B.Tech. COMPUTER SCIENCE & ENGINEERING (CS)

III/IV B. Tech SEMESTER-I

S.No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
	Code	Subject Name		Hours in a Week			Marks		Credits
				L	T	P	Internal	External	
1	CS/CY/AM/DS 311	COMPUTER NETWORKS	PC	3	0	0	30	70	3
2	CS/CY 312	ADVANCED DATA STRUCTURES	PC	3	0	0	30	70	3
3	CS 313	WEB TECHNOLOGIES	PC	3	0	0	30	70	3
4	CS 314	Elective I [Select in set-1 from respective specialization]	PC	3	0	0	30	70	3
5	CS 315	Elective II [Select in set-1 from respective specialization]	PC	3	0	0	30	70	3
6	CS/AM 316	INTELLECTUAL PROPERTY RIGHTS	MC	3	0	0	30	70	0
7	CS/CY/DS 351	COMPUTER NETWORKS LAB	PC	0	0	2	30	70	1.5
8	CS 352	WEB TECHNOLOGIES LAB	PC	0	0	2	30	70	1.5
9	CS 353	SKILL COURSE	SC	1	0	2	30	70	2
10	CS 354	INTENSHIP/ MINI PROJECT	SC	0	0	3	30	70	1.5
Total Credits									**21.5**
Industrial/Research Internship (2 Months) after 2nd Year during summer vacation									
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)									**4**

Elective-I(set-1)		Elective-II(set-1)	
A	COMPUTER ORGANIZATION AND ARCHITECTURE	E	EMBEDDED SYSTEMS
B	DIGITAL IMAGE PROCESSING	F	INFORMATION RETRIEVEL
C	KNOWLEGE REPRESENTATION & REASONING	G	FUNDAMENTALS OF MACHINE LEARNING
D	SOFTWARE ENGINEERING	H	COMPUTER GRAPHICS

Dr. BALAJI VEERAPU
M.Tech., Ph.D
Head
Department of Computer Science & Engineering
R.V.R. & J.C College of Engineering
Nagarjuna University, Nagarjuna Nagar

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

AM/CS/CY/DS 311	Computer Networks	L T P M C 3 0 0 100 3

Course Objectives

1. To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
2. To study data link layer concepts, design issues, and protocols.
3. To study MAC layer Random Access Protocols, LAN.
4. To gain knowledge on Network layer and Routing Algorithms.
5. To learn Transport layer services, and protocols.
6. To acquire knowledge of Application layer protocols.

Course Outcomes

1. Illustrate the OSI reference model, TCP/IP, and Digital transmission techniques
2. Demonstrate Data Link Layer protocols
3. Compare and contrast MAC protocols, various types of LANs
4. Summarize various network layer services and Routing algorithms
5. Implement Transport layer and application layer protocols

SYLLABUS

UNIT-I

Introduction: Introduction to Computer Networks, Network Models (protocols): OSI reference model, TCP/IP reference model. Network topologies, types of networks (LAN, MAN, WAN).

Physical layer: Data and Signals, Digital signals, Digital transmission (Digital-to-Digital, Analog-to-Digital), multiplexing (FDM, TDM), Transmission media.

UNIT-II

Data Link Layer: Error Detection & Correction: types of errors, Error Detection (Parity, CRC, Check Sum), Error Correction (Using hamming code), Data Link Layer services: framing, flow control, error control. Error & Flow control mechanisms: stop and wait, Go back N and selective repeat, High Level Data Link Control (HDLC).

UNIT-III

Medium access control: Random access: Aloha, Slotted Aloha, CSMA, CSMA/CD, and CSMA/CA, Local area networks: Ethernet, Types of ethernet (Token Ring, Fast Ethernet, Gigabit Ethernet), Personal Area Network: Bluetooth (Architecture), Wireless LANS: IEEE 802.11(Architecture, MAC sub layer).

UNIT-IV

Network layer: Network Layer Services, IPV4 Address, Subnetting, Super-netting, Classless addressing, Internet Protocol (IP, ARP, DHCP, ICMP), IPV6 Address format, Routing algorithms: Distance vector, Link state, Network Address Translation (NAT).

