GURU GHASIDAS VISHWAVIDYALAYA
BILASPUR (C.G.)

(A Central University)

Koni, Bilaspur-495009, C.G (India)

OUTCOME BASED EDUCATION
WITH
CHOICE BASED CREDIT SYSTEM (CBCS)

MASTER OF TECHNOLOGY
IN
Computer Science and Engineering

COURSE STRUCTURE AND SYLLABUS

M.Tech Regular Two Year Degree Program

(Effective from the academic year 2021-22)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY,
GGV, BILASPUR, C.G. (INDIA)

Department of Computer Science & Engineering
School of Studies in Engineering & Technology
Guru Ghasidas Vishwavidyalaya, Bilaspur (C.G.)

Minutes of Meeting

Today, on 29 Oct 2021, the board of studies (BOS) meeting held through online platform google meet from 04:00 pm. The following members attended this online meeting.

1. Dr. Alok Kumar Singh Kushwaha, **Head and Chairman of BOS**
2. Mr. Amit Sharma, **External Member, BOS**
3. Dr. Sanjay Kumar, **External Member, BOS**
4. Dr. Manish Shrivastava, Assistant Prof., CSE — Invited Members
5. Mr. Nishant Behar, Assistant Prof., CSE — Invited Members
6. Mr. Devendra Kumar Singh, Assistant Prof., CSE — Invited Members
7. Mr. Vaibhav Kant Singh, Assistant Prof., CSE — Invited Members
8. Mrs. Raksha Pandey, Assistant Prof., CSE — Invited Members
9. Mr. Amit Baghel, Assistant Prof., CSE — Invited Members
10. Mr. Satish Kumar Negi, Assistant Prof., CSE — Invited Members
11. Mr. Pushpendra Kumar Chandra, Assistant Prof., CSE — Invited Members
12. Mr Manjit Jaiswal, Assistant Prof., CSE — Invited Members
13. Dr. Princy Matlani, Assistant Prof., CSE — Invited Members

In this online meeting the following point has been concluded

1. M.Tech. Ist and 2nd year Scheme and Syllabus Designed and will be effected from Session 2021-22.

The Meeting ended with a vote of thanks by the Head of the Department.

Mr. Amit Sharma
(External Member, BOS)
(Consent through e-mail)

Dr. Sanjay Kumar
(External Member, BOS)
(Consent through e-mail)

Dr. Alok Kumar Singh Kushwaha

Dr. Manish Shrivastava

Mr. Nishant Behar

Mr. Devender Kumar Singh

Mrs. Raksha Pandey

Mr. Amit Baghel

Mr. Vaibhav Kant Singh

Mr. Satish Kumar Negi

Mr. Pushpendra K. Chandra

Dr. Princy Matlani

Mr. Manjit Jaiswal

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES OF ENGINEERING & TECHNOLOGY, GGV,
BILASPUR, C.G. (INDIA)

SCHEME OF EXAMINATION

M.TECH. COMPUTER SCIENCE AND ENGINEERING

M.Tech. I-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1	CSPATT1	Advanced Data Structure	3	0	0	40	60	100	3
2	CSPATT2	Advanced Computer Network	3	0	0	40	60	100	3
3	ITPATC1	Research Methodology and IPR	2	0	0	-	50	50	2
4	CSPATP1 CSPATP2 CSPATP3	Professional Elective -I 1. Logics of Computer Science 2. Advance Computer Architecture 3. Multimedia System	3	0	0	40	60	100	3
5	CSPATP4 CSPATP5 CSPATP6	Professional Elective -II 1. Advanced Artificial Intelligence 2. Specialized Machine Learning Multimedia System 3. Soft Computing	3	0	0	40	60	100	3
6	CSPATP7 CSPATP8 CSPATP9	Professional Elective -III 1. Cluster and Grid Computing Specialized 2. High Performance Network 3. Ad Hoc and Wireless Sensor Network.	3	0	0	40	60	100	3
7.	CSPALT1	Advanced Data Structure Lab	0	0	3	30	20	50	2
Total			17	0	3	230	370	600	19

M.Tech. II-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1.	CSPBTT1	Advanced Algorithm	3	0	0	40	60	100	3
2.	CSPBTT2	Advanced Digital Image Processing	3	0	0	40	60	100	3
3.	CSPBTP1 CSPBTP2 CSPBTP3	Professional Elective-I 1. Data Science 2. Software Process and Project Management 3. GPU Computing	3	0	0	40	60	100	3
4.	CSPBTP4 CSPBTP5 CSPBTP6	Professional Elective-II 1. Data Base Engineering 2. Cryptography and Network Security 3. Multi-processor System	3	0	0	40	60	100	3
5.	MSPBTO1 IPPBTO2 IPPBTO3 CEPBTO4 MEPBTO5 CHPBTO6 ECPBTO7 MCPBTO8	Open Elective-1 1. Business Analytics 2. Industrial Safety 3. Operations Research 4. Cost Management of Engineering Projects 5. Composite Materials 6. Waste to Energy 7. IoT 8. MOOCs	3	0	0	40	60	100	3
6.	CSPALT1	Advanced Algorithm Lab	0	0	3	30	20	50	2
7.	CSPALT2	Advanced DIP Lab	0	0	3	30	20	50	2
8.	ELPBTX1 PEPBTX2 CEPBTX3 LAPBTX4	Audit Course/Value Added Course English for Research Paper Writing Stress Management by Yoga Disaster Management Constitution of India	2	0	0	40	60	100	2
Total			17	0	06	300	400	700	21

Note: Under MOOCs the students have to opt any subject other than Computer Science and Engineering from NPTEL/UGC SWAYAM

