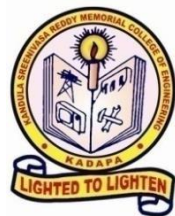


**UG Programs in Engineering (R20UG)  
Curriculum and Syllabus for  
V - VI Sem B.Tech  
Department of Computer Science and Engineering**



**KandulaSrinivasa Reddy Memorial College of Engineering (Autonomous)  
Kadapa 516003 AP  
(Approved by AICTE, Affiliated to JNTUA, Ananthapuramu, Accredited by NAAC)  
(An ISO 9001-2008 Certified Institution)**

## COMPUTER SCIENCE AND ENGINEERING

### Approved Course Structure

#### V Semester (Theory-05,Lab-02)

S.No.	Subject Code	SUBJECT	SC	L	T	P	IM	EM	CR
1	2005501	Software Engineering	PCC	3	0	0	40	60	3
2	2005502	Design and Analysis of Algorithms	PCC	3	0	0	40	60	3
3	2005503	Computer Networks	PCC	3	0	0	40	60	3
		Open Elective Course-I(OEC-I)							
4	200E501	Open Elective Course-I	OEC	3	0	0	40	60	3
	200E502	Open Elective Course-I	OEC	3	0	0	40	60	3
		Professional Elective Course -I (PEC-I)							
5	2005504	Web Technologies	PEC	3	0	0	40	60	3
	2005505	Multimedia Systems	PEC	3	0	0	40	60	3
	2005506	Distributed Systems	PEC	3	0	0	40	60	3
6	2005507	DAA Lab	PCC	0	0	3	40	60	1.5
7	2005508	Professional Elective Course -I Lab	PCC	0	0	3	40	60	1.5
8	20245SC	Soft Skill Oriented Course Advanced English & Communication Lab/Professional Communication Lab	SC	0	0	4	40	60	2.0
9	2005510	Community Service Project	PROJ	0	0	0	100		1.5
10	20MC509	Constitution of India	MC	2	0	0	40	00	00
<b>Total</b>				<b>17</b>	<b>00</b>	<b>10</b>	<b>420</b>	<b>480</b>	<b>21.5</b>

**VI Semester (Theory-05,Lab-02)**

S. No.	Subject Code	SUBJECT	SC	L	T	P	IM	EM	CR
1	2005601	Internet of Things	PCC	3	0	0	40	60	3
2	2005602	Data Mining	PCC	3	0	0	40	60	3
3	2005603	Cryptography & Network Security	PCC	3	0	0	40	60	3
		<b>Open Elective Course -II(OEC-II)</b>							
4	200E503	Open Elective Course-II	OEC	3	0	0	40	60	3
	200E504	Open Elective Course-II	OEC	3	0	0	40	60	3
		<b>Professional Elective Course -II ( PEC-II)</b>							
5	2005604	Artificial Intelligence	PEC	3	0	0	40	60	3
	2005605	Software Testing	PEC	3	0	0	40	60	3
	2005606	Adhoc & Sensor Networks	PEC	3	0	0	40	60	3
6	2005607	IOT Lab	PCC	0	0	3	40	60	1.5
7	2005608	Data Mining Lab	PCC	0	0	3	40	60	1.5
8	2005609	Network Security Lab	PCC	0	0	3	40	60	1.5
9	2005610	<b>Skill Oriented Course</b> Mobile Application Development	SC	0	0	4	40	60	2.0
10	20MC612	<b>Management Organizational Behaviour</b>	MC	2	0	0	40	00	00
<b>Total</b>				<b>17</b>	<b>00</b>	<b>13</b>	<b>440</b>	<b>540</b>	<b>21.5</b>

**Structure of the Undergraduate Engineering Program:**

<b>S.No.</b>	<b>Category</b>	<b>Code</b>	<b>Credits</b>	<b>APSCHE Suggested Credits</b>
1	Humanities & Social Sciences including Management Sciences	HSMC	10.5	10
2	Basic Science Courses	BSC	18	21
3	Engineering Science Courses	ESC	24	24
4	Professional Core Courses	PCC	54	51
5	Open Elective Courses	OEC	12	12
6	Professional Elective Courses	PEC	15	15
7	Internship & Project Work	Proj	16.5	17
8	Mandatory Courses	MC	03	Non-Credit
9	Skill Oriented Courses	SC	10	10
	<b>Total Credits</b>		<b>163</b>	<b>160</b>

# **B.Tech V SEM CSE (R20)**

Course Title	SOFTWARE ENGINEERING				B.Tech V Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005501	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Knowledge of basic Software engineering methods and practices, and their appropriate application also the software engineering layered technology and Process frame work.</li> <li>• A general understanding of software process models such as the waterfall and evolutionary models.</li> <li>• Understanding of the role of project management including planning, scheduling, risk management, etc.</li> <li>• Understanding of data models, object models, context models and behavioural models also different software architectural styles.</li> <li>• Understanding of software testing approaches such as unit testing and integration testing other testing strategies and Risk management.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Ability to apply software engineering principles and techniques.							
<b>CO 2</b>	Ability to develop, maintain and evaluate large-scale software systems.							
<b>CO 3</b>	To produce efficient, reliable, robust and cost-effective software solutions.							
<b>CO 4</b>	To manage time, processes and resources effectively by prioritising competing demands to achieve personal and team goals Identify and analyzes the common threats in each domain.							

### UNIT - I

**Software and Software Engineering:** The Nature of Software, Software Engineering, Software Process Software Myths. Process Models: A Generic Process Model, Prescriptive Process Models, Specialized Process Models, The Unified Process, Personal and Team Process Models.

### UNIT - II

**Understanding Requirements:** Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Building the Requirements Model, Negotiating Requirements, Validating Requirements.

**Requirements Modeling:** Requirements Analysis, Scenario-Based Modeling, Data Modeling Concepts, Class-Based Modeling.

### UNIT - III

**Design Concepts:** Design within the Context of Software Engineering, Design Process, Design Concepts, The Design Model.

**Architectural Design:** Software Architecture, Architectural Genres, Architectural Styles, Architectural Design.

## **UNIT - IV**

**User Interface Design:** The Golden Rules, User Interface Analysis and Design, Interface Analysis, Interface Design Steps, Design Evaluation.

**Coding and Testing:** Testing, Testing in the Large versus Testing in the Small, Unit Testing, Integration Testing, Black-Box Testing, White-Box Testing, Debugging, System Testing.

## **UNIT - V**

**Software Project Management:** Project Planning, Metrics for Project Size Estimation, Project Estimation Techniques, Empirical Estimation Techniques, COCOMO-A Heuristic Estimation Technique, Halstead's Software Science-An Analytical Technique, Risk Management.

### **Text Books:**

1. Software Engineering: A practitioner's Approach, Roger S. Pressman, Seventh Edition, 2010, McGrawHill International Edition.
2. Fundamentals of Software Engineering, Rajib Mall, 4th Edition, 2014, PHI.
3. Software Engineering, Ian Sommerville, Ninth edition, Pearson education.
4. Software Engineering : A Primer, Waman S Jawadekar, Tata McGraw-Hill, 2008

### **Reference Books:**

1. Software Engineering, A Precise Approach, Pankaj Jalote, Wiley India, 2010.
2. Software Engineering, Principles and Practices, Deepak Jain, Oxford University Press.
3. Software Engineering1: Abstraction and modeling, Diner Bjorner, Springer International edition, 2006.
4. Software Engineering2: Specification of systems and languages, Diner Bjorner, Springer International edition , 2006.
5. Software Engineering Foundations, Yingxu Wang, Auerbach Publications, 2008.

Course Title	DESIGN AND ANALYSIS OF ALGORITHMS				B.Tech CSE V Sem (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005502	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To understand and apply the algorithm analysis techniques.</li> <li>To critically analyze the efficiency of alternative algorithmic solutions for the same problem.</li> <li>To understand different algorithm design techniques.</li> <li>To understand the limitations of Algorithmic power.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
CO 1	Prove the correctness and analyze space and time complexity of an algorithm.							
CO 2	Understand different algorithm design strategies.							
CO 3	Analyze & Apply standard algorithms.							
CO 4	Understand Graph/Tree bases applications and appropriate techniques.							
CO 5	Current trends in Non Deterministic concepts.							

### UNIT-I

**Introduction:** What is an algorithm? Algorithm Specification, **Performance Analysis:** Space complexity, Time Complexity. **Asymptotic Notations:** Big-Oh notation (O), Omega notation ( $\Omega$ ), Theta notation ( $\Theta$ ), **Brute Force Method:** Sequential Search, Selection Sort, Bubble Sort.

### UNIT-II

**Divide and Conquer:** General method, Binary search, Merge sort, Quick sort, Strassen's Matrix multiplication.

**Greedy Method:** General method, Knapsack Problem, Job sequencing with deadlines. **Minimum cost spanning trees:** Prim's Algorithm, Kruskal's Algorithm.

### UNIT-III

**Dynamic Programming:** General method, Multistage Graphs, All Pairs Shortest Paths, Single Source Shortest Path, Optimal Binary Search Trees, 0/1 Knapsack problem, Travelling Sales Person problem .

### UNIT-IV

**Search and Traversal techniques:** Techniques for Binary tree, Technique for Graphs, connected components and spanning tree, Bi connected components.

**Backtracking:** General method, N-Queens problem, Sum of sub sets problem, Graph coloring, Hamiltonian cycles.



## **UNIT-V**

**Branch and Bound:** Travelling Sales Person problem, 0/1Knapsack problem: LC Branch and Bound solution, FIFO Branch and Bound solution.