UNIT-V

Transport layer: UDP (User Datagram, Services, Applications), TCP (TCP Services, features, Segment, Connection establishment and termination, sliding window protocol, flow control and congestion control)

Application Layer: Application Layer services and protocols including WWW, DNS, SMTP, POP, FTP, Telnet, HTTP, Firewalls.

Textbook:

1. Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill, 5th Edition, 2017.

Reference Books:

1. Data and Computer Communications, William Stallings,Pearson, 10th Edition, 2013.
2. Computer Networks, Andrew S. Tanenbaum, David J. Wetherall, Pearson Education India; 5th edition, 2013.
3. Computer Networks: A Systems Approach, LL Peterson, BS Davie, Morgan-Kauffman, 5th Edition, 2011.
4. Computer Networking: A Top-Down Approach JF Kurose, KW Ross, Addison-Wesley, 5th Edition, 2009.

Dr. BALAJI VICHARAM M.Tech., Ph.D. Head of the Department Computer Science & Engineering (DS) R.V.R. & J.C. College of Engineering Chowdavaram, GUNTUR-522019

Department of Computer Science & Engineering (DS) SK ANU College of Engineering Acharya Nagarjuna University

PRINCIPAL R.V.R. & J.C College of Engineering Chandramoulipuram, Chowdavaram GUNTUR

MAPPING OF CO's &PO's:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	2	3		3		2		2			3	2
CO2	2	2		2	2	3				2			2	2
CO3	2	3		3		3		3		2			3	2
CO4	2	2		2				3		2			2	2
CO5	2	3	2			3		3		2			2	3

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

Dr. [illegible] VICHARAPU
M.Tech., Ph.D,
Head
Department of Computer Science & Engineering
Dr. [illegible] College of Engineering & Technology
Acharya Nagarjuna University, Nagarjuna Nagar

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

CS/CY 312 **Advanced Data Structures**

L	T	P	M	C
3	0	0	100	3

Course Objectives:

- To understand the usage of algorithms in computing.
- To learn and use hierarchical data structures and its operations
- To learn the usage of graphs and its applications.
- To select and design data structures and algorithms that is appropriate for problems.

COURSE OUTCOMES:

1. Understanding the role of algorithms in computing and finding time complexity for recursive algorithms.
2. Analyse hierarchical data structures and algorithms to solve computing problems.
3. Create algorithms using graph structure to solve real-life problems.
4. Understanding partition ADT.
5. Implementing data structures for handling strings.

UNIT-1

ROLE OF ALGORITHMS IN COMPUTING: Review of Basic Concepts, Asymptotic Analysis of Recurrences: The Substitution Method, iterative method, Recursion-Tree Method, master method. Randomized Algorithms, Randomized Quicksort, Algorithm Analysis Techniques - Amortized Analysis.

UNIT II

HIERARCHICAL DATA STRUCTURES: Red-Black trees: Properties of Red-Black Trees – Rotations – Insertion – Deletion , Splay Trees: Rotations – Insertion – Deletion ,B-trees+ trees, Heap trees, priority queues, Binomial Heaps, Fibonacci Heaps.

UNIT III

GRAPHS: Elementary Graph Algorithms: Representations of Graphs – Breadth-First Search – Depth-First Search – Topological Sort – Strongly Connected Components, Connected graphs, Articulation points in a graph, minimum cost spanning tree. Network Flows-Max flow, min-cut theorem, Ford-Fulkerson, Edmonds-Karp algorithm, Bipartite Matching.

UNIT IV

Partition ADT: Disjoint sets, operations on sets, weighted union or union by rank, path compression, Permutations and Combinations.

Skip Lists: Skip list representation, Search and Update Operations on skip lists.

UNIT V

Data Structures for Strings: Tries and Compressed Tries, Dictionaries allowing Errors in Queries, Suffix Trees and Suffix Arrays.

String Matching – The naive string-matching algorithm, The Rabin-Karp algorithm, The Knuth-Morris-Pratt algorithm.