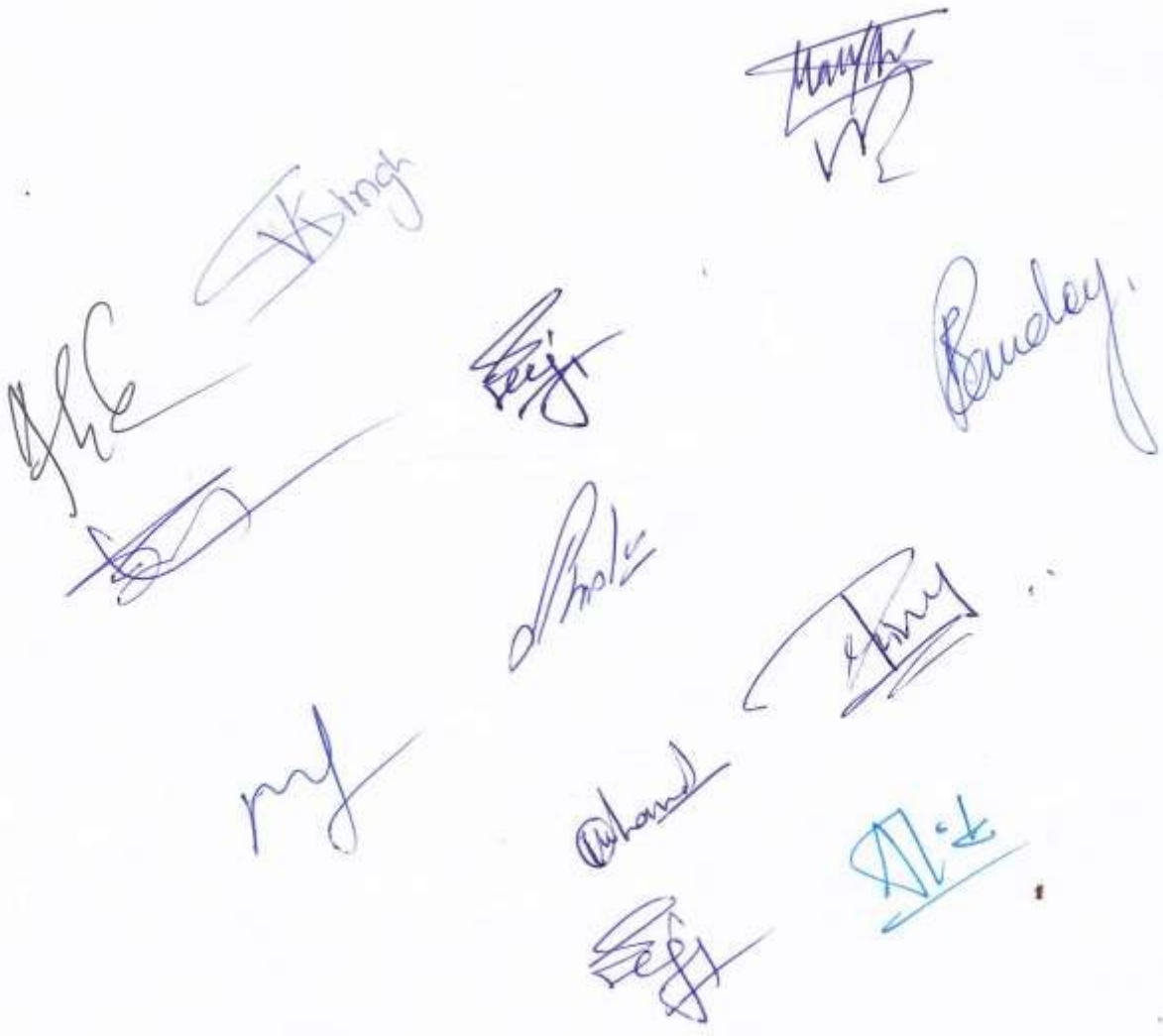
M.Tech. III-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1.	CSPCLT1	Dissertation Stage–I	0	0	28	100	100	200	14
Total			0	0	28	100	100	200	14

M.Tech. IV-Semester

Sl.	Course Type/ Code	Subjects	Periods/Week			Evaluation			Credits
			L	T	P	IA	ESE	Total	
1.	CSPDPT1	Dissertation Stage–II	0	0	32	100	200	300	16
Total			0	0	32	100	200	300	16

Total Credits for the Program = 19 + 21 +14 +16 = 70



SubTitle:ADVANCED DATA STRUCTURE		
SubCode:CSPATT1	**No.ofCredits: 3=3:0:0 (L-T-P)**	**Nooflecturehours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSEOBJECTIVE:

1. The fundamental design, analysis, and implementation of basic data structures.
2. Basic concepts in the specification and analysis of programs.
3. Principles for good program design, especially the uses of data abstraction.
4. Significance of algorithms in the computer field
5. Various aspects of algorithm development
6. Qualities of a good solution

UNIT No	SyllabusContent	Noof Hours
1	Algorithms, Performance analysis- time complexity and space complexity, Asymptotic Notation-Big Oh, Omega and Theta notations, Complexity Analysis Examples. Data structures-Linear and non-linear data structures, ADT concept, Linear List ADT, Array representation, Linked representation,Vector representation, singly linked lists - insertion, deletion, search operations, doubly linked lists-insertion, deletion operations, circular lists. Representation of single, two-dimensional arraysand their representation.	**10**
2	Stack and Queue ADTs, array and linked list representations, infix to postfix conversion using stack,implementation of recursion, Circular queue-insertion and deletion, Dequeue ADT, array and linked list representations, Priority queue ADT, implementation using Heaps, Insertion into a Max Heap, Deletion from a Max Heap, ArrayList, Linked List, Vector classes, Stacks and Queues.	**10**
3	Searching–Linear and binary search methods, Hashing-Hash functions, Collision Resolution Methods-Open Addressing, Chaining, Hashing, HashMap, HashSet, Hashtable. Sorting –Bubble sort, Insertion sort, Quick sort, Merge sort, Radix sort, comparison of sorting methods.	**08**
4	Search trees- Binary search tree-Binary search tree ADT, insertion, deletion and searching operations, Balanced search trees, AVL trees-Definition and examples only, Red Black trees – Definition and examples only, B-Trees-definition, insertion and searching operations, Trees, TreeSet, Tree Map Classes, Comparison of Search trees.	**10**
5	Trees- Ordinary and Binary trees terminology, Properties of Binary trees, Binary tree ADT, representations, recursive and non-recursive traversals, Threaded binary trees. Graphs- Graphs terminology, Graph ADT, representations, graph traversals/search methods-DFS and BFS, Application of Graph and algorithm. Heap Data structure: Fibonacci heap, Binomial heap, Binary heap.	**10**