**NP-Complete and NP-Hard problems:** Basic concepts on-deterministic algorithms, P, NP, NP-Complete, and NP-Hard classes.

### **Text Books:**

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications.
2. Levitin, Anany. "Introduction to the design & analysis of algorithms" Pearson Education, 2008.
3. Udit Agarwal, "Algorithms Design and Analysis", Dhanpath Rai & Co, 2017.
4. Sedgewick Robert and Kevin Wayne, "Algorithms", Pearson Education, Fourth Edition.
5. Parag H. Dave Himanshu B. Dave "Design and Analysis of Algorithms" Pearson Education 2008.

### **Reference Books:**

1. Aho, Hopcroft, Ulman, "The Design and Analysis of Computer Algorithms" Pearson Education, 2000.
2. Steven S. Skiena, "The Algorithm Design Manual", Springer, Third Edition.
3. R.L. Rivest and C. Stein "Introduction to Algorithms", Second Edition, Pearson Education
4. M.T. Goodrich and R. Tomassia, John Wiley and sons, "Algorithm Design: Foundations, Analysis and Internet examples".
5. Sanjoy Dasgupta, Christos H Papadimitriou, Umesh Virkumar Vazirani, "Algorithms", McGraw-Hill Higher Education, 2008

Course Title	COMPUTER NETWORKS				B.Tech V Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005503	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Study the evolution of computer networks and future direction.</li> <li>• Study the concepts of computer networks from layered.</li> <li>• Perspective study the issues open for research in computer networks.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Understand the terminology and concepts of the OSI reference model and TCP-IP.							
<b>CO 2</b>	Describe the functions of Data link layer and its protocols.							
<b>CO 3</b>	Classifying the different routing algorithms and IP addressing with network layer							
<b>CO 4</b>	Understand connection establishment and services provides by TCP and UDP.							
<b>CO 5</b>	Explain the working of DNS and World Wide Web.							

### UNIT - I

**Introduction:** Uses of Computer Networks, Network Hardware, Reference Models: OSI, TCP/IP, Comparison of OSI & TCP/IP reference models.

**Introduction to physical layer:** Data and Signals, Transmission impairment, Datarate limits, Performance.

**Transmission media:** Introduction, Guided Media, Unguided Media.

**Switching:** Introduction, Circuit Switched Networks, Packet Switching.

### UNIT - II

**The Data Link Layer:** Data Link Layer design issues, Error Detection and Correction, ElementaryData Link Protocols, Sliding Window Protocols.

**The Medium Access Control sublayer :** Multiple Access protocols, Ethernet, Data Link Layer Switching.

### **UNIT - III**

**The Network Layer:** Network layer design issues, Routing algorithms : The Optimality Principle, Shortest Path Algorithm, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Anycast Routing,

Congestion control algorithms, Quality of service, IP Addresses, IPv4, IPv6, Tunneling, Fragmentation.

### **UNIT - IV**

**The Transport Layer:** The Transport Service, Elements of Transport Protocols, Congestion Control, The internet transport protocols: UDP, TCP: Introduction to TCP, Service Model, Protocol, Segment Header, Connection Establishment, Connection Release.

### **UNIT - V**

**The Application layer:** Domain Name System (DNS), World Wide Web (WWW), E-mail.

### **Text Books:**

1. "Computer Networks", Andrew S. Tanenbaum, David J. Wetherall, Pearson, 5th edition, 2010.
2. "Data communications and networking", Behrouz A. Forouzan, TMH, 5th edition, 2012.
3. "Internetworking with TCP/IP – Principles, protocols, and architecture- Volume 1, Douglas E. Comer, 5th edition, PHI
4. "Computer Networks", 5E, Peterson, Davie, Elsevier.

### **Reference Books:**

1. "Introduction to Computer Networks and Cyber Security", Chawan- Hwa Wu, Irwin, CRC Publications.
2. "Computer Networks and Internets with Internet Applications", Comer.
3. Computer Networks, A Top-Down Approach, James F. Kurose, Keith W. Ross, 3<sup>rd</sup> Edition, Pearson.
4. Computer Networks, A Top-Down Approach, Behrouz A. Forouzan, Firoz Mosharraf, Special Indian Edition, McGraw Hill.

Course Title	WEB TECHNOLOGIES (Professional Elective Course-I)				B.Tech V Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005504	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>Familiarize the tags of HTML.</li> <li>Write backend code in PHP language and Writing optimized front end code HTML and JavaScript.</li> <li>Understand, create and debug database related queries and Create test code to validate the applications against client requirement.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
CO 1	Enumerate the Basic Concepts of Markup Languages.							
CO 2	Develop web Applications using Scripting Languages & Frameworks.							
CO 3	Make use of Express JS frameworks.							
CO 4	Develop server side programs using PHP.							
CO 5	Accessing database through PHP.							

### UNIT - I

**HTML:** Basic Syntax, Standard HTML Document Structure, Basic Text Markup, Html styles, Elements, Attributes, Heading, Layouts, Html media, Iframes Images, Hypertext Links, Lists, Tables, Forms, GET and POST method, HTML 5, Dynamic HTML.

**CSS:** Cascading style sheets, Levels of Style Sheets, Style Specification Formats,

### UNIT - II

**JavaScript:** Introduction to JavaScript, Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions,

### UNIT - III

Fundamentals of Angular JS and NODE JS Angular Java Script- Introduction to Angular JS.  
**Expressions:** ARRAY, Objects, Strings, Angular JS Form Validation & Form Submission.

### UNIT - IV

**PHP Programming:** Introduction to PHP, Creating PHP script, Running PHP script. Working with variables and constants: Using variables, Using constants, Data types, Operators. Controlling program flow: Conditional statements, Control statements, Arrays, functions. PHP Advanced Concepts: Using Cookies, Using HTTP Headers, Using Sessions, Authenticating users.

## **UNIT - V**

Database connectivity – Basic Database Concepts, Connecting to a MYSQL database, JSP, PHP, Practice of SQL Queries. Introduction to Mongo DB and JQuery.

### **Text Books:**

1. Programming the World Wide Web, 7th Edition, Robert W Sebesta, Pearson, 2013.
2. Web Technologies, 1st Edition 7th impression, Uttam K Roy, Oxford, 2012.
3. Pro Mean Stack Development, 1st Edition, ELad Elrom, Apress O'Reilly, 2016
4. Java Script & jQuery the missing manual, 2nd Edition, David sawyer mcfarland, O'Reilly, 2011.
5. Beginning PHP and MySQL, 5th Edition, Jason Gilmore, Apress Publications (Dream tech.)

### **Reference Books:**

1. Ruby on Rails Up and Running, Lightning fast Web development, 1st Edition, Bruce Tate, Curt Hibbs, Oreilly, 2006.
2. Programming Perl, 4th Edition, Tom Christiansen, Jonathan Orwant, O'Reilly, 2012.
3. Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, 1st Edition, Dream Tech, 2009.

Course Title	MULTIMEDIA SYSTEMS (Professional Elective Course-I)				B.Tech V Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005505	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Minutes					End Exam Duration: 3Hrs			
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To adapt the architecture for design of multimedia system.</li> <li>To solve issues related to multimedia file handling.</li> <li>To adopt hypermedia standards in developing multimedia applications.</li> <li>Know the basics of creating multimedia applications.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
CO 1	Analyze and synthesis the key components of multimedia technologies including text, audio and graphics.							
CO 2	Understand the key components of multimedia technologies including video, animation and compression techniques.							
CO 3	Examine various process scheduling techniques.							
CO 4	Recall the data storage and retrieval methods.							
CO 5	Interpret reference model for multimedia synchronization and summarize applications of multimedia.							

### UNIT - I

**Multimedia:** Definition, Where to use multimedia, Medium, Main properties of multimedia system, Traditional data stream characteristics, Data stream characteristics for continuous media, Information units.

**Sound/Audio:** Basic sound concepts, Music, Speech.

**Images/Graphics:** Basic concepts, Computer image processing.

### UNIT - II

**Video and Animation:** Basic concepts, Television, Computer based animation.

**Data Compression:** Storage space, Coding requirements, Source, Entropy and Hybrid coding, Some basic compression techniques, JPEG, H.261,(Px64), MPEG, DVI.

### **UNIT - III**

**Computer Technology:** Communication Architecture, Multimedia Workstation.

**Multimedia Operating Systems:** Introduction, Real time, Resource management, Process management.

**Multimedia Communication systems:** Application Subsystem, Transport subsystem.

### **UNIT - IV**

**Database Systems:** Multimedia Database Management System, Characteristics of an MDBMS, Data Analysis, Data Structure, Operations on data, Integration in a Database model.

**Documents, Hypertext and MHEG:** Documents, Hypertext and Hypermedia, Document Architecture ODA, MHEG.

### **UNIT - V**

**Synchronization:** Introduction, Notion of Synchronization, Presentation requirements, Reference model for multimedia synchronization, Synchronization specifications.

**Multimedia Applications:** Introduction, Media Presentation, Media Composition, Media Integration, Media Communication, Media Consumption, and Media Entertainment.

### **Text Books:**

1. "Multimedia: Computing, Communications and Applications", Ralf Steinmetz and KlaraNahrstedt, Pearson Education.
2. "Multimedia: Making It work:", Tay Vaughan, Pearson Education.
3. "Multimedia Systems", Koegel Buford, Pearson Education
4. "Fundamentals of Multimedia , Ze-Nian Li, Mark.S.Drew, Springer.

