b> or <b>one Skill Development Activity of 40 marks</b> to attain the COs and POs The sum of three tests, two assignments/skill Development Activities, will be <b>scaled down to 50 marks</b> <b>CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.</b>  <b>Semester End Examination:</b> 71. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.	
<b>Suggested Learning Resources:</b> <b>Books</b> <ul style="list-style-type: none"> <li>• Thomas A. Powel: Ajax The Complete reference, McGraw Hill, 2008</li> <li>• Dana Moore, Raymond Budd, Edward Benson: Professional Rich Internet Applications: AJAX and Beyond, Wiley 2012.</li> </ul>	

- Jake Spurlock: "Bootstrap: Responsive Web Development", O'Reilly Media, 2014.
- Bootstrap essentials by Snig by Packt-open source
- Alex Banks and Eve Porcello “Learning React Functional Web Development with React and Redux”

**Web links and Video Lectures (e-Resources):**

- <https://www.w3schools.com/jquery/>
- <https://jquery.com/>
- <https://www.toptal.com/front-end/what-is-bootstrap-a-short-tutorial-on-the-what-why-and-how>

**Skill Development Activities Suggested**

- Ajax Application development
- Bootstrap application development
- JQuery applications
- Your first React Web Application .
- **Calculator** Implementation of the iOS calculator built in React

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Build the Web Applications using JQuery, PHP, XML for the given problem	
CO2	Design the Web Pages using AJAX for the given problem.	
CO3	Analyse the advances in Web2.0 and demonstrate its usage for the problem considered.	
CO4	Analyse the web services and demonstrate its usage for the problem considered.	
CO5	Design responsive web applications using Bootstrap for the given problem.	

**Program Outcome of this course**

Sl. No.	Description	POs

Mapping of COS and POs										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1										
CO2										
CO3										
CO4										
CO5										

Distributed Operating System			
Course Code	22VMC264	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	3	Exam Hours	
<b>Course Learning objectives:</b>			
<ul style="list-style-type: none"> <li>Analyse design issues and different message passing techniques in DOS, distributed systems</li> <li>Analyse RPC implementation and its performance in DOS.</li> <li>Analyse the major security issues associated with distributed systems and evaluate techniques available for increasing system security.</li> <li>Apply the concepts of distributed shared memory and resource management for the given problem/ case study.</li> <li>Analyse distributed file systems and evaluate the performance in terms of fault tolerance, file replication as major factors.</li> <li>Apply modification to the existing algorithms to improve the performance of DOS.</li> </ul>			
<b>Module-1</b>			
<p><b>Fundamentals:</b> What is Distributed Computing Systems? Evolution of Distributed Computing System; Distributed Computing System Models; What is Distributed Operating System? Issues in Designing a Distributed Operating System; Introduction to Distributed Computing Environment(DCE).</p> <p><b>Message Passing:</b> Introduction, Desirable features of a Good Message Passing System, Issues in PC by Message Passing, Synchronization, Buffering, Multi-datagram Messages, Encoding and</p>			

Decoding of Message Data, Process Addressing, Failure Handling, Group Communication, Case Study: 4.3 BSD UNIX IPC Mechanism	
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching</b>
<b>Module-2</b>	
<b>Remote Procedure Calls:</b> Introduction, The RPC Model, Transparency of RPC, Implementing RPC Mechanism, Stub Generation, RPC Messages, Marshaling Arguments and Results, Server Management, Parameter-Passing Semantics, Call Semantics, Communication Protocols for RPCs, Complicated RPCs, Client-Server Binding, Exception Handling, Security, Some Special Types of RPCs, RPC in Heterogeneous Environments, Lightweight RPC, Optimization for Better Performance, Case Studies: Sun RPC.	
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching</b>
<b>Module-3</b>	
<b>Distributed Shared Memory:</b> Introduction, General Architecture of DSM systems, Design and Implementation Issues of DSM, Granularity, Structure of Shared Memory Space, Consistency Models, Replacement Strategy, Thrashing, Other approaches to DSM, Heterogeneous DSM, Advantages of DSM. <b>Synchronization:</b> Introduction, Clock Synchronization, Event Ordering, Mutual Exclusion, Dead Lock, Election Algorithms	
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching</b>
<b>Module-4</b>	
<b>Resource Management:</b> Introduction, Desirable Features of a Good Global Scheduling Algorithm, Task Assignment Approach, Load – Balancing Approach, Load – Sharing Approach <b>Process Management:</b> Introduction, Process Migration, Threads.	
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching</b>
<b>Module-5</b>	
<b>Distributed File Systems:</b> Introduction, Desirable Features of a Good Distributed File System, File models, File–Accessing Models, File – Sharing Semantics, File – Caching Schemes, File Replication, Fault Tolerance, Atomic Transactions and Design Principles.	
<b>Teaching-Learning Process</b>	<b>Power Point, Lecture, Black Board teaching</b>