COURSEOUTCOMES: Thestudentswouldhavelearnt

1. Basic ability to analyze algorithms and to determine algorithm correctness and time efficiency class.
2. Master a variety of advanced abstract data type (ADT) and data structures and their implementation's.
3. Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc
4. Ability to apply and implement learned algorithm design techniques and data structures to solve problems.

TextBooks:

1. S. Sahni, "Data structures, Algorithms and Applications in Java", Universities Press. [ISBN:0-07-109217-x]
2. Adam Drozdek, "Data structures and Algorithms in Java", 3rd edition, Cengage Learning. [ISBN:978-9814239233]

ReferenceBooks:

1. R.Lafore "Data structures and Algorithms in Java", Pearson education. ISBN: 9788 131718124.
2. J.P.Tremblay and G.A.Cheston "Data structures and Software Development in an ObjectOriented Domain", Java edition, Pearson Education.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	3	3	1	2	3	3	3	3	2	3	2
CO2	3	3	1	3	3	3	3	3	1	3	3	3	3	2	2
CO3	2	3	2	2	2	1	2	3	2	2	2	3	2	3	3
CO4	3	2	2	1	1	2	3	2	2	1	1	3	2	2	3
CO5	2	3	1	2	2	2	2	3	3	2	2	3	3	1	2

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: Advanced Data Structure Lab	
Sub Code: CSPALT1	**No. of Credits: 2=0:0:2(L-T-P)**
Exam Duration:3 hours	**IA+ESE =30+20**

COURSEOBJECTIVE:

1. The fundamental design, analysis, and implementation of basic data structures.
2. Basic concepts in the specification and analysis of programs.
3. Principles for good program design, especially the uses of data abstraction.
4. to understand the sorting techniques
5. to understand the non linear data structures
6. to learn bout the pattern matching

UNIT	Data structures:	Noof Hours
UNIT I,II, III, IV, V	1. Write Java programs that use both recursive and non-recursive functions for implementing the following searching methods: a) Linear search b) Binary search 2. Write Java programs to implement the following using arrays and linked lists a) List ADT. 3. Write Java programs to implement the following using an array. a) Stack ADT b) Queue ADT 4. Write a Java program that reads an infix expression and converts the expression to postfix form. (Use stack ADT). 5. Write a Java program to implement circular queue ADT using an array. 6. Write a Java program that uses both a stack and a queue to test whether the given string is a palindrome or not. 7. Write Java programs to implement the following using a singly linked list. a) Stack ADT b) Queue ADT 8. Write Java programs to implement the deque (double ended queue) ADT using a) Array b) Singly linked list c) Doubly linked list. 9. Write a Java program to implement priority queue ADT. 10. Write a Java program to perform the following operations: a) Construct a binary search tree of elements. b) Search for a key element in the above binary search tree. CSE 2014-2015 SR Engineering College 21 c) Delete an element from the above binary search tree. 11. Write a Java program to implement all the functions of a dictionary (ADT) using Hashing. 12. Write a Java program to implement Dijkstra's algorithm for Single source shortest path problem. 13. Write Java programs that use recursive and non-recursive functions to traverse the given binary tree in a) Preorder b) Inorder c) Postorder. 14. Write Java programs for the implementation of bfs and dfs for a given graph. 15. Write Java programs for implementing the following sorting methods: a) Bubble sort d) Merge sort g) Binary tree sort b) Insertion sort e) Heap sort c) Quick sort f) Radix sort 16. Write a Java program to perform the following operations: a) Insertion into a B-tree b) Searching in a B-tree 17. Write a Java program that implements Kruskal's algorithm to generate minimum cost spanning tree. 18. Write a Java program that implements KMP algorithm for pattern matching.	**24**

COURSEOUTCOMES: Thestudentswouldhavelearnt

1. Basic ability to analyze algorithms and to determine algorithm correctness and time Efficiency class.
2. Master a variety of advanced abstract data type (ADT) and data structures and their Implementations.
3. Master different algorithm design techniques (brute-force, divide and conquer, greedy, etc.)
4. Ability to apply and implement learned algorithm design techniques and data structures to solve problems

ReferenceBooks:

1. A. Drozdek "Data Structures and Algorithms in java", 3rd edition, Cengage Learning.
2. J. R. Hubbard, "Data Structures with Java", 2nd edition, Schaum's Outlines, TMH. (Note: Use packages like java.io, java.util, etc)

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	3	3	3	3	1	2	3	3	3	3	2	3	2
CO2	3	3	1	3	3	3	3	3	1	3	3	3	3	2	2
CO3	2	3	2	2	2	1	2	3	2	2	2	3	2	3	3
CO4	3	2	2	1	1	2	3	2	2	1	1	3	2	2	3
CO5	2	3	1	2	2	2	2	3	3	2	2	3	3	1	2

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

SubTitle:Advanced Computer Network		
SubCode:CSPATT2	**No.ofCredits: 3=3:0:0 (L-T-P)**	**Nooflecturehours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSEOBJECTIVE:

1. Demonstrate in-depth knowledge in the area of Computer Networking.
2. To demonstrate scholarship of knowledge through performing in a group to identify, formulate and solve a problem related to Computer Networks.
3. Prepare a technical document for the identified Networking System.
4. Analyze the identified research work in building Computer Networks.