### **Reference Books:**

1. "Multimedia System design ", Prabhat K. Andheigh, Kiran Thakrar, THM
2. "Multimedia Communication Systems: Techniques, standards and networks, K.R.Rao, D.Milovanovic.
3. Introduction to Multimedia, Ramesh Bangia, Firewall Media.
4. Principles of Multimedia, 2<sup>nd</sup> Edition, Ranjan Parekh, MAT Lab examples.

Course Title	DISTRIBUTED SYSTEMS (Professional Elective Course-I)				B.Tech V Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005506	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>To make the student to understand the features of distributed systems.</li> <li>Creating awareness among students on processes and synchronization among processes.</li> <li>Learn the concepts of consistency models, replication and fault tolerance in distributed systems.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Identify the core concepts of distributed systems.							
<b>CO 2</b>	Understand the concepts of threads and communication mechanisms for processes.							
<b>CO 3</b>	Develop the clock synchronization, mutual exclusion and election algorithms.							
<b>CO 4</b>	Analyze the consistency and replication models.							
<b>CO 5</b>	Understand the fault tolerance mechanisms in distributed systems.							

### UNIT - I

**Introduction:** Definition of a distributed system, Goals, Types of distributed systems.

**Architectures:** Architecture styles, System architectures.

### UNIT - II

**Processes:** Threads, virtualization, clients, servers, code migration.

**Communication:** Fundamentals, Remote Procedure Call, Message oriented communication, Stream oriented communication, Multicast communication.

### UNIT - III

**Synchronization:** Clock synchronization, Logical clocks, Mutual exclusion, Election Algorithms.

### UNIT - IV

**Consistency and Replication:** Introduction, Data centric consistency models, Client centric consistency models, Replica management, Consistency protocols.

### UNIT - V

**Fault Tolerance:** Introduction to fault tolerance, Process resilience, Reliable client server communication, Reliable group communication, Distributed commit, Recovery.



**Text Books:**

1. Andrew S. Tanenbaum, Marteen Van Steen, “Distributed Systems: Principles and Paradigms”, 2<sup>nd</sup> Edition, PHI.
2. George Coulouris, Jean Dollimore, Tim Kindberg, “Distributed Systems – Concepts and Design”, Fourth Edition, Pearson Education.
3. Andrew S. Tanenbaum, “Distributed Operating System”, Pearson Education.
4. Pradeep K. Sinha, “Distributed Operating Systems – Concepts and Design”, PHI publications.

**Reference Books:**

1. Distributed Systems and Algorithm Analysis, Randy Chew, Theodore Johnson, Pearson.
2. Distributed Systems and Paradigms, Andrew. S. Tanenbaum, Maarten Van Steen, 2<sup>nd</sup> Edition, Pearson.
3. Distributed Systems: Computing over Network, Joel M. Crichlow, 2<sup>nd</sup> Edition, PHI.

Course Title	DESIGN AND ANALYSIS OF ALGORITHMS LAB					B.Tech CSE V Sem (R20)		
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005507	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1.5	40	60	100
					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Learn how to analyze a problem and design the solution for the problem.</li> <li>• Design and implement efficient algorithms for a specified application.</li> <li>• Strengthen the ability to identify and apply the suitable algorithm for the given real world problem.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Design algorithms using appropriate design techniques (divide and conquer, greedy, dynamic programming, etc.,).							
<b>CO 2</b>	Implement variety of algorithms such as sorting, searching, graph related, etc., in a high level language.							
<b>CO 3</b>	Analyze and compare the performance of algorithms using language features.							

### Experiments:

1. Write a program to perform Selection sort for any given list of numbers.
2. Write a program to perform Bubble sort for any given list of numbers.
3. Write a program to perform Sequential Search for any given list of numbers.
4. Write a Program to perform Merge Sort on the given two lists of integer values
5. Write a program to perform Quick Sort for the given list of integer values.
6. Write a program to find solution for knapsack problem using greedy method.
7. Write a program to find minimum cost spanning tree using Prim's Algorithm.
8. Write a program to find minimum cost spanning tree using Kruskal's Algorithm.
9. Write a program to perform Dijkstra's algorithm.
10. Write a program to implement Floyd's algorithm.
11. Write a program to solve N-QUEENS problem.
12. Write a program to solve Sum of subsets problem for a given set of distinct numbers.

### Text Books:

1. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, "Fundamentals of Computer Algorithms", Galgotia Publications.
2. Levitin, Anany. "Introduction to the design & analysis of algorithms" Pearson Education, 2008.
3. Udit Agarwal, "Algorithms Design and Analysis", Dhanpath Rai & Co, 2017.
4. Sedgewick Robert and Kevin Wayne, "Algorithms", Pearson Education, Forth Edition.
5. Parag H. Dave Himanshu B. Dave "Design and Analysis of Algorithms" Pearson Education 2008.

### **Reference Books:**

1. Aho, Hopcroft, Ulman, "the Design and Analysis of Computer Algorithms" Pearson Education, 2000.
2. Steven S.Skienna, " The Algorithm Design Mannual", Spingers, Third Edition.
3. R.L.Rivest and C.Stein" Introduction to Algorithms", Second Edition, Pearson Education
4. M.T.Goodrich and R.Tomassia, John Wiley and sons, " Algorithm Design: Foundations, Analysis and Internet examples".
5. Sanjoy Dasgupta, Christos H Papadimitriou, Umesh Virkumar Vazirani, "Algorithms" , McGraw-Hill Higher Education, 2008

<b>Course Title</b>	<b>PROFESSIONAL ELECTIVE COURSE-I LAB</b>					<b>B.Tech CSE V Sem (R20)</b>		
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>2005508</b>	<b>PCC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Continuous Internal Assessment</b>	<b>End Exams</b>	<b>Total</b>
		0	0	3	1.5	40	60	100
					<b>End Exam Duration: 3Hrs</b>			

### **List of Experiments**

A Minimum of 10 Experiments shall be given from **Professional Elective Course-I.**

<b>Course Title</b>	<b>ADVANCED ENGLISH &amp; COMMUNICATION LAB</b> (Soft Skill Oriented Course)				<b>B.Tech CSE V Sem (R20)</b>			
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>20245SC</b>	<b>SC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Continuous Internal Assessment</b>	<b>End Exams</b>	<b>Total</b>
		0	0	4	2	40	60	100
					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Interpret using language effectively in Group Discussions</li> <li>• Develop the required skills for facing interviews and public speaking</li> <li>• Analyze improving of language proficiency</li> <li>• Build confidence by exposing to various situations and contexts for their successful professional career.</li> <li>• Develop them industry – ready</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Interpret using language effectively in Group Discussions.							
<b>CO 2</b>	Develop the required skills for facing interviews and public speaking.							
<b>CO 3</b>	Analyze improving of language proficiency.							
<b>CO 4</b>	Build confidence by exposing to various situations and contexts for their successful professional career.							
<b>CO 5</b>	Develop them industry – ready.							

### 1. Syllabus:

The following course content is prescribed for the Advanced English Communication Skills:

**1.Functional English** -- Starting & Responding to a Conversation-- Social Etiquette, Formal and informal Conversation -- Role play – Body language in conversation—departing phrases.

**2.Technical Report Writing** --- Types of formats and styles, subject matter, organization, clarity, coherence and style, data-collection, tools, analysis, sample report.

**3.Resume' Writing** --- Structure, format and style, planning, defining the career, objective, projecting one's strengths and skills, creative self-marketing, cover letter.

**4.Group Discussion---** Communicating views and opinions, discussing, intervening.Providing solutions on any given topic across a cross-section of individuals, (keeping an eye on modulation of voice, clarity, body language, relevance, fluency and coherence) in personal and professional lives.

**5. Interview Skills** --- Concept and process, pre-interview planning, mannerisms, body language, organizing, answering strategies, interview through tele and video-conferencing.

## 2. Minimum Requirements

The English Language Lab shall have two parts:

The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.

The Communication Skills Lab with movable chairs and audio-visual aids with a P.A System, a TV, A digital stereo-audio and video system, Camcorder etc.

### **System Requirement (Hardware Component):**

Computer network with LAN with a minimum of 60 multimedia systems with the following specifications:

P-IV Processor, Speed-2.8 GHz, RAM\_512 MB minimum, Hard Disk-80 GB, Headphones

**Prescribed Software: Walden and K-Van Solutions.**

### **Text Books:**

1. **Technical writing and professional communication, Huckin and Olsen** Tata McGraw-Hil 2009.
2. **Speaking about Science, A Manual for Creating Clear Presentations by Scott Morgan and Barrett Whitener, Cambridge University press, 2006.**
3. **Handbook for Technical Writing** by David A McMurrey& Joanne Buckely CENGAGE Learomg 2008.
4. **Technical Communication** by Meenakshi Raman &Sangeeta Sharma, Oxford University Press 2009.
5. **The ACE of Soft Skills** by Gopal Ramesh and Mahadevan Ramesh, Pearson Education, 2010.
6. **Cambridge English for Job-Hunting** by ColmDownes, Cambridge Unicversity Press, 2008.
7. **Resume's and Interviews** by M. Ashraf Rizvi, Tata McGraw-Hill, 2008.
8. **From Campus to Corporate** by KK Ramachandran and KK Karthick, Macmillan Publishers India Ltd, 2010.
9. **English Language Communication: A Reader cum Lab Manual**Dr A Ramakrishna Rao, Dr G Natanam& Prof SA Sankaranarayanan, Anuradha Publications, Chennai 2008.