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

31. Three Unit Tests each of **20 Marks**
32. Two assignments each of **20 Marks** or one **Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks**

**CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.**

**Semester End Examination:**

76. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

**Suggested Learning Resources:****Books**

- Pradeep. K. Sinha: Distributed Operating Systems: Concepts and Design, PHI, 2007.
- Andrew S. Tanenbaum: Distributed Operating Systems, Pearson Education, 2013.
- Ajay D. Kshemkalyani and MukeshSinghal, Distributed Computing: Principles, Algorithms and Systems, Cambridge University Press, 2008.
- . SunitaMahajan, Seema Shan, “ Distributed Computing”, Oxford University 02.03.2021 updated 48/ 104 Press,2015.

**Web links and Video Lectures (e-Resources):**

- <http://www.kompx.com/en/web-browsers-for-dos.htm>.
- <https://www.freedos.org/links/>
- <https://www.dosbox.com/>





<b>Natural Language Processing</b>			
Course Code	22VMC265	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:0:2	SEE Marks	50
Total Hours of Pedagogy	48	Total Marks	100
Credits	3	Exam Hours	03
<p><b>Course Learning objectives:</b></p> <p>At the end of the course, the students will be able to:</p> <ul style="list-style-type: none"> <li>• Learn the techniques in natural language processing.</li> <li>• Be familiar with the natural language generation.</li> <li>• Be exposed to Text Mining.</li> <li>• Analyze the information retrieval techniques</li> </ul>			
<b>Module-1</b>			
Introduction, Morphology: Knowledge in Speech & Lang Processing, Ambiguity, Models & Algorithms, Language, Thought & Understanding, Some Brief History, The State of the Art & Near-Term Future, Summary Morphology and Finite State Transducers: Survey of English Morphology, Finite state Morphological Parsing, Lexicon-Free FST: The Porter Stemmer, Human Morphological Parsing, Summary, Combining FST Lexicon and Rules.			
<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz's, Assignments		
<b>Module - 2</b>			
N-Grams: Counting Words in Corpora, Simple N-Grams, Smoothing, Back off, Deleted Interpolation, N-Grams for Spelling and Pronunciation, Entropy, Summary. Word Classes and Part-of- Speech Tagging: English Word Classes, Tag sets for English, Part-of-Speech Tagging.			
<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz's, Assignments		
<b>Module-3</b>			

Context-Free Grammars and Predicate Calculus for English: Constituency, Context-Free Rules and Trees, Sentence Level Constructions, Coordination, Agreement, The Verb Phrase Sub Categorization, Auxiliaries, Spoken Language Syntax, Grammar Equivalence and Normal Form, Finite –State and Context- Free Grammars, Grammars and Human Processing, The Early Algorithm, Finite-State Parsing Method, Summary Representing Meaning:	
<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz’s, Assignments
<b>Module-4</b>	
Semantic Analysis: Syntax-Driven Semantic Analysis, Attachments for a Fragment of English, Integrating Semantic Analysis into the Earley Parser, Idioms and Compositionality, Robust Semantic Analysis, Summary. Lexical Semantics: Relations Among Lexemes and Their Senses, WordNet: A Database of Lexical Relations, The Internal Structure of Words, Creativity and the Lexicon, Summary Word Sense Disambiguation and Information	
<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz’s, Assignments
<b>Module-5</b>	
Retrieval: Selection Restriction Based Disambiguation, Robust Word Sense Disambiguation, Information Retrieval, Other Retrieval Tasks, and Summary. Case Study of Simple Text Recognition or Content Based Text Extraction System. Evolving Explanatory Novel Patterns for Semantically-Based Text Mining: Related Work, A Semantically Guided Model for Effective Text Mining.	
<b>Teaching-Learning Process</b>	Lectures, Presentations, Quiz’s, Assignments

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation:**

33. Three Unit Tests each of **20 Marks**
34. Two assignments each of **20 Marks** or **one Skill Development Activity of 40 marks** to attain the COs and POs

The sum of three tests, two assignments/skill Development Activities, will be **scaled down to 50 marks** CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**Semester End Examination:**

81. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
82. The question paper will have ten full questions carrying equal marks.