UNIT No	SyllabusContent	NoofHours
1	**Introduction to the Link Layer:** Services of Link Layer, Error-Detection and-Correction Techniques: Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC), Multiple Access Links and Protocols: Channel Partitioning Protocols, Random Access Protocols, Taking-Turns Protocols DOCSIS, Switched Local Area Networks, Multiprotocol Label Switching (MPLS)	10
2	**Data Forwarding and Routing:** Introduction, Forwarding and Routing, Network Service Models, Virtual Circuit and Datagram Networks, Virtual-Circuit Networks, Datagram Networks, Origins of VC and Datagram Networks, Router: Input Processing, Switching , Output Processing, The Internet Protocol (IP): Forwarding and Addressing in the Internet, Datagram Format, IPv4, Addressing, Internet Control Message Protocol (ICMP), IPv6: IP Security, Routing Algorithms: The Link-State (LS) Routing Algorithm, The Distance-Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet: Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter-AS Routing: BGP, Broadcast and Multicast Routing: Broadcast Routing Algorithms, Multicast	10

3	**Transport Layer:** Introduction and Transport-Layer Services, Relationship Between Transport and Network Layers, Overview of the Transport Layer in the Internet, Multiplexing and Demultiplexing, Connectionless Transport: UDP, UDP Segment Structure, UDP Checksum, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N (GBN), Selective Repeat (SR), Connection-Oriented Transport: TCP, The TCP Connection, TCP Segment Structure, Round Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control	**12**
4	**Wireless and Mobile Networks:** Introduction, Wireless Links and Network Characteristics: CDMA, Wireless LANs: The 802.11 Architecture, The 802.11 MAC Protocol, The IEEE 802.11 Frame, Mobility in the Same IP Subnet, Advanced Features in 802.11, Personal Area Networks: Bluetooth and Zigbee, Cellular Internet Access,: An Overview of Cellular Network Architecture, 3G Cellular Data Networks: Extending the Internet to Cellular subscribers, On to 4G: LTE, Mobility Management: Principles: Addressing, Routing to a Mobile Node, Mobile IP, Managing Mobility in Cellular Networks: Routing Calls to a Mobile User, Handoffs in GSM, Wireless and Mobility: Impact on Higher-Layer Protocols.	**10**
5	**Network Management:** Overview of Network Management, The Infrastructure for Network Management, The Internet-Standard Management Framework, Structure of Management Information: SMI, Management Information Base: MIB, SNMP Protocol Operations and Transport Mappings, Security and Administration.	**10**

COURSEOUTCOMES: Thestudentswouldhavelearnt

CO1: Understand the general principles of Computer Network.
CO2: Differentiate between different LAN-based forwarding devices so that they can make thoughtful suggestions on how to build a network.
CO3: Evaluate the challenges in building networks and solutions.
CO4: Design and implement networking applications.

Text Books:

1. Ross, Computer Networking A Top down Approach, James F. Kurose, Keith W, Pearson.
2. TCP/IP Protocol Suite , Behrouz A Forouzan, Tata Mc Graw-Hill .
3. Data communications and Networking, Behrouz A Forouzan, Tata Mc Graw-Hill 5th edition.

Reference Books:

1. Larry Peterson and Bruce S Davis “Computer Networks :A System Approach” , Elsevier
2. Douglas E Comer, “Internetworking with TCP/IP, Principles, Protocols and Architecture”, PHI.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	2	1									3	2	1
CO2	2	1	3	3									1	2	3
CO3	3	2	3	2									2	3	2
CO4	2	3	2	2									2	2	3

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Subject: CSPATC1	Research Methodology and IPR (IPPATC1)	Credits			
		L	T	P	Total
Teaching Scheme:	Lectures: 2 hours/week	2	0	0	2

Course outcomes:	At the end of the course, students will be able to
1	Understand research problem formulation.
2	Analyze research related information
3	Follow research ethics
4	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property
5	Right to be promoted among students in general & engineering in particular.
6	Understand research problem formulation.

Syllabus Contents:

- **Introduction and Design of research**: Meaning, objectives and significance of research, types and parameters of research, research process, identification and definition of the research problem, definition of construct and variables, pure and applied research design, exploratory and descriptive design methodology, qualitative vs. quantitative research methodology, field studies, field experiments vs. laboratory experiments, research design in social and physical sciences.

- **Data and Methods of Data Collection**: Survey, assessment and analysis: data collection, primary and secondary sources of data, Collection of primary data through questionnaire and schedules. Collection of secondary data, processing and analysis of data. Sample survey, simple random sampling, stratified random sampling, systematic sampling, cluster sampling, area sampling and multistage sampling. Pilot survey, scaling techniques, validity & reliability.

- **Data Analysis:** Procedure for testing of hypothesis, the null hypothesis, determining levels of significance, type i and ii errors, grouped data distribution, measures of central tendency, measures of spread/dispersion, normal distribution, analysis of variance: one way, two way, chi square test and its application, students 'T' distribution, non-parametric statistical techniques, binomial test. Correlation and regression analysis – discriminate analysis – factor analysis – cluster analysis, measures of relationship

- Research report preparation and presentation: Review of literature: historical survey and its necessity, layout of research plan, meaning, techniques and precautions of interpretation, types of report: technical report, popular report, report writing – layout of research report, mechanics of writing a research report. Writing bibliography and references.

- Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and

Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

References:

- Research in education, By J W Best and J V Kahn, Pearson/ Allyn and Bacon.
- Research Methodology – Methods and Techniques, C K Kothari, New Age International.
- Design and Analysis of Experiments, D C Montgomery, Wiley.
- Applied Statistics & Probability for Engineers, D C Montgomery & G C Runger, Wiley.
- Management Research Methodology: Integration of Principles, Methods and Techniques, K N Krishnaswamy, A I Sivakumar and M Mathiranjan, Pearson Education.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1								1	3	2	1
CO2	2	2	3	2								1	1	3	3
CO3	1	2	3	2								1	1	3	2
CO4	2	3	3	2								1	2	2	3
CO5	2	2	3	2								1	2	3	2

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Subject Title : MultiMedia System		
SubCode:CSPATP2	**No.ofCredits: 3=3:0:0 (L-T-P)**	**Nooflecturehours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSE OBJECTIVE

1. Explain standard Multimedia system architecture
2. Compare the various types of compression available both for image and video.
3. To analyze different media and design issues related to multimedia systems.

UNIT	TOPIC	CONTACT HOURS
1	**UNIT-I BASICS OF MULTIMEDIA TECHNOLOGY :-**Multimedia -An introduction: Multimedia application, Multimedia system architecture, Evolving technologies for multimedia system, Defining objects for multimedia systems, Multimedia data interface standards. multimedia devices CD Audio. CD-ROM. CD-presentation devices	**8**
2	**UNIT-2 IMAGE COMPRESSION & STANDARDS :-** Making still images: Capturing images; scanning images; computer color models: color palettes; Losyy and lossless compression, JPEG-objectives and architecture: JPEG-DCT encoding and quantization, JPEG statistical coding; JPEG predictive loss less coding; JPEG performance; Overview of video coding standardsMPEG-1, MPEG-2, MPEG-4, MPEG-7.	**8**
3	**UNIT-3- MULTIMEDIA WEB APPLICATION AND PROTOCOL** :- Multimedia over IP: RTP, RTCP. Streaming media, Codec and Plugins, VoIP, Text and Voice Chat. Multimedia Communication across networks - packet audio / video, Streaming video across internet.	**10**
4	**UNIT IV- ARCHITECTURAL AND TELECOMMUNICATION CONSIDERATIONS** :- Specialized computational processors, memory systems, Multimedia board solutions, LAN/WAN Connectivity, Multimedia transport across ATM networks, Wireless Networks.	**8**
5	**UNIT V -MULTIMEDIA APPLICATION DESIGN (NITT)** :- Multimedia Application Classes – Types of Multimedia Systems – Virtual Reality – Components of Multimedia Systems -Multimedia Authoring Systems – Multimedia Authoring Tools - User Interface Design- Mobile Messaging – Hypermedia Message Components - Hypermedia Linking and embedding.	**8**

Outcome

1. Technical know to develop new compression standards
2. Acquire skill set to handle all multimedia components efficiently
3. Develop Integrated and Collaborative multimedia systems

Text Books

1. Prabat K Andleigh and Kiran Thakrar, "Multimedia Systems and Design", Prentice Hall India, 2007,New Delhi.
2. Ralf Steinmetz, Klara Steinmetz, "Multimedia Computing, Communications & Applications", Pearson education, 2009.

References

1. A.K. Jain, Fundamentals of Digital Image Processing ,PHI, New Delhi, 2001.
2. William K Pratt, Digital Image Processing, John Willey , 2012.
3. Rafael C Gonzalez, Richard E Woods 2nd Edition, Digital Image Processing - Pearson Education, 2011.
4. Tay Vaughan, "Multimedia Making It Work", McGraw Hill, 2011.
5. Parekh R "Principles of Multimedia" Tata McGraw-Hill, 2006.

Course Outcomes and their mapping with Programme Outcomes:

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

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

SubTitle:ADVANCED ARTIFICIAL INTELLIGENCE		
SubCode:CSPATP4	**No.ofCredits:3=3:0:0(L-T-P)**	**Nooflecturehours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSE OBJECTIVE

1. To Discuss the Problem and Search Techniques in AI
2. To Discuss Knowledge Representation Schemes
3. To Discuss Learning and Fuzzy Logic Systems
4. To Discuss Connectionist Models and Expert System
5. To Discuss PROLOG and LISP Programming Languages

UNIT No	SyllabusContent	No of Hours
1	**PROBLEMS AND SEARCH** The importance of AI, Early Work in AI, The AI Problems, Defining the Problem as a State Space Search, Production Systems, Control Strategies, Heuristic Search Techniques (Hill Climbing, Best First Search).	8
2	**KNOWLEDGE REPRESENTATION** Approaches to Knowledge Representation, Representing Simple Facts in Logic, Resolution (Conversion to Clause Form, The Unification Algorithm, Resolution Algorithm), Procedural versus Declarative Knowledge, Weak Slot and Filler Structure (Semantic Nets, Frames), Strong Slot and Filler Structures (Scripts).	8
3	**LEARNING AND FUZZY LOGIC SYSTEMS:** What is Learning, Rote Learning, Learning by Taking Advice, Explanation- Based Learning, Formal Learning Theory, Crisp Sets, Fuzzy Sets, Some FuzzyTerminology.	8
4	**CONNECTIONIST MODELS AND EXPERT SYSTEMS:** Introduction to Hopfield Networks, Learning in Neural Networks, Backpropagation Networks, Applications of Neural Networks, Recurrent Networks, Expert System Architecture, MYCIN, DENDRAL.	8
5	**PROLOG AND LISP** Introduction to PROLOG, Converting English to PROLOG Facts and Rules, Goals, PROLOG Terminology, Variables, Control Structures, Arithmetic Operators, Backtracking, Introduction to LISP, Basic List Manipulation Functions in LISP, Defining Functions, Predicates and Conditionals, Input, Output and Local Variables, Iteration and Recursion, Property Lists and Arrays	8

COURSE OUTCOMES: The Students would have Learnt

CO1: Understanding the basics of Problem Solving in AI
CO2: Understanding the Knowledge Representation Scheme
CO3: Understanding Fuzzy Logic
CO4: Understanding Expert System
CO5: Understanding the Languages PROLOG and LISP

TextBooks:

Artificial Intelligence,E. Rich, K. Knight and S.B. Nair,McGraw Hill Education,3edition.