Course Title	COMMUNITY SERVICE PROJECT				B.Tech V Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005510	PROJ	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		-	-	-	1.5	100	-	100
<b>Internal Evaluation</b>								
<b>Course Objectives:</b>								
The objective of the project is to enable the student to take up investigative study in rural areas/ Community in the field of Computer Science and Engineering.								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Understand core concepts and research findings relative to human development, socialization, group dynamics and life course processes.							
<b>CO 2</b>	Identify and transfer existing ideas into new contexts and applications.							
<b>CO 3</b>	Apply and transfer academic knowledge into the real-world.							
<b>CO 4</b>	Design a component or a product applying all the relevant standards and with realistic Constraints.							

The following are the rules and regulation for **Community Service Project Projects**:

1. The student has to spend 50 to 60 Hrs in the semester on any Community Service Project and submit a report for evaluation.
2. The project is evaluated for 100 marks in the semester by a committee consisting of head of the department, project mentor and one senior faculty member of the department.
3. A student shall acquire 2 credits assigned, when he/she secures 50% or more marks from the total of 100 marks.
4. In case, if a student fails, he/she shall resubmit the report.
5. There is no external evaluation for the Community Service Project.

Course Title	CONSTITUTION OF INDIA (Mandatory Course)				B.Tech V Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20MC509	HSMC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		2	-	-	0	40	--	40
<b>Mid Exam Duration: 90 Minutes</b>								
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• To realize the significance of the constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution.</li> <li>• To identify the importance of fundamental rights as well as fundamental duties.</li> <li>• To understand the functioning of Union, State and Local Governments in the Indian federal system.</li> <li>• To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Describe the historical background of the constitution making and its importance for building a democratic India.							
<b>CO 2</b>	Explain the functioning of three wings of the government i.e., executive, legislative and judiciary.							
<b>CO 3</b>	Explain the value of the fundamental rights and duties for becoming good citizen of India.							
<b>CO 4</b>	Analyze the decentralization of power between central, state and local self-government.							
<b>CO 5</b>	Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy							

### UNIT - I

**Introduction to Indian Constitution:** Constitution meaning of the term, Indian Constitution – Sources and constitutional history, Features – Citizenship, Fundamental Rights and Duties, Directive Principles of State Policy.

### UNIT - II

**Union Government and its Administration Structure of the Indian Union:** Center- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions.



### **UNIT - III**

**State Government and its Administration** Governor – Role and Position – CM and Council of ministers, State Secretariat: Organization, Structure and Functions.

### **UNIT - IV**

**Local Administration:** District's Administration Head – Role and Importance, Municipalities – Mayor and role of Elected Representative – ZillaPanchayat, Elected officials and their roles, CEO ZilaPanchayat: Block level Organizational Hierarchy – (Different departments), Village level – Role of Elected and Appointed officials.

### **UNIT - V**

**Election Commission:** Election Commission- Role of Chief Election Commissioner and Election Commissioner State Election Commission:, Functions of Commissions for the welfare of SC/ST/OBC and women.

### **Text Books:**

1. M.V.Pylee, "Introduction to the Constitution of India", 4th Edition, Vikas publication, 2005.
2. Durga Das Basu( DD Basu) , "Introduction to the constitution of India", (Student Edition), 19th edition, Prentice-Hall EEE, 2008.

### **Reference Books:**

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subhash Kashyap, Indian Constitution, National Book Trust
3. J.A. Siwach, Dynamics of Indian Government & Politics
4. D.C. Gupta, Indian Government and Politics
5. H.M.Seervai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication)
6. J.C. Johari, Indian Government and Politics Hans
7. J. Raj Indian Government and Politics
8. M.V. Pylee, Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi
9. Noorani, A.G., (South Asia Human Rights Documentation Centre), Challenges to Civil Right), Challenges to Civil Rights Guarantees in India, Oxford University Press 2012.

### **E-Resources:**

- [nptel.ac.in/courses/109104074/8](http://nptel.ac.in/courses/109104074/8)
- [nptel.ac.in/courses/109104045/](http://nptel.ac.in/courses/109104045/)
- [nptel.ac.in/courses/101104065/](http://nptel.ac.in/courses/101104065/)

## Open Elective Course-I (OEC-I)

S.No	Subject Code	Open Elective Course-I(OEC-I)	SC	L	T	P	IM	EM	CR
1	20OE501	Data Structures	OEC	3	0	0	40	60	3
2	20OE502	Database Management Systems	OEC	3	0	0	40	60	3

<b>Course Title</b>	<b>DATA STRUCTURES (Open Elective Course-I)</b>				<b>B.Tech V Sem (R20)</b>			
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>20OE501</b>	<b>OEC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Continuous Internal Assessment</b>	<b>End Exams</b>	<b>Total</b>
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• To develop skills and analyze linear and nonlinear data structures.</li> <li>• To understand basic concepts about linked lists, stacks, queues.</li> <li>• To study algorithms as they apply to trees and graphs.</li> <li>• To study in detail about sorting.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Understand the variety of abstract data types and data structures.							
<b>CO 2</b>	Analyze data structures such as linked list, Stacks and Queues.							
<b>CO 3</b>	Apply and analyze tree traversal algorithms and graph traversal algorithms.							
<b>CO 4</b>	Organize data in order using various sorting algorithms.							

### UNIT - I

**Introduction:** Data structures, Primitive & Non Primitive data structures, Linear & Non Linear data structures, **Linear Lists:** Definition, **Arrays:** Definition, **Linked Lists:** Single Linked List-Definition, Insertion and Deletion operations, Doubly Linked List- Definition, Insertion and Deletion operations. **Stacks:** Definition, Array & Linked representations, Operations, Applications.

### UNIT – II

**Queues:** Definition, Array & Linked representations, Operations, Circular Queues & Dequeues.

**Trees:** Basic terminology, **Binary Trees** - Definition, Properties, Representation, Complete and Full Binary Tree, **Tree Traversal Algorithm:** Inorder, Preorder and Postorder.

### UNIT – III

**Binary Search Tree (BST):** Definition, Operations & Implementations, Indexed BST.

**Balanced Search Trees:** AVL trees, Red-Black trees & Splay trees.

## **UNIT – IV**

**Graphs:** Terminology, Representations, **Graph Traversal:** Depth First Search (DFS), Breadth First Search (BFS), Applications of graphs.

## **UNIT - V**

**Sorting:** Selection, Insertion, Bubble, Heap, Quick Sort, Merge Sort.

**Searching:** Linear and Binary search.

**Hashing:** Introduction, Hash Table representation, Hash Functions.

### **Text Books:**

1. An Introduction to Data Structures with applications, Jean Paul Trembley and Paul G.Sorenson, McGraw Hill.
2. Fundamentals of Data Structures in C, Horowitz, Sahni, Anderson Freed, Universitiespress.
3. Data Structures using C++, Varsha H.Patil, Oxford University Press.
4. Data Structures, Seymour Lipschutz, Schaum's Outlines, McGraw Hill.
5. Data Structures and Algorithms, G.A.V.Pai, Tata McGraw Hill.

### **Reference Books:**

1. Data Structures, Algorithms and Applications in C++, AnandaRao Akepogu and Radhika Raju Palagiri, Pearson Education.
2. Data Structures and Algorithms in C++, S.Sahni, University Press (India) Private Limited,Second Edition.
3. Data Structures using C and C++, Langsam, Augenstein and Tanenbaum, PHI.

### **Web links:**

1. <https://nptel.ac.in/courses/106102064>
2. <https://nptel.ac.in/courses/106103069>

<b>Course Title</b>	<b>DATABASE MANAGEMENT SYSTEMS</b> <b>(Open Elective Course – I)</b>				<b>B.Tech CSE Sem (R20)</b>			
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>20OE502</b>	<b>OEC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Continuous Internal Assessment</b>	<b>End Exams</b>	<b>Total</b>
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>To study the physical and logical database designs, database modeling, relational hierarchical, and network models.</li> <li>To understand and use data manipulation language to query, update, and managing the database.</li> <li>To develop an understanding of essential DBMS concepts such as: database security integrity and concurrency.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	To understand the basic concepts and the application of Database systems.							
<b>CO 2</b>	To understand the basics of SQL and construct queries using SQL.							
<b>CO 3</b>	To understand the Relational Database design principles.							
<b>CO 4</b>	To apply various Normalization techniques for database design improvement.							
<b>CO 5</b>	To apply concurrency control and recovery techniques during transaction execution.							

### **UNIT-I**

**Introduction** - Database-System Applications, View of Data, Database languages, Database architecture, Database Users and Administrators.

**E-R Model** - The Entity Relationship Model, Constraints, Entity Relationship Diagrams, and Extended E-R features.

### **UNIT-II**

**Relational Model** - Structure of Relational Databases, Database Schema, Keys, Query Languages, Fundamental Relational Algebra Operations, Additional Relational Algebra Operations, Extended Relational Algebra Operations, Modification of Database.

### **UNIT-III**

**Introduction to SQL** - Data Definition, Basic Structure of SQL Queries, Set Operations, Null Values, Aggregate Functions, Nested Sub queries, Complex queries, views, Modification of the Database.

**Advanced SQL** - Integrity Constraints, Dynamic SQL, Functions and Procedures.

**Other Relational Query Languages** - Tuple Relational Calculus, Domain Relational calculus.

## **UNIT-IV**

**Normal Forms** – Atomic domain and First Normal Form, Keys and Functional Dependencies, Second Normal Form, BCNF, BCNF and Dependency Preservation, Third Normal Form, Lossless Decomposition, Dependency- preserving, Multi valued Dependencies, Fourth Normal Form, Join Dependencies, Fifth Normal Form, and Inclusion dependencies.

## **UNIT-V**

**Transactions** -Transaction Concept, Transaction State, Implementation of Transaction Atomicity and Durability, Concurrent Executions, Serializability.