**Suggested Learning Resources:****Books:**

1. Daniel Jurafsky and James H Martin, "Speech and Language Processing: An introduction to Natural Language Processing, Computational Linguistics and Speech Recognition", 2<sup>nd</sup> Edition, Prentice Hall, 2009.

**Reference Books:**

1. Christopher D. Manning and Hinrich Schütze, "Foundations of Statistical Natural Language Processing", MIT Press, 1999.
2. Tanveer Siddiqui, U.S. Tiwary, "Natural Language Processing and Information Retrieval", Oxford University Press, 2008.
3. Anne Kao and Stephen R. Poteet (Eds), "Natural Language Processing and Text Mining", Springer Verlag London Limited 2007.

**Web links and Video Lectures (e-Resources):****NPTEL Web Course:**

<https://nptel.ac.in/courses/106101007>

<https://nptel.ac.in/courses/106106211>

<https://archive.nptel.ac.in/courses/106/105/106105158/>

**Skill Development Activities Suggested :**

1. A customer support bot
2. A predictive text generator
3. Sentiment analysis for marketing

**Course outcome (Course Skill Set)**

At the end of the course the student will be able to :

<b>Sl. No.</b>	<b>Description</b>	<b>Blooms Level</b>
CO1	Apply parsing technique to the given problem and verify the output and give valid conclusions	Applying ( Level 3)
CO2	Illustrate the approaches to syntax and semantics in NLP.	Remember ( Level 1)
CO3	Formulate solutions for a range of natural language components using existing algorithms, techniques and frameworks, including part-of-speech tagging, language modeling, parsing and semantic role labeling	Analysing ( Level 4)
CO4	Evaluate NLP solutions of the given problem and arrive at valid conclusions.	Evaluation ( Level 5)
CO5	Illustrate information retrieval techniques.	Analysing ( Level 4)

<b>Program Outcome of this course</b>		
<b>Sl. No.</b>	<b>Description</b>	<b>POs</b>
1	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems	PO1
2	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences	PO2
3	<b>Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations	PO3
4	<b>Conduct investigations of complex problems:</b> Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.	PO4
5	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations	PO5
6	<b>The engineer and society:</b> Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice	PO6
7	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	PO7
8	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	PO8
9	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.	PO9
10	<b>Communication:</b> Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions	PO10
11	<b>Project management and finance:</b> Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments	PO11
12	<b>Life-long learning:</b> Recognize the need for, and have the preparation and	PO12

**Mapping of COS and Pos**

CO	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	1	1	1	1	1	1	-
CO2	1	2	-	-	-	1	1	1	1	1	1	-
CO3	1	1	3	1	1	1	-	2	1	1	1	-
CO4	1	1	3	1	1	1	-	2	1	1	1	-
CO5	1	1	3	1	1	1	-	2	1	1	1	-

1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High) - : None

<b>Web Technologies Lab with Mini Project</b>			
Course Code	<b>22VMCL27</b>	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:3:0	SEE Marks	50
Credits	2	Exam Hours	03
<b>Course objectives:</b>			
<ul style="list-style-type: none"> <li>• <b>Understand</b> the fundamental concept of XHTML and HTML5 programs .</li> <li>• <b>Implement</b> the CSS with XHTML to access user required information from the system.</li> <li>• <b>Execute</b> programs on static and dynamic javascript.</li> <li>• <b>Develop</b> programs on XML to design the web pages.</li> <li>• <b>Write</b> and implement programs on PHP.</li> </ul>			
<b>SLNO</b>	<b>Experiments /Part - A</b>		
1	Create an XHTML page that provides information about your department. Your XHTML page must use the following tags: <ol style="list-style-type: none"> <li>a) Text Formatting tags</li> <li>b) Horizontal rule</li> <li>c) Meta element</li> <li>d) Links</li> <li>e) Images</li> <li>f) Tables (Use of additional tags encouraged).</li> </ol>		
2	Develop and demonstrate a HTML5 page which contains <ol style="list-style-type: none"> <li>a) Dynamic Progressive bar.</li> <li>b) Display Video file using HTML5 video tag.</li> </ol>		
3	Develop and demonstrate the usage of inline, external and internal style sheet using CSS. Use XHTML page that contains at least three paragraphs of text, listed elements and a table with		