ReferenceBooks:

Introduction to ARTIFICIAL INTELLIGENCE AND EXPERT SYSTEMS,D.W. Patterson,PHI.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	2	1	1	1	1	1	1	3	3	2	1
CO2	3	2	2	2	3	1	1	1	1	1	1	2	3	2	1
CO3	2	3	2	3	2	1	1	1	1	1	1	2	3	2	1
CO4	3	2	2	2	3	1	1	1	1	1	1	1	3	2	1
CO5	2	3	2	3	2	1	1	1	1	1	1	2	3	2	1

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

SubTitle:Cluster and Grid Computing Specialized		
SubCode:CSPATP7	**No.ofCredits: 3=3:0:0 (L-T-P)**	**Nooflecturehours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSEOBJECTIVE:

1. To know the Basics for Cluster and Grid Computing
2. To understand any kind of heterogeneous resources over a network using open standards
3. To learn the Scheduling of Grid Computing.
4. To know about the Applications of Grid
5. To know about the grid architecture

UNIT No	SyllabusContent	Noof Hours
1	**Cluster Computing** Basic concept of distributed and parallel computing, shared memory, Scheduling Concept, Cluster Computing-Introduction, Architecture of Cluster Computing, Functionality of Cluster, Categories of Clusters.	10
2	**Grid Computing** Grid Computing: History of grid computing, Basic concept, benefits of grid computing,Clustering and Grid Computing: Conventional Service Model, Central Grid Approach and Distributed Grid Computing Environment. cluster Vs Grid. Grid Architecture, Grid Applications, Grid Components. .	10
3	**Scheduling** High performance Grid, HPC Grids; Grid scheduler and a local resource scheduler, Load Balancing, Grid Scheduling: Job Scheduling, Resource Scheduling, Various factors of Scheduling, Scheduling Procedure. Challenges in Grid Scheduling.	08
4	**Implementation: Grid Simulation tool kit** Grid Sim Tool kit —Overview, OGSA based Grids, Installation of Pre-requisites and Necessary Component, Installation of GridSim Toolkit, Salient Feature of GridSim.	10

5	Application integration- Application classification – SPSD , SPMD, MIMD, MPSD, Granularity, Grid requirements- Job Scheduling, Data Management, Security,Managing Grids– Different application areas of Grid computing.	10

COURSEOUTCOMES: Thestudentswouldhavelearnt

1. Be able to know about Grid Computing Basics
2. Be able to utilise grid computing, its application
3. able to Simulate Grid with Simulation Kit
4. Able to know the Structure of Grid Computing.

Text Books

1. Ahmar Abbas, "Grid Computing, A Practical Guide to Technology and Applications", Firewall Media.
2. Joshy Joseph and Craig Fellenstein, "Grid Computing", Pearson Education.
3. Fran Berman, Geoffrey Fox and Anthony J. G. Hey, "Grid Computing: Making the Global Infrastructure a Reality", Willy Publisher.

Reference Books

1. Grid and Cluster Computing by C.S.R. Prabhu, PHI.
2. Ian Foster and Carl Kesselman, "Grid Blue Print for New Computing Infrastructure", Morgan Kaufmann.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	3	3	2							1	3	2	1
CO2	3	2	2	2	3							1	3	2	1
CO3	2	3	2	3	2							1	3	2	1
CO4	3	2	2	2	3							1	3	2	1
CO5	2	3	2	3	2							1	3	2	1

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Sub Title: Advanced Algorithm		
Sub Code: CSPBTT1	**No. of Credits:4=3:0:0(L-T-P)**	**No of lecture hours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSE OBJECTIVE:

1. To making strategy for an adequate algorithm
2. To introduce some optimization technique
3. To introduce technique for making a hard approximation algorithm
4. To introduce some advance analysis for algorithm.
5. To expose students to how develop the different kind of algorithm for newly problem.

UNIT No	Syllabus Content	No of Hours
1	Greedy strategy and algorithm, Dynamic introduction and programming, Recursive algorithm	**10**
2	Amortized analysis: Aggregate analysis, Potential method, Accounting method, Dynamic tables, Disjoint set, Backtracking technique.	**10**
3	Graph algorithm: Elementary graph algorithms, Maximum Flow, Single source and all pair shortest paths,	**12**
4	String matching, Matrix operations, Optimized strategy and algorithm, some parallel sorting algorithm(specify one or two)	**10**
5	Complexity classes: P, NP, NP-completeness, NP-hardness, Approximation algorithms, Randomization and linear programming.	**10**

COURSE OUTCOMES:

CO1. Ability to find out adequate algorithm for a problem.
CO2. Able to spontaneous analysis of algorithm
CO3. Basic ability to design a technique and data structure to solve a problem
CO4. Learn different graph based algorithm
CO5. Ability to find the approximation solution for a hard problem.

Text Books:

1. Cormen T, Leiserson C, Rivest R, and Stein C: Introduction to Algorithms, MIT Press, 2009
2. Introduction to parallel algorithm C. Xavier,S.S. Iyengar,New York Willey c1998.
3. Data Structures, Algorithms and Applications in C++ by Sartaj Sahni. University Press.
4. Motwani and Raghavan: Randomized Algorithms. Cambridge University Press, 2004

Reference Books:

1.J. Kleinberg and E. Tardos, Algorithm Design, Pearson International Edition, 2005.
2. An Introduction to Optimization, Edwin KP. Chong& Stanislaw H. Zak, Wiley Publication.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	3								2	1	1
CO2	2	2	3	2	2								3	2	2
CO3	3	2	2	1	2								1	3	2
CO4	3	2	1	2	2								3	2	1
CO5	1	3	2	1	3								3	2	3

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

Sub Title: Advanced Algorithm Lab	
Sub Code: CSPALT1	**No. of Credits: 2=0:0:2(L-T-P)**
Exam Duration:3 hours	**IA+ESE =30+20**

Lab OBJECTIVE:

1. To basic implementation of graph algorithm
   To analyze the code optimization strategy.
3. To expose students how to implement parallel algorithm.
4. To analyze the linear programming and maximum flow implementation.
5. Making good strategy towards the algorithm to be become the good researcher.