**Concurrency Control** -Lock-Based Protocols, Timestamp-Based Protocols. **Recovery System** - Failure Classification, Storage, Recovery and Atomicity, Logbased recovery.

### **Text Books:**

1. Abraham Silberschatz, Henry F. Korth, S. Sudarshan, "Database system Concepts", 5th Edition, McGrawhill.
2. Ramez Elmasri, Shamkant B. Navathe, "Fundamental Database Systems", Pearson Education, 3rd Edition, 2003
3. C.J.Date, "Introduction to Database", 8 Th Edition, 2003, Addison-Wesley publication.
4. Hector Garcia Molina, Jeffrey D. Ullman, Jennifer Widom, "Database System Implementation", Pearson Education, United States 1st Edition, 2000

### **Reference Books:**

1. Raghurama Krishnan, Johannes Gehrke, Data base Management Systems.3<sup>rd</sup> Edition, Tata McGrawHill.
2. Peter Rob, Ananda Rao and Carlos Corone, Database Management Systems, Cengage Learning, 1<sup>st</sup> Edition, 2011
3. Thomas Connolly, Carolyn Begg, Database Systems: A Practical Approach to Design, Implementation and Management,6th Edition,2012.
4. S.K.Singh, "Database Systems Concepts, Design and Applications", First Edition, Pearson Education, 2006

### **Reference Links:**

1. <https://nptel.ac.in/courses/106/105/106105175/> (IIT KHARAGPUR)
2. <https://nptel.ac.in/courses/106/106/106106095/> (IIT MADRAS)

# **B.Tech VI SEM CSE (R20)**

Course Title	INTERNET OF THINGS				B.Tech VI Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005601	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Basic principles of IOT.</li> <li>• Various IOT platforms and application development.</li> <li>• To know about Arduino board.</li> <li>• To know about Raspberry pi.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Demonstrate knowledge on Protocols, functional blocks and communication models of Internet of Things.							
<b>CO 2</b>	Identify domain specific IoT's.							
<b>CO 3</b>	Design appropriate solutions for IoT applications.							
<b>CO4</b>	Working with Arduino board.							
<b>CO5</b>	Design and develop applications using Raspberry pi device.							

## UNIT I

### **INTRODUCTION TO IoT:**

Definition and Characteristics of IoT, Physical Design of IoT, Logical Design of IoT, IoT Enabling Technologies, IoT Levels and Development Templates.

## UNIT II

### **DOMAIN SPECIFIC IoTS**

Introduction, Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Lifestyle.

## UNIT III

### **IOT and M2M:**

Introduction, M2M, Difference between IoT and M2M, SDN and NFV for IoT

### **IoT Platform Design Methodology:**

Introduction, IoT Design Methodology, Case Study on IoT System for Weather Monitoring.

## UNIT IV

### **Introduction to Arduino:**

Introduction, The Arduino Way, The Arduino Platform, Getting started with Arduino, Advanced Input and Output, Sample Programs.

**Sensors:** Introduction to sensors, Transducer, Sensors characteristics.



## **UNIT V**

### **IOT Physical Devices:**

What is an IOT device, basic building blocks of an IOT device, Exemplary device: Raspberry Pi, about the board, linux on raspberry Pi, raspberry Pi interfaces, Programming Raspberry Pi with Python, Other IoT Devices.

### **Text Books:**

1. Adrian McEwen, Hakin Cassimally “Designing the Internet of Things” Wiley India.
2. Getting Started with Arduino, 3rd Edition, Massimo Banzi and Michael Shiloh
3. Getting Started with Raspberry Pie, Matt Richardson & Shawn Wallace, O’Reilly-2014.
4. ArshdeepBahga, Vijay Madiseti “ Internet of Things( A hands on approach)”  
1STedition, VPI publications,2014.

### **Reference Books:**

1. Raj Kamal, “Internet of Things”, McGraw Hill, 1<sup>st</sup> Edition, 2016.
2. Internet of Things, Surya Durbha, Jyothi Joglekar, Oxford Higher Education.
3. The Internet of Things, Michael Miller, Pearson.
4. The Internet of Things, Samuel Greengard, The MIT Press Ltd.

Course Title	DATA MINING				B.Tech VI Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005602	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>To learn the concepts of database technology evolutionary path which has led to the need for data mining and its applications</li> <li>To develop skills of using data mining techniques for solving practical problems.</li> <li>To learn Data mining algorithms to build analytical applications.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Understand the fundamentals of Data Mining and its Principles.							
<b>CO 2</b>	Understand different steps followed in Data mining and pre-processing for Data mining.							
<b>CO 3</b>	Apply appropriate data mining algorithms to find Frequent patterns, Associations, and Correlations.							
<b>CO4</b>	Compare and evaluate data mining techniques classification, prediction.							
<b>CO5</b>	Cluster the high dimensional data for better organization of the data and to detect the Outliers in the high dimensional data.							

### UNIT - I

**Introduction:** Why Data Mining? What Is Data Mining? What Kinds of Data Can Be Mined? What Kinds of Patterns Can Be Mined? Major issues in Data Mining.

### UNIT - II

#### **Data Preprocessing:**

Why Pre-process the Data? Descriptive Data Summarization, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation.

### UNIT - III

**Mining Frequent Patterns, Associations, and Correlations: Basic Concepts and Methods:** Basic Concepts, Frequent Itemset Mining Methods, From Association Analysis to Correlation Analysis, Pattern Mining in Multilevel, Multidimensional Space, Constraint-Based Frequent Pattern Mining.

## **UNIT - IV**

### **Classification:**

Basic Concepts, Decision Tree Induction, Baye's Classification Method, Rule-Based Classification.

**Prediction:** Basic concepts, Accuracy and Error measures, Evaluating the accuracy of a classifier or a predictor.

## **UNIT - V**

**Cluster Analysis:** Cluster Analysis basic concepts, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods.

**Outlier Detection** - Outliers and Outlier Analysis, Outlier Detection Methods

### **Text Books:**

1. Data Mining: Concepts and Techniques, Jiawei Han , Micheline Kamber and Jian Pei, Morgan Kaufmann Publishers, Elsevier, Third Edition, 2012.
2. Data Warehousing in the Real world, Sam Aanhory & Dennis Murray , Pearson Education, Asia.
3. Intelligent Data Mining, Da Raun. Guoqing Chen, Etienne E. Kerre. Geert Wets, Springer.
4. Data Mining & Data Warehousing: Principles and Practical Techniques, Parteek Bhatia, Cambridge.

### **Reference Books:**

1. Data Mining Techniques, Arun K Pujari, Second Edition, Universities Press.
2. Insight into Data Mining, K.P.Soman, S.Diwakar , V.Ajay, PHI 2008.
3. Data Mining: Introductory and Advanced Topics, Margaret H. Dunhan, Pearson.
4. Data Mining, Vikram Pudi, P. Radha Krishna, Oxford Higher Education.

Course Title	CRYPTOGRAPHY & NETWORK SECURITY				B. Tech. VI Sem CSE (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005603	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Min</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Extensive, thorough and significant understanding of the concepts, issues, principles and theories of computer network security</li> <li>• Identifying the suitable points for applying security features for network traffic</li> <li>• Understanding the various cryptographic algorithms and implementation of the same.</li> <li>• Understanding the various attacks, security mechanisms and services.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Identify information security goals, classical encryption techniques and acquire fundamental knowledge on the concepts of finite fields and number theory.							
<b>CO 2</b>	Understand, compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication.							
<b>CO 3</b>	Apply the knowledge of cryptographic checksums and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.							
<b>CO 4</b>	Apply different digital signature algorithms to achieve authentication and create secure applications.							
<b>CO 5</b>	Apply network security basics, analyze different attacks on networks and evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP.							
<b>CO 6</b>	Apply the knowledge of cryptographic utilities and authentication mechanisms to design secure applications							

### UNIT I

Computer Security concepts, The OSI Security Architecture, Security attacks, Security services and Security mechanisms, A model for Network Security, Classical encryption techniques-symmetric cipher model, substitution ciphers, transposition ciphers, Steganography, Modern Stream ciphers.

### UNIT II

**Modern Block Ciphers:** Block ciphers principles, Data encryption standard (DES), Strength of DES, Block cipher modes of operations, AES, RC4.

**Introduction to Number theory :** Integer Arithmetic, Modular Arithmetic, Linear Congruence, Algebraic Structures, GF(2<sup>n</sup>) Fields, Primes, Factorization, Chinese remainder Theorem, Quadratic Congruence.

### **UNIT III**

**Public-key cryptography** :Principles of public-key cryptography, RSA Algorithm, Diffie-Hellman Key Exchange, ELGamal cryptographic system.

**Cryptographic Hash functions**: Applications of Cryptographic Hash functions, Requirements and security, Hash functions based on Cipher Block Chaining, Secure Hash Algorithm (SHA).

### **UNIT IV**

**Message Authentication Codes**: Message authentication Requirements, Message authentication functions, Message authentication codes, security of MACs, HMAC.

**Digital Signatures**: Digital Signatures, Schnorr Digital Signature Scheme, Digital Signature Standard.

### **UNIT V**

**User Authentication**: Remote user Authentication Principles, Kerberos

**Electronic mail security**: Pretty Good Privacy (PGP), S/MIME  
Worms, Viruses, Firewalls.

### **Text Books:**

1. Cryptography and network Security by Fourth edition, Stallings, PHI/Pearson
2. Cryptography & Network Security by Behrouz A. Forouzan, TMH.
3. Network Security: The complete reference by Robert Bragg, Mark Rhodes, TMH
4. Computer Security Basics by Rick Lehtinen, Deborah Russell & G.T.Gangemi Sr., SPD O'REILLY.