Text Books:

1. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, —Data Structures and Algorithms‖, Pearson Education, Reprint 2006.
2. Advanced Data Structures, PETER BRASS City College of New York, CAMBRIDGE UNIVERSITY PRESS.
3. Classic Data Structures, DebasisSamanta, PHI.
4. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein, —Introduction to Algorithms‖, Third Edition, Prentice-Hall, 2011.

Reference Books:

1. Robert Sedgewick and Kevin Wayne, —ALGORITHMS‖, Fourth Edition, Pearson Education.
2. S.Sridhar, Design and Analysis of Algorithms‖, First Edition, Oxford University Press, 2014.

MAPPING OF CO's &PO's

Mapping of Course Outcomes with Program Outcomes													
	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PS0 1	PSO 2
CO1	3	1	2	1	2	-	-	-	-	-	-	-	1	1
CO2	3	-	2	1	1	-	-	-	-	-	-	-	1	1
CO3	3	2	2	1	1	-	-	-	-	-	-	-	1	1
CO4	2	2	2	1	1	-	-	-	-	-	-	-	1	1
CO5	1	-	2	1	1	-	-	-	-	-	-	-	1	2

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

Dr. BALAJI VICHARAPU
M.Tech., Ph.D.
Head
Department of Computer Science & Engineering
ANU College of Engineering & Tech...
...ya Nagarjuna University, Nagarjuna ...

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Cho...
GUNTUR - 522 019...

CS 313 **WEB TECHNOLOGIES** **L T P M C**
3 0 0 100 3

Course Objectives: From the course the student will learn

1. Translate user requirements into the overall architecture and implementation of new systems and Manage Project and coordinate with the Client
2. Write backend code in PHP language and Writing optimized front end code HTML and JavaScript
3. Understand, create and debug database related queries and Create test code to validate the applications against client requirement
4. Monitor the performance of web applications & infrastructure and Troubleshooting web application with a fast and accurate a resolution

Course Outcomes:

1. Illustrate the basic concepts of HTML and CSS & apply those concepts to design static web pages
2. Identify and understand various concepts related to dynamic web pages and validate them using JavaScript
3. Outline the concepts of Extensible markup language & AJAX
4. Develop web Applications using Scripting Languages & Frameworks

SYLLUBUS

UNIT-I

Introduction to HTML: Introduction to html, fundamentals of HTML elements.

Document body, text, hyperlink, lists, tables, color and images, **Forms** & frames.

Cascading Style Sheets: Introduction, types of css, conflicting styles, css backgrounds, defining your own styles, properties and values in styles, formatting blocks, and layers;

JavaScript: JavaScript basics, variables, operators, Control statements, arrays and functions, mathematical functions and string manipulation.

UNIT-II

Objects in JavaScript: built-in objects, exception handling, event model, regular expressions & Data validation.

XML: Introduction to XML, uses of XML, simple XML, and XML key components, DTD and Schemas, Well formed, using XML with application.XML, XSL and XSLT. Introduction to XSL, XML transformed simple example, XSL elements, transforming with XSLT

UNIT-III

Servlets: Lifecycle of a Servlet, a simple Servlet, the servlet API, the javax. servlet package, reading Servlet parameters, the javax.servlet.http package, Handling HTTP requests and responses, **Session Tracking techniques**.

JSP: The anatomy of a JSP page, JSP processing, declarations, directives, expressions, code snippets, implicit objects, **JSP Standard Action Tags**, connecting to database in JSP.

UNIT-IV

Introduction to PHP: Basics of PHP, the anatomy of a PHP page; PHP data types Variables and data types, operators, expressions and statements, strings, arrays and functions.

UNIT-V

PHP and database access: Basic Relational Data Model, Relational database concepts, connecting to a MySQL database, retrieving and displaying results, modifying, updating and deleting data; MVC architecture: PHP and other web technologies: PHP and XML.

Text Books:

1. Internet & World Wide Web How to Program,Deitel & Deitel Second edition.
2. Chris Bates, "Web Programming: Building Internet Applications", Wiley DreamTech, 2nd Edition.2002.