Unit No.	Content	Teaching Hours
I,II, III, IV and V	• Implement a graph algorithm. • Implement a string matching algorithm • Implement a greedy algorithm • Implement dynamic algorithm • Implement a matrix operation algorithm • Implement maximum flow algorithm • Implement some approximation algorithm • Implement shortest path algorithm • Implement for sparse graph algorithm • Implement some linear programming algorithm • Implement some optimized algorithm • Implement some parallel sorting algorithm	24

LAB OUTCOMES:

CO1: Bring the capabilities to students to be become the good researcher
CO2: To teach hot to make and formulate optimization problem.
CO3: Students spontaneous able to implement the some graph and approximation algorithm.
CO4: Students will able to implement the dynamic type problem.
CO5: To able to develop the mathematical formula and model.

Text Books:

1. Introduction to Algorithm, Thomas H. Cormen, Charles E. Leiserson, Ronald Rivest, Clifford Stein, Publisher PHI, ISBN 81-203-2141-3
2. Python Algorithms Mastering Basic Algorithms in the Python Language by Magnus Lie Hetland.
3. Introduction to parallel algorithm C. Xavier,S.S. Iyengar, New York Willey c1998

Reference Books:

1. Introduction to Parallel Computing: From Algorithms to Programming on State-of-the-Art Platforms, Roman Trobec, BoštjanSlivnik, Patricio Bulic, Borut Robi ´c ,Spinger,2018

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	2	1	1	3								2	1	1
CO2	2	2	3	2	2								3	2	2
CO3	3	2	2	1	2								1	3	2
CO4	3	2	1	2	2								3	2	1
CO5	1	3	2	1	3								3	2	3

Weightage: 1-Sightly; 2-Moderately; 3-Strongly

SubTitle: ADVANCED DIGITAL IMAGE PROCESSING		
Sub Code: CSPBTT1	**No.ofCredits:3=3:0:0(L-T-P)**	**No of lecture hours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSEOBJECTIVE:

1. Explain the essentials of digital image processing.
2. Describe various segmentation techniques for image analysis.
3. Outline the various feature extraction techniques for image analysis.
4. Discuss the concepts of image registration and fusion.
5. Outline various object recognition techniques.

UNIT No	Syllabus Content	No of Hours
1	**REVIEW OF DIGITAL IMAGE FUNDAMENTALS** Steps in digital image processing, Digital Imaging system. Digital Image Transform – DFT, DCT etc. Image enhancement in spatial and frequency domain, Histogram equalization. .	10
2	**SEGMENTATION** Edge detection, Thresholding-Global thresholding, Adaptive thresholding etc. Region growing- Region growing, Split and merge algorithm etc. Active contour models, Validation of Segmented Algorithms, Colour Image Segmentation, Fuzzy segmentation.	10
3	**IMAGE FEATURE REPRESENTATION** Boundary Representation, Boundary Description- Simple descriptor, Fourier descriptor, Concavity Tree etc. Regional Descriptor – Shape Feature, Topological, Texture , Transform, Syntactic and structural feature. Feature Selection Technique.	10
4	**IMAGE REGISTRATION AND FUSION** Feature matching, Spatial alignment, Resampling- NearestNeighbour and Cubic Splines, Pixel level fusion , Feature level fusion operation , Decisive level fusion operators.	10
5	**OBJECT RECOGNITION** Pattern and Pattern Classes, Template Matching, Classification, Bayesian Classifier, K-NN Classifier, Regression Methods, Clustering Techniques.	10

COURSE OUTCOMES: The students would have learnt
CO1: Fundamentals of Image Processing.
CO2: Various Segmentation technique for Image Analysis.
CO3:Various feature extraction techniques for image analysis.
CO4: Concepts of image registration and fusion.
CO5: Various object recognition techniques.

TextBooks:

2. **Digital Image Processing-** RCGonzalez&REWoods,Pearson Education ,Third edition.
3. **Digital Image Processing** – S.Sridhar, Oxford University Press, 2nd Edition.

Reference Books:

5. **Digital Image Processing-**S.Jayaraman, S.Esakkirajan, T.Veerakumar, Tata Mcgraw Hill.
6. **Fundamentals of Digital Image processing**, AKJain, PHI/PearsonEducation,1989.
7. **Digital Image Processing**, SidAhmed, McGrawHill.

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	1	1							3	3	1	1
CO2	3	3	3	2	1							3	3	3	3
CO3	3	3	3	2	1							3	2	1	1
CO4	3	3	3	2	1							3	2	1	1
CO5	3	2	1	1	1							3	3	1	1

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

SubTitle:SOFTWARE PROCESS AND PROJECT MANAGEMENT		
SubCode: CSPBTP2	**No.ofCredits: 3=3:0:0 (L-T-P)**	**Nooflecturehours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSEOBJECTIVE:

1. Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
2. Compare and differentiate organization structures and project structures.
3. Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools.
4. To understand the future software project management practices
5. To learn the different process models
6. To understand workflows, check points of process