### **Reference Books:**

1. Cryptography and network Security by Atul Kahate, 4<sup>th</sup> Edition, Tata McGraw Hill.
2. Understanding Cryptography, Christof Paar. Jan Pelzl, Springer.
3. Introduction to Modern Cryptography, Jonathan Katz, Yehuda Lindell, 2<sup>nd</sup> Edition, CRC.

Course Title	ARTIFICIAL INTELLIGENCE (Professional Elective Course-II)				B.Tech VI Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005604	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>To understand how a computer making intelligent decisions.</li> <li>To understand the notions of state space representation, heuristic search methods.</li> <li>To learn different knowledge representation techniques</li> <li>To understand the applications of AI.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Given a search problem, analyze and formalize the problem (as a state space, graph, etc.).							
<b>CO 2</b>	The ability defines admissible and consistent heuristics and completeness and optimality.							
<b>CO 3</b>	Analyze and Apply knowledge representation technique.							
<b>CO4</b>	Ability to understand uncertainty and Design appropriate Bayes Nets corresponding to the causal relationships and conditional independence of a real world situation							
<b>CO5</b>	Design good evaluation functions and strategies for game playing and Understand concept of natural language processing.							

### **UNIT-I:**

**Introduction to AI:** AI Problems History what is an AI Technique. Problem, Problem Space and Search, Heuristic Search Techniques.

### **UNIT-II:**

Knowledge Representation Issues, Predicate Logic, Knowledge Representation using rules.

### **UNIT –III:**

Symbolic reasoning under Uncertainty, Bayesian Networks.

### **UNIT-IV:**

Weak Slot Filler Structures, Strong Slot and Filler Structures, Knowledge Representation summary.

### **UNIT –V:**

Game Playing, Planning, Natural Language processing.

### **Text Books:**

1. Rich, Knight, Nair: Artificial intelligence, Tata McGraw Hill, Third Edition 2009.
2. Russell, Norvig: Artificial intelligence, A Modern Approach, Pearson Education, Second Edition. 2004.
3. *Philip C Jackson*, Introduction to Artificial Intelligence: Second, Enlarged Edition.
4. Saroj Kaushik. Artificial Intelligence. Cengage Learning, 2011.

### **Reference Books:**

1. Charu C. Aggarwal, Artificial Intelligence, Springer, 2021.
2. Adelyn Zhou, Mariya Yao and Marlene Jia Applied Artificial Intelligence: A Handbook for Business Leaders, 2017
3. Peter Norvig, Paradigms of Artificial Intelligence Programming: Case Studies in Common Lisp.
4. Dr. Dheeraj Mehrotra, Basics of Artificial Intelligence & Machine Learning
5. Chandra S.S.V, Artificial Intelligence and Machine Learning
6. Denis Rothman, Artificial Intelligence by Example

Course Title	SOFTWARE TESTING (Professional Elective Course -II)				B.Tech VI Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005605	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Study the concepts of Software Testing objectives, Complications of bugs and Types of bugs.</li> <li>• Learn various testing methodologies.</li> <li>• Identify the techniques and skills on how to use modern software testing tools to support software testing projects.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Recall Software Testing.							
<b>CO 2</b>	Compare various Terminologies used in Software Testing.							
<b>CO 3</b>	Understand various testing methodologies like Path Testing, Domain Testing, Logic based Testing and Tools (Win-runner testing Tool).							
<b>CO 4</b>	Construct various graphs useful in Software Testing like Flow Graph, State Graph.							
<b>CO 5</b>	Examine various testing strategies and categorize them.							

### UNIT - I

**Introduction:** Purpose of testing, Dichotomies, Model for testing, Consequences of Bugs, Taxonomy of bugs.

**Flow graphs and Path testing:** Path testing basics, Predicates, Path Predicates and Achievable Paths, Path Sensitizing, Path Instrumentation, Application of path testing.

### UNIT - II

**Transaction Flow Testing:** Transaction Flows, Transaction Flow Testing Techniques.

**Dataflow testing:** Basics of dataflow testing, Strategies in dataflow testing, Application of dataflow testing.

### UNIT - III

**Domain Testing:** Domains and Paths, Nice & Ugly Domains, Domain Testing, Domains and Interfaces Testing, Domains and Testability.

**Paths, Path products and Regular expressions:** Path products & Path expression, Reduction Procedure, Regular Expressions & Flow Anomaly Detection.



## **UNIT - IV**

**Logic Based Testing:** Overview, Decision Tables, and Path Expressions and specifications.

**State, State Graphs and Transition Testing:** State Graphs, Good & Bad State Graphs, State Testing, Testability Tips.

## **UNIT - V**

**Graph Matrices and Application:** Matrix of Graph, Power of a Matrix, Node Reduction Algorithm.

### **Text Books:**

1. Software Testing techniques, Boris Beizer, Dreamtech, Second Edition.
2. Software Testing, N.Chauhan, Oxford University Press.
3. The craft of software testing - Brian Marick, Pearson Education.
4. Foundations of Software Testing, D.Graham and Others, Cengage Learning.

### **Reference Books:**

1. Software Testing, Third Edition, P.C.Jorgensen, Aurbach Publications (Dist.by SPD).
2. Introduction to Software Testing, P.Ammann and J.Offutt, Cambridge Univ. Press.
3. Effective methods of Software Testing, Perry, John Wiley, Second Edition, 1999.
4. Software Testing Concepts and Tools, P.Nageswara Rao, Dreamtech Press.
5. Software Testing, M.G.Limaye, TMH.
6. Software Testing Tools, Dr.K.V.K.K.Prasad, Dreamtech.

Course Title	ADHOC & SENSOR NETWORKS (Professional Elective Course-II)				B.Tech VI Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005606	PEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Minutes</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Learn the different types of MAC protocols.</li> <li>• Be familiar with different types of ad hoc routing protocols.</li> <li>• Be expose to the TCP issues in ad hoc networks.</li> <li>• Learn the architecture and protocols of wireless sensor networks.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Understand the concepts, network architectures and applications of adhoc and wirelesssensor networks.							
<b>CO 2</b>	Analyze the protocol design issues of adhoc and sensor networks.							
<b>CO 3</b>	Design routing protocols for adhoc systems.							
<b>CO4</b>	Develop wireless sensor networks with respect to some protocol design issues.							
<b>CO 5</b>	Evaluate the QoS related performance measurements of ad hoc and sensor networks.							

### UNIT - I

**INTRODUCTION:** Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio propagation Mechanisms – Characteristics of the Wireless Channel -mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs) :concepts and architectures. Applications of Ad Hoc and Sensor networks. Design Challenges in Ad hoc and Sensor Networks.

### UNIT - II

#### **MAC PROTOCOLS FOR ADHOC WIRELESS NETWORKS:**

Issues in designing a MAC Protocol- Classification of MAC Protocols- Contention based protocols- Contention based protocols with Reservation Mechanisms- Contention based protocols with SchedulingMechanisms – Multi channel MAC-IEEE 802.11

### UNIT – III

#### **ROUTING PROTOCOLS AND TRANSPORT LAYER IN ADHOC WIRELESS NETWORKS 9:**

Issues in designing a routing and Transport Layer protocol for Ad hoc networks- proactive routing, reactive routing (on-demand), hybrid routing- Classification of Transport Layer solutions-TCPover Ad hoc wireless Networks.

## **UNIT – IV**

### **WIRELESS SENSOR NETWORKS(WSN) AND MAC PROTOCOLS 9**

Single node architecture: hardware and software components of a sensor node – WSN

Network architecture: typical network architectures-data relaying and aggregation strategies -MAC layer protocols: self-organizing, Hybrid TDMA/FDMA and CSMA based MAC- IEEE 802.15.4.

## **UNIT – V**

### **WSN ROUTING, LOCALIZATION & QOS 9:**

Issues in WSN routing – OLSR- Localization – Indoor and Sensor Network Localization-absolute and relative localization, triangulation-QOS in WSN-Energy Efficient Design-Synchronization- Transport Layer issues

### **Text Books:**

1. C. Siva Ram Murthy, and B. S. Manoj, “Ad Hoc Wireless Networks: Architectures and Protocols “, Prentice Hall Professional Technical Reference, 2008.
2. Jing (Selina) He, Mr. Mr. Shouling Ji, Yingshu Li, Yi Pan, “Wireless Ad Hoc and Sensor Networks”, CRC Press.
3. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.

### **Reference Books:**

1. Feng Zhao and Leonides Guibas, “Wireless Sensor Networks”, Elsevier Publication – 2002.
2. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”, “Wiley”, 2005

Course Title	IOT LAB				B. Tech. VI Sem CSE (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005607	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1.5	40	60	100
					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• Student should get the knowledge of Python and Eclipse background.</li> <li>• Student should get the knowledge of Control statements in python</li> <li>• Student should get the knowledge of Arduino.</li> <li>• Student should get the knowledge of Raspberry Pi</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Student will be aware of Python and Eclipse background.							
<b>CO 2</b>	Student will develop basic programs in python							
<b>CO 3</b>	Student will get knowledge on Arduino IDE and Arduino Board							
<b>CO 4</b>	Student will get knowledge on Raspberry Pi							

#### **IoT Experiments:-**

1. Study and Install IDE of Arduino and different types of Arduino.
2. Digital Output (Blinking of LED)
3. Digital Input (Push Button)
4. Analog Output (Fading)
5. Communication between Computer and Arduino.
6. Displaying messages on LCD
7. Traffic Controller
8. Night Light Simulation using LDR and PVR
9. Fire Alert.
10. Study and Configure Raspberry Pi
11. Write a Program for LED blink using Raspberry Pi
12. Write a Program for LED blink using Switch with Raspberry Pi

**Text Books:**

1. Adrian McEwen, Hakin Cassimally “Designing the Internet of Things” Wiley India.
2. Getting Started with Arduino, 3rd Edition, Massimo Banzi and Michael Shiloh
3. Getting Started with Raspberry Pie, Matt Richardson & Shawn Wallace, O’Reilly-2014.
4. Arshdeep Bahga, Vijay Madisetti “ Internet of Things( A hands on approach)” 1st Edition, VPI publications, 2014.