Dr. BALAJI VICHARAPU M.Tech., Ph.D. Head Department of Computer Science & Engineering Dr. YSR ANU College of Engineering & Technology Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department Computer Science & Engineering (DS) R.V.R. & J.C. College of Engineering Chowdavaram, GUNTUR-522019

PRINCIPAL R.V.R. & J.C College of Engineering Chandramoulipuram, Chowdavaram GUNTUR - 522 019. A.P.

3. Jeffrey C K Jackson, "Web Technologies", Pearson Education, 1 st Edition, 2006.
4. Steven Holzner, "The Complete Reference PHP", Tata McGraw-Hill, 1st Edition, 2007

MAPPING OF CO&PO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	3	-	2	1	-	-	-	-	-	1
CO2	2	1	3	-	2	1	-	-	-	-	-	1
CO3	2	2	3	-	2	1	-	-	-	-	-	1
CO4	2	2	3	-	2	1	-	-	-	-	-	1

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

Dr. [illegible] VICHARAPU
M.Tech., Ph.D.
Head
Department of Computer Science & Engineering
A.N.U College of Engineering & Technology
Acharya Nagarjuna University, Nagarjuna Nagar

AM/CS/CY/DS 314-A	Computer Organization and Architecture (ELECTIVE -1)	L	T	P	M	C
		3	0	0	100	3

Course Outcomes:

1. Study of the basic structure and operation of a digital computer system.
2. Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating-point arithmetic operations.
3. Implementation of control unit techniques and the concept of Pipelining
4. Understanding the hierarchical memory system, cache memories and virtual memory
5. Understanding the different ways of communicating with I/O devices and standard I/O interfaces

UNIT-1

Introduction: Functional units of digital system and their interconnections, buses, bus architecture, types of buses and bus arbitration. Register, bus and memory transfer. Processor organization, general registers organization, stack organization and addressing modes.

UNIT-2

Arithmetic and logic unit: Look ahead carries adders. Multiplication: Signed operandmultiplication, Booths algorithm and array multiplier. Division and logic operations. Floating point arithmetic operation, Arithmetic & logic unit design. IEEE Standard for Floating Point Numbers

Unit-3

Control Unit: Instruction types, formats, instruction cycles and sub cycles (fetch and execute etc), micro operations, execution of a complete instruction. Program Control, Reduced Instruction Set Computer, Pipelining. Hardwire and micro programmed control: micro programme sequencing, concept of horizontal and vertical microprogramming.

Unit-4

Memory: Basic concept and hierarchy, semiconductor RAM memories, 2D & 2 1/2D memory organization. ROM memories. Cache memories: concept and design issues & performance, address mapping and replacement Auxiliary memories: magnetic disk, magnetic tape and optical disks Virtual memory: concept implementation.

Unit-5

Input / Output: Peripheral devices, I/O interface, I/O ports, Interrupts: interrupt hardware, types of interrupts and exceptions. Modes of Data Transfer: Programmed I/O, interrupt initiated I/O and Direct Memory Access., I/O channels and processors. Serial Communication: Synchronous & asynchronous communication, standard communication interfaces.

Text books:

1. Computer System Architecture - M. Morris Mano
2. Carl Hamacher, Zvonko Vranesic, Safwat Zaky Computer Organization, McGraw-Hill, Fifth Edition, Reprint 2012
3. John P. Hayes, Computer Architecture and Organization, Tata McGraw Hill, Third Edition, 1998.

Reference books

4. William Stallings, Computer Organization and Architecture-Designing for Performance, Pearson Education, Seventhedition, 2006.
5. Behrooz Parahami, "Computer Architecture", Oxford University Press, Eighth Impression, 2011.
6. David A. Patterson and John L. Hennessy, "Computer Architecture-A Quantitative Approach", Elsevier, a division ofreed India Private Limited, Fifth edition, 2012 Structured Computer Organization, Tarmenbaum(PHI)

Dr. BALAJI VICHARA
M.Tech., Ph.D.
Head
Department of Computer Science & Engineering
R. ANU College of Engineering & Tech.
Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019, A.P.