	four rows and four columns.
4	To create an XHTML with CSS script code to demonstrate the usage of : a. Border properties b. Margin and padding which includes all subject code followed by subject name followed by staff name
5	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
6	a) Develop and demonstrate, a HTML document that collects the USN (the valid format is : A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by three upper-case characters followed by two digits; (no embedded spaces are allowed) from the user. Use JavaScript that validate the content of the document. Suitable messages should be display in the alert if errors are detected in the input data. Use CSS and event handlers to make your document appealing. b) Modify the above program to get the current semester also(restricted to be a number from 1 to 4)
7	Develop and demonstrate a HTML file which includes JavaScript that uses functions for the following problems: a. Parameter: A string Output: The position in the string of the left-most vowel. b. Parameter: A number Output: The number with its digits in the reverse order.
8	Develop and demonstrate, using JavaScript script, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough of each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible. Modify the above document so that when a text is moved from the top stacking position, it returns to its original position rather than to the bottom.
9	Develop a simple calculator to perform arithmetic (addition, subtraction, multiplication and division) operations on given two numbers. Use an HTML tag that allows the user to input two numbers and to display the result of arithmetic operation. Write suitable HTML and JavaScript and CSS to your simple calculator. The following figure show sample document display.

	<p style="text-align: center;"><b>A SIMPLE CALCULATOR</b></p> <p>Number 1 = <input type="text" value="56"/></p> <p>Number 2 = <input type="text" value="47"/></p> <p>Result = <input type="text" value="2632"/></p> <p style="text-align: center;"> <input type="button" value="ADD"/> <input type="button" value="SUB"/> <input type="button" value="MUL"/> <input type="button" value="DIV"/> <input type="button" value="CLEAR"/> </p>
10	<p>Using PHP and MySQL, develop a program to accept book information viz. Accession number, title, authors, edition and publisher from a web page and store the information in a database and to search for a book with the title specified by the user and to display the search results with proper headings.</p>
11	<p>a) Design an XML document to store information about a student in an engineering college affiliated to VTU. The information must include USN, Name, Name of the College, Branch, Year of Joining, and e-mail id. Make up sample data for 3 students. Create a CSS style sheet and use it to display the document.</p> <p>b) Create an XSLT style sheet for one student element of the above document and use it to create a display of that element.</p>
<p style="text-align: center;"><b>Part-B</b></p> <p>Develop a web application (mini-project) using the languages and concepts learnt in the theory and exercises listed in part A with a good look and feel effects. Database connection needs to be implemented.</p> <p><b>Note: 1.</b></p> <p>A team of two students must develop the mini project. However during the examination, each student must demonstrate the project individually.</p> <p>2. Each students has to execute one program picked from Part-A during the semester end examination.</p> <p>3. The team must submit a brief project report (20-25 pages) that must include the following</p> <ol style="list-style-type: none"> <li>a. Introduction</li> <li>b. Requirement Analysis</li> <li>c. Software Requirement Specification</li> <li>d. Analysis and Design,</li> <li>e. Implementation</li> <li>f. Testing</li> </ol> <p>4. Brief synopsis not more than two pages to be submitted by the team as per the format given. It was recommended that students to do prior art search as part of literature survey before submitting the synopsis for the Mini/Major projects.</p> <p>5. Rubrics may be used to evaluate the Mini-Project.</p>	



**Course outcomes (Course Skill Set):**

At the end of the course the student will be able to:

- 1) Design XHTML and HTML5 program using fundamental tags.
- 2) Develop visual effect style sheet using CSS for a given problem.
- 3) Implement JavaScript to validate a form with event handler for a given problem.
- 4) Demonstrate client/server application for a given problem using client as PHP,XML
- 5) Design web based applications according to customer needs for a given problem.

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 40% of maximum marks in the semester-end examination(SEE). In total of CIE and SEE student has to secure 50% maximum marks of the course.