**Reference Books:**

1. Raj Kamal, “Internet of Things”, McGraw Hill, 1<sup>st</sup> Edition, 2016.
2. Internet of Things, Surya Durbha, Jyothi Joglekar, Oxford Higher Education.
3. The Internet of Things, Michael Miller, Pearson.
4. The Internet of Things, Samuel Greengard, The MIT Press Ltd.

Course Title	DATA MINING LAB				B. Tech. VI Sem CSE (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005608	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3				
					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>The different data <b>mining models</b> and techniques will be discussed in this course.</li> <li>Data mining and data warehousing applications in bioinformatics will also be explored.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
CO 1	Understand the data mining process and important issues around data cleaning, pre-processing and integration.							
CO 2	Understand the principle algorithms and techniques used in data mining, such as clustering, association mining, classification and prediction.							

### Credit Risk Assessment

**Description:** The business of banks is making loans. Assessing the credit worthiness of an applicant is of crucial importance. You have to develop a system to help a loan officer decide whether the credit of a customer is good, or bad. A bank's business rules regarding loans must consider two opposing factors. On the one hand, a bank wants to make as many loans as possible. Interest on these loans is the banks profit source. On the other hand, a bank cannot afford to make too many bad loans. Too many bad loans could lead to the collapse of the bank. The bank's loan policy must involve a compromise: not too strict, and not too lenient.

To do the assignment, you first and foremost need some knowledge about the world of credit. You can acquire such knowledge in a number of ways.

1. Knowledge Engineering. Find a loan officer who is willing to talk. Interview her and try to represent her knowledge in the form of production rules.
2. Books. Find some training manuals for loan officers or perhaps a suitable text book on finance. Translate this knowledge from text form to production rule form.
3. Common sense. Imagine yourself as a loan officer and make up reasonable rules which can be used to judge the credit worthiness of a loan applicant.
4. Case histories. Find records of actual cases where competent loan officers correctly judged when, and when not to, approve a loan application.

## **The German Credit Data:**

Actual historical credit data is not always easy to come by because of confidentiality rules. Here is one such dataset, consisting of 1000 actual cases collected in Germany. credit dataset (original) Excel spreadsheet version of the German credit data (Down load from web).

In spite of the fact that the data is German, you should probably make use of it for this assignment. (Unless you really can consult a real loan officer !)

A few notes on the German dataset

- DM stands for Deutsche Mark, the cents Canadian (but looks and acts like a quarter).
- Owns telephone. German phone rat so fewer people own telephones.
- foreignhere\_areworkermillionsofthese. Tin Germany (many from Turrkey). It is very hard to get German citizenship if you were not born of German parents.
- There are 20 attributes used in the classify the applicant into one of two categories, good or bad.

### **Subtasks : (Turn in your answers to the following tasks)**

1. List all the categorical (or nominal) attributes and the real-valued attributes separately.
2. What attributes do you think might be crucial in making the credit assessment? Come up with some simple rules in plain English using your selected attributes.
3. One type of model that you can create is a Decision Tree - train a Decision Tree using the complete dataset as the training data. Report the model obtained after training.
4. Suppose you use your above model trained on the complete dataset, and classify credit good/bad for each of the examples in the dataset. What % of examples can you classify correctly ? (This is also called testing on the training set) Why do you think you cannot get 100 % training accuracy ?
5. Is testing on the training set as you did above a good idea ? Why or Why not ?
6. One approach for solving the problem encountered in the previous question is using cross validation ? Describe what is cross-validation briefly. Train a Decision Tree again using cross-validation and report your results. Does your accuracy increase/decrease ? Why ? (10 marks)

### **Text Books:**

1. Data Mining: Concepts and Techniques, Jiawei Han , MichelineKamberand Jian Pei, Morgan Kaufmann Publishers, Elsevier, Third Edition,2012.
2. Data Warehousing in the Real world, Sam Aanhory& Dennis Murray , Pearson Education, Asia.
3. Intelligent Data Mining, Da Raun.Guoqing Chen, Etienne E. Kerre. Geert Wets, Springer.
4. Data Mining & Data Warehousing: Principles and Practical Techniques, Parteek Bhatia, Cambridge.

### **Reference Books:**

1. Data Mining Techniques, Arun K Pujari, Second Edition, Universities Press.
2. Insight into Data Mining, K.P.Soman, S.Diwakar , V.Ajay, PHI2008.
3. Data Mining: Introductory and Advanced Topics, Margaret H. Dunhan, Pearson.
4. Data Mining, Vikram Pudi, P. Radha Krishna, Oxford Higher Education.



Course Title	NETWORK SECURITY LAB				B. Tech. VI Sem CSE (R20)			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005609	PCC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	3	1.5	40	60	100
					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• To provide deeper understanding into cryptography, its application to network security, threats/vulnerabilities to networks and countermeasures.</li> <li>• To Identify basic security attacks and services.</li> <li>• To explain various approaches to Encryption techniques, Digital Signatures.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Identify the security issues in data transmission over computer network and resolve it.							
<b>CO 2</b>	Implementation of various types of Encryption techniques.							
<b>CO 3</b>	Implementation of Digital Signature schemes.							
<b>CO 4</b>	Understanding functionality of Intrusion Detection System.							

**List of Experiments:**

1. Perform encryption and Decryption using Substitution technique Caesar Cipher.
2. Perform encryption and Decryption using Substitution technique Playfair Cipher.
3. Perform encryption and Decryption using Substitution technique Hill Cipher.
4. Perform encryption and Decryption using Substitution technique Vigenere Cipher.
5. Perform encryption and Decryption using Transposition technique Railfence Cipher.
6. Perform encryption and Decryption using Transposition technique row-column transformation Cipher.
7. Perform encryption and Decryption using Block Cipher Data Encryption Standard.
8. Perform encryption and Decryption using Public Key Encryption technique RSA.
9. Implement the Key Exchange technique Diffie-Hellman Algorithm.
10. Implement Digital Signature technique MD5.
11. Demonstrate encryption and Decryption using Certificate Manager Kleopatra for GnuPG.
12. Demonstrate open source Intrusion Detection system.

**Text Books:**

1. Cryptography and network Security by Fourth edition, Stallings, PHI/Pearson
2. Cryptography & Network Security by Behrouz A. Forouzan, TMH.
3. Network Security: The complete reference by Robert Bragg, Mark Rhodes, TMH
4. Computer Security Basics by Rick Lehtinen, Deborah Russell & G.T.Gangemi Sr., SPD O'REILLY.

**Reference Books:**

1. Cryptography and network Security by Atul Kahate, 4<sup>th</sup> Edition, Tata McGraw Hill.
2. Understanding Cryptography, Christof Paar. Jan Pelzl, Springer.
3. Introduction to Modern Cryptography, Jonathan Katz, Yehuda Lindell, 2<sup>nd</sup> Edition, CRC Press.

Course Title	MOBILE APPLICATION DEVELOPMENT (Skill Advanced Courses)				B.Tech VI Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
2005610	SC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		0	0	4	2	40	60	100
					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>• To understand fundamentals of android operating systems.</li> <li>• Illustrate the various components, layouts and views in creating android applications.</li> <li>• To understand fundamentals of android programming.</li> <li>• To understand Kotlin programming.</li> <li>• Utilizing the android components by using Kotlin language.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Develop applications using services and publishing android applications.							
<b>CO 2</b>	To demonstrate their skills of using Android software development tools.							
<b>CO 3</b>	Implementing Android programming with java to develop basic applications.							
<b>CO4</b>	Installing Kotlin Software and utilizing.							
<b>CO5</b>	Developing applications with kotlin.							

### **LIST OF EXPERIMENTS:**

1. Setting up the Development Environment
  - 1.1 Installation of JDK and Setting path
  - 1.2 Downloading and Installing Android Studio
2. Creating "Hello World" Application and viewing the output through emulator.
3. Creating the Application by using Activity class
  - i) onCreate()
  - ii) onStart()
  - iii) onResume()
  - iv) onPause()
  - v) onStop()
  - vi) onDestroy()
  - vii) onRestart()
4. Create the Application using the Edit Text control.
5. Create the Application Choosing options.
  - i) CheckBox
  - ii) RadioButton
  - iii) Spinner

6. Create the applications using different layouts.
  - i) Linear Layout
  - ii) Relative Layout
  - iii) Absolute Layout
  - iv) Table Layout
7. Create the application for doing arithmetic operations. (Calculator)
8. Create the application to play the audio and video clips.
9. Create the application by using menus and action bar.
10. Sample Android applications using SQLite Database as a backend.
11. Installing Kotlin software.
12. Creating an android application in kotlin using EditText and Button controls.
13. Create an android app in Kotlin to find the health condition of the person.