UNIT No	SyllabusContent	Noof Hours
1	Software Process Maturity: Software maturity Framework, Principles of Software Process Change, Software Process Assessment, The Initial Process, The Repeatable Process, The Defined Process, The Managed Process, The ptimizing Process. Process Reference Models: Capability Maturity Model (CMM), CMMI, PCMM, PSP, TSP.	**10**
2	Software Project Management Renaissance: Conventional Software Management, Evolution of Software Economics, Improving Software Economics, The old way and the new way. Life-Cycle Phases and Process artifacts: Engineering and Production stages, inception phase, elaboration phase, construction phase, transition phase, artifact sets, management artifacts, engineering artifacts and pragmatic artifacts, model based software architectures.	**10**
3	Workflows and Checkpoints of process: Software process workflows, Iteration workflows, Major milestones, Minor milestones, Periodic status assessments. Process Planning: Work breakdown structures, Planning guidelines, cost and schedule estimating process, iteration planning process, Pragmatic planning.	**08**
4	Project Organizations: Line-of- business organizations, project organizations, evolution of organizations, process automation. Project Control and process instrumentation: The seven-core metrics, management indicators, quality indicators, life-cycle expectations. Pragmatic Software metrics and metrics automation.	**10**

5	CCPDS-R Case Study and Future Software Project Management Practices Modern Project Profiles, Next-Generation software Economics, Modern Process Transitions.	10

COURSEOUTCOMES:The student will be able to

1. Appreciate the importance of software process and management;
2. Apply project management techniques for information systems development;
3. Apply the management skills to monitor and control a software project;
4. Work together as a team in preparing a report
animation, e-research;
4. Describe the hardware and software concepts and architecture of cloud computing.

TEXT BOOKS:

1. Watts S.Humphrey,"Managing the Software Process" , Pearson Education.[ISBN-13:978- 0201180954]
2. Walker Royce"Software Project Management", Pearson Education. [ISBN: 9788177583786]

REFERENCE BOOKS:

1. Agile, Extreme, Robert Wysocki, "Effective Project Management: Traditional", Sixth edition, Wiley India, rp2011.[ISBN:978-1-118-01619-0]
2. Bob Hughes & Mike Cotterell ,"Software Project Management", fourth edition, TMH, 2006

Course Outcomes and their mapping with Programme Outcomes:

CO	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1								1	3	2	1
CO2	2	2	3	2								1	1	3	3
CO3	1	2	3	2								1	1	3	2
CO4	2	3	3	2								1	2	2	3
CO5	2	2	3	2								1	2	3	2

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

SubTitle: Cryptography and Network Security		
Sub Code: CSPBTP5	**No.ofCredits:3=3:0:0(L-T-P)**	**No of lecture hours/week:03**
ExamDuration:3hours	**IA+ESE =40+60**	**Totalnoofcontacthours:21**

COURSEOBJECTIVE:

The course is designed to train the post graduates in:

1. In depth understanding of network security.
2. In depth understanding of the Cryptographic Techniques.
3. To apply cryptographic techniques in computer systems.
4. To design new or modify existing cryptographic techniques.
5. To work in research institutions / Industry in the field of Security

UNIT No	Syllabus Content	Noof Hours
1	(Introduction to Cryptography and Block Ciphers) Introduction to security attacks - services and mechanism - introduction to cryptography - Conventional Encryption: Conventional encryption model - classical encryption techniques - substitution ciphers and transposition ciphers – cryptanalysis – steganography - stream and blockciphers - Modern Block Ciphers: Block ciphers principals - Shannon's theory of confusion and diffusion - fiestal structure - data encryption standard(DES) - strength of DES - differential and linearcrypt analysis of DES - block cipher modes of operations - triple DES – AES.	**10**
2	(Public key cryptography and Authentication requirements) Principles of public key crypto systems - RSA algorithm - security of RSA - key management – Diffle-Hellman key exchange algorithm, Message Authentication and Hash Function: Authentication requirements - authentication functions - message authentication code - hash functions - birthday attacks – security of hash functions and MACS.	**10**
3	(Integrity checks and Authentication algorithms) MD5 message digest algorithm - Secure hash algorithm (SHA) Digital Signatures: Digital Signatures - authentication protocols - digital signature standards (DSS) - proof of digital signature algorithm - Authentication Applications: Kerberos and X.509 - directory authentication service - electronic mail security-pretty good privacy (PGP) - S/MIME.	**10**
4	(IP Security and Key Management) IP Security: Architecture - Authentication header - Encapsulating security payloads - combining security associations - key management.	**10**
5	(Web and System Security) Web Security: Secure socket layer and transport layer security - secure electronic transaction (SET) - System Security: Intruders - Viruses and related threads - firewall design principals – trusted systems.	**10**

COURSE OUTCOMES: Post Graduates after completing the course shall gain:

1. Ability to understand concepts of network security and cryptographic techniques.
2. Ability to design and analyze cryptographic techniques.
3. Ability to solve network security issues in real time applications.
4. Ability to take up doctoral level research work in security.

Text Books

1. William Stallings, "Crpyptography and Network security Principles and Practices", Pearson/PHI.

2. Wade Trappe, Lawrence C Washington, " Introduction to Cryptography with coding theory", Pearson.

Reference Books

1. W. Mao, "Modern Cryptography – Theory and Practice", Pearson Education.

2. Charles P. Pfleeger, Shari Lawrence Pfleeger – Security in computing – Prentice Hall of India.

Course Outcomes and their mapping with Programme Outcomes:

	PO												PSO		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO2	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO3	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO4	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO5	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3
CO6	3	3	3	3	1	3	3	3	3	1	3	1	3	3	3

Weightege: 1-Slightly;, 2-Moderately: 3-Strongly;

Semester: - III

S.No	Course Code	SUBJECT	Internal Assessment	Credits
1.	**CSPCLT1**	Seminar on Dissertation	100	4
2.	**CSPCLT2**	Dissertation- Interim Evaluation	100	10
		Total	**200**	**14**

Total Credits = 14 Total Marks=200

Semester: - IV

S.No.	Course Code	SUBJECT	Internal Assessment	ESE (External)	Credits
1.	**CSPDLT1**	Dissertation- Open Defence	100	**----**	6
2.	**CSPDLT2**	Dissertation- Evaluation*	100	100	10
		Total	**200**	**100**	**16**

Total Credits = 16 Total Marks=200