**Continuous Internal Evaluation (CIE):**

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of **scaled-down** marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute, examiners are

appointed by the University.

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 10% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

#### Suggested Learning Resources:

<https://www.w3schools.com/>

[https://onlinecourses.swayam2.ac.in/nou20\\_cs05/preview](https://onlinecourses.swayam2.ac.in/nou20_cs05/preview)

<https://www.javatpoint.com/html-tutorial>

<https://www.geeksforgeeks.org/web-technology/>

<https://www.tutorialride.com/html/html-tutorial.htm>

<https://www.tutorialspoint.com/>

<b>Java Programming Lab.</b>			
Course Code	22VMCL28	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:3:0	SEE Marks	50
Credits	2	Exam Hours	3
<b>Course objectives:</b>			
<ul style="list-style-type: none"> <li>To experiment with the syntax and semantics of java language and gain experience with java Programming</li> <li>Learn to use object orientation to solve problems and use java language to implement them.</li> </ul>			
<b>SLN O</b>	<b>Experiments</b>		
1	a. Write a java program to find the Fibonacci series using recursive and non recursive functions b. Program to print pyramid using numbers.		
2	a. Write a java program for Method overloading and Constructor overloading. b. Write a JAVA program to implement Inner class and demonstrate its Access protection.		
3	a) Write a java program to represent Abstract class with example.		

	b) Write a java program to implement Interface using extends keyword.
4	Write a Java Program to demonstrate the following String Handlings. i. String Length& Concatenation. ii. Character Extraction. iii. String Comparison. iv. Searching and modifying String.
5	Write a java program to display the employee details (NAME, Employee ID, AGE, Salary, Department) using Scanner class.
6	a). Write a java program that checks whether a given string is palindrome or not b). Write a java program for creating multiple catch blocks.
7	Complete the following: a. Create a package named shape. b. Create some classes in the package representing some common shapes like Square, Triangle, and Circle. c. Import and compile these classes in other program.
8	a) Java program to demonstrate working of ArrayList in Java b) Write a java program to display File class properties.
	<b>Demonstration Experiments ( For CIE ) if any</b>
9	<b>Student activity like mini-project, surveys, quizzes, etc. should be done in group of 2-3 students.</b>
10	Write a program to implement the concept of Exception Handling - using predefined exception. - by creating user defined exceptions
11	Write a program to implement the concept of threading. -by extending Thread Class -by implementing Runnable Interface
<p><b>Course outcomes (Course Skill Set):</b> At the end of the course the student will be able to:</p> <p><b>CO1:</b> Demonstrate the fundamental data types and constructs of Java Programming by writing executable / interpretable programs.</p> <p><b>CO2:</b> Illustrate the object oriented principles with the help of java programs.</p> <p><b>CO3:</b> Develop reusable and efficient applications using inheritance and multi-threading concepts of java.</p> <p><b>CO4:</b> Apply client-side programming and networking concepts to develop distributed applications.</p> <p><b>CO5:</b> Write java programs to demonstrate the concepts of interfaces, inner classes and I/O streams..</p>	

**Assessment Details (both CIE and SEE)**

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course. The student has to secure not less than 40% of maximum marks in the semester-end examination (SEE). In total of CIE and SEE student has to secure 50% maximum marks of the course.

**Continuous Internal Evaluation (CIE):**

CIE marks for the practical course is **50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments designed by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests for 100 marks, the first test shall be conducted after the 8<sup>th</sup> week of the semester and the second test shall be conducted after the 14<sup>th</sup> week of the semester.
- In each test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The average of 02 tests is scaled down to **20 marks** (40% of the maximum marks).

The Sum of **scaled-down** marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.

**Semester End Evaluation (SEE):**

SEE marks for the practical course is 50 Marks.

SEE shall be conducted jointly by the two examiners of the same institute; examiners are appointed by the University.

All laboratory experiments are to be included for practical examination.

(Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

Students can pick one question (experiment) from the questions lot prepared by the internal /external examiners jointly.

Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 10% Marks allotted to the procedure part to be made zero.

The duration of SEE is 03 hours

**Suggested Learning Resources:**

The Java Tutorials: <http://docs.oracle.com/javase/tutorial/>  
<https://www.w3schools.com/java/>