**Text Books:**

1. Android Programming by B.M Harwani, Pearson Education, 2013.
2. T1. Lauren Darcey and Shane Conder, “Android Wireless ApplicationDevelopment”, Pearson Education, 2nd ed. (2011)
3. Android application Development for Java Programmers, James C Sheusi, CengageLearning
4. Android In Action by W.Frank Ableson, Robi Sen, Chris King, C. Enrique Ortiz.,Dreamtech.

**Reference Books:**

1. Beginning Android 4 Application Development, by Wei-Meng Lee , Wiley India.
2. Android Programming for Beginners, John Horton, 2nd Edition, Packt.
3. Android App Development for Dummies, Michael Burton, 3rd Edition, Wiley.

<b>Course Title</b>	<b>MANAGEMENT ORGANIZATIONAL BEHAVIOUR (Mandatory Course)</b>				<b>B.Tech VI Sem (R20) CSE</b>			
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>20MC612</b>	<b>MC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>Continuous Internal Assessment</b>	<b>End Exams</b>	<b>Total</b>
		2	0	0	0	40	--	40
					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>To aid students in understanding human behavior in organizations,</li> <li>To provide students with a comprehensive exposure to organizational behavior theories, research and workplace issues.</li> <li>The course also provides an overview of the theories and practices of management in organizational contexts.</li> </ul>								
<b>Course Outcomes: On successful completion of this course, the students will be able to</b>								
<b>CO 1</b>	Explain the Importance & Role of Management in the Organizations.							
<b>CO 2</b>	Evaluate the different aspects related to Decision Making and Controlling Process							
<b>CO 3</b>	Describe the different theories related to Individual behavior in the Organization							
<b>CO4</b>	Analyze Group Behavioral influence in the Organization.							
<b>CO5</b>	Evaluate the process and climate effects in Organization Behavior.							

### UNIT-I

#### **Role of Management:**

Concept – Significance – Functions – Principles of Management - Patterns of Management: Scientific – Behavioural – Systems – Contingency.

### UNIT-II

**Decision Making & Controlling** – Process – Techniques. Planning – Process – Problems — Making It Effective. Controlling - System of Controlling – Controlling Techniques – Making Controlling Effective.

### UNIT-III

**Individual Behaviour & Motivation** – Understanding Individual Behaviour – Perception – Learning – Personality Types – Johari window- Transactional Analysis- Motivation – Concept of Motivation - Motivational Theories of Maslow, Herzberg, David McClelland, and Porter and Lawler.

### UNIT-IV

**Group Behavior & Leadership:** Benefits of Groups – Types of Groups – Group Formation and Development. Leadership and Organizational Culture and Climate: Leadership – Traits Theory – Managerial Grid – Transactional Vs Transformational Leadership – Qualities of good leader- Women Leadership in India.

## **UNIT-V**

**Organisational Behaviour:** Organizing Process – Departmentation Types – Making Organizing Effective – Organisational culture- Types of culture – Organisational Culture Vs Organisational climate - Conflict management - Change Management .

### **Text Books:**

1. Organisational Behaviour, Stephen P. Robbins, Pearson Education
2. Management and Organisational Behaviour, Subbarao P, Himalaya Publishing House
3. Principles of Management, Koontz, Weihrich and Aryasri, Tata McGraw Hill.

### **Reference Books:**

1. Organisational Behaviour ,S.S.Khanka, S.Chand
2. Organisational Behaviour , Mishra .M.N ,Vikas
3. Management and Organisational behaviour, Pierce Gordner, Cengage.
4. Behaviour in Organizations, Hiriyappa .B.New Age Publications
5. Organisational Behaviour, Sarma, Jaico Publications.
6. Principles of Management ,Murugesan ,Laxmi Publications

## Open Elective Course –II (OEC-II)

S.No	Subject Code	Open Elective Course -II(OEC-II)	SC	L	T	P	IM	EM	CR
1	20OE503	Java Programming	OEC	3	0	0	40	60	3
2	20OE504	Web Designing	OEC	3	0	0	40	60	3

Course Title	JAVA PROGRAMMING (Open Elective Course-II)				B. Tech VI Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
20OE503	OEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
<b>Mid Exam Duration: 90 Mins</b>					<b>End Exam Duration: 3Hrs</b>			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>To give the students a firm foundation on Java concepts like Primitive data types, Java control flow, Methods, Object-oriented programming, Core Java classes, packages and interfaces, multithreading.</li> <li>To provide the students with an understanding of Java applets, Abstract Window, Toolkit and exception handling.</li> </ul>								
<b>Course Outcomes:</b> On successful completion of this course, the students will be able to								
<b>CO 1</b>	Solve problems using object oriented approach and implement them using Java.							
<b>CO 2</b>	Develop efficient programs with multitasking ability and handle exceptions.							
<b>CO 3</b>	Develop user friendly interface.							
<b>CO 4</b>	Create AWT components.							

### UNIT - I

**Object Oriented Programming basics:** Need for OOP paradigm, Principles of OOP concepts

**Java Basics:** History of Java, Java buzzwords, Simple java program, classes and objects – concepts of classes, objects, constructors, methods, Introducing access control, **this** keyword, overloading methods and constructors.

### UNIT - II

**Inheritance:** Hierarchical abstractions, Types of Inheritance, benefits of inheritance, **super** uses, using **final** with inheritance, polymorphism- method overriding, abstract classes.

**Packages and Interfaces:** Defining, Creating and Accessing a Package, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

### UNIT - III

**Exception handling:** Concepts of exception handling, exception hierarchy, usage of try, catch, throw, throws and finally, creating own exception sub classes.



## **UNIT - IV**

**Event Handling :** Events, Event sources, Event classes, Event Listeners, The AWT class hierarchy, user interface components- Labels, Button, Scrollbars, Text Components, Check box, Choices, Layout manager types – Flow, Border, Grid, Card and Grid bag.

## **UNIT - V**

**Applets:** Concepts of Applets, differences between applets and applications, life cycle of an Applet, creating applets, passing parameters to applets.

**Swings:** Icons and Labels, text fields, JButton class, Check boxes, Radio buttons, Combo boxes, and Tables.

### **Text Books:**

1. Java; the complete reference, 7th editon, Herbert schildt, TMH.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson Education.
3. An Introduction to programming and OO design using Java, J.Nino and F.A.Hosch, John wiley &sons.
4. An introduction to Java programming and object oriented application development, R.A. Johnson-Thomson.

### **Reference Books:**

1. Core Java 2, Vol 1, Fundamentals, Cay.S.Horstmann and Gary Cornell, eighth Edition, PearsonEducation.
2. Core Java 2, Vol 2, Advanced Features, Cay.S.Horstmann and Gary Cornell, eighth Edition, Pearson Education.
3. Object Oriented Programming through Java, P. Radha Krishna, University Press.
4. Java and Object-Oriented programming Paradigm, Debasish Jana, PHI Learning Pvt. Ltd.

Course Title	WEB DESIGNING (Open Elective Course-II)				B. Tech VI Sem (R20) CSE			
Course Code	Category	Hours/Week			Credits	Maximum Marks		
200E504	OEC	L	T	P	C	Continuous Internal Assessment	End Exams	Total
		3	0	0	3	40	60	100
Mid Exam Duration: 90 Mins					End Exam Duration: 3Hrs			
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>To learn the basic principles of Web page design.</li> <li>To learn the basic concepts of HTML.</li> <li>To introduce client side scripting with Java Script.</li> <li>To introduce the concepts of CSS and Web publishing.</li> </ul>								
<b>Course Outcomes:</b> On successful completion of this course, the students will be able to								
CO 1	Define the principle of Web page design and basics in web design.							
CO 2	Visualize the basic concept of HTML and recognize the elements of HTML.							
CO 3	Understand java Script and create static web pages.							
CO 4	Introduce basics concept of CSS.							
CO 5	Develop the concept of web publishing.							

### UNIT – I

**Web Design Principles:** Basic principles involved in developing a web site, Planning process, Five Golden rules of web designing, Designing navigation bar, Page design ,Home Page Layout, Design Concept

**Basics in Web Design:** Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

### UNIT – II

**Introduction to HTML:** What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

**Elements of HTML:** Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

### UNIT – III

**Java Script:** Introduction, Basics of Java Script, Control Structures, Pop up Boxes, Functions, Arrays Events, Objects, Dynamic HTML.

## **UNIT – IV**

**Introduction to Cascading Style Sheets:** Concept of CSS , Creating Style Sheet, CSS Properties, CSS Styling(Background, Text Format, Controlling Fonts) , Working with block elements and objects, Working with Lists and Tables, CSS Id and Class , Box Model(Introduction, Border properties, Padding Properties, Margin properties) , CSS Advanced(Grouping, Dimension, Display, Positioning, Floating, Align, Pseudo class, Navigation Bar, Image Sprites, Attribute sector), CSS Color , Creating page Layout and Site Designs.

## **UNIT – V**

**Introduction to Web Publishing or Hosting:** Creating the Web Site, Saving the site, working on the web site, Creating web site structure, Creating Titles for web pages, Themes-Publishing web sites.

### **Text Books:**

1. Creating a Web Page and Web Site College, 2002, Murray, Tom/Lynchburg.
2. HTML 5 in simple steps Dreamtech Press, Kogent Learning Solutions Inc.
3. A beginner's guide to HTML NCSA,14th May,2003.

### **Reference Books:**

1. HTML, XHTML, and CSS Bible, 5ed, HTML, XHTML, and CSS Bible, 5ed, Wiley India.
2. Beginning HTML, XHTML, CSS, and JavaScript by John Duckett, Wiley India.
3. Beginning CSS: Cascading Style Sheets for Web Design by Ian Pouncey, Richard York, Wiley India.