MAPPING OF CO&PO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	3	-	2	1	-	-	-	-	-	1
CO2	2	1	3	-	2	1	-	-	-	-	-	1
CO3	2	2	3	-	2	1	-	-	-	-	-	1
CO4	2	2	3	-	2	1	-	-	-	-	-	1

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

Dr. BALAJI VICHARAPU
M.Tech., Ph.D
Head
Department of Computer Science & Engineering
R.V.R. & J.C College of Engineering & Tech.
Acharya Nagarjuna University, Nagarjuna N.

AM/CS/DS 314-B	Digital Image Processing (ELECTIVE -I)	L	T	P	M	C
		3	0	0	100	3

Course Objectives:

Students undergoing this course are expected to:

1. Familiarize with basic concepts of digital image processing and different image transforms
2. Learn various image processing techniques like image enhancement, restoration, segmentation and compression
3. Understand color fundamentals and different color models
4. Understand wavelets and morphological image processing

Course Outcomes:

After undergoing the course students will be able to

1. Perform image manipulations and different digital image processing techniques
2. Perform basic operations like – Enhancement, segmentation, compression,Image transforms and restoration techniques on image.
3. Analyze pseudo and fullcolor image processing techniques.
4. Apply various morphological operators on images

UNIT-1

Introduction: Introduction to Image Processing, Fundamental steps in digital image processing, components of an image processing system, image sensing and acquisition, image sampling and quantization, some basic relationships between pixels, an introduction to the mathematical tools used in digital image processing.

Image Transforms: Need for image transforms, Discrete Fourier transform (DFT) of one variable, Extension to functions of two variables, some properties of the 2-D Discrete Fourier transform, Importance of Phase, Walsh Transform. Hadamard transform, Haar Transform, Slant transform, Discrete Cosine transform, KL Transform, SVD and Radon Transform, Comparison of different image transforms.

UNIT-2

Intensity Transformations and Spatial Filtering: Background, Some basic intensity transformation functions, histogram processing, fundamentals of spatial filtering, smoothing spatial filters, sharpening spatial filters, Combining spatial enhancement methods

Filtering in the Frequency Domain: Preliminary concepts, The Basics of filtering in the frequency domain, image smoothing using frequency domain filters, Image Sharpening using frequency domain filters, Selective filtering.

UNIT-3

Image Restoration and Reconstruction: A model of the image degradation / Restoration process, Noise models, restoration in the presence of noise only-Spatial Filtering, Periodic Noise Reduction by frequency domain filtering, Linear, Position –Invariant Degradations, Estimating the degradation function, Inverse

Dr. BALAJI VICHARAPU
Head
Department of Computer Science & Engineering
YSR ANU College of Engineering
Acharya Nagarjuna University, Nagarjuna

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019, A.P.

filtering, Minimum mean square error (Wiener) filtering, constrained least squares filtering ,geometric mean filter .

UNIT-4

Image compression: Fundamentals, Basic compression methods: Huffman coding, Golomb coding, Arithmetic coding, LZW coding, Run-Length coding, Symbol-Based coding, Bit-Plane coding, Block Transform coding, Predictive coding .

Wavelets and Multiresolution Processing: Image pyramids, subband coding, Multiresolution expansions, wavelet transforms in one dimensions & two dimensions, Wavelet coding.

UNIT-5

Image segmentation: Fundamentals, point, line, edge detection, thresholding, region –based segmentation.

Morphological Image Processing: Preliminaries, Erosion and dilation, opening and closing, basic morphological algorithms for boundary extraction, thinning, gray-scale morphology, Segmentation using morphological watersheds.

Text Books

1. R. C. Gonzalez and R. E. Woods, Digital Image Processing, 3rd edition, Prentice Hall, 2008.

2. Jayaraman, S. Esakkirajan, and T. Veerakumar," Digital Image Processing", Tata McGraw-Hill Education,

2011.

Reference Books

1. Anil K.Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 9th Edition, Indian Reprint, 2002.

2. B.Chanda, D.Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2009

MAPPING OF CO&PO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1	1	-	2	1	-	-	-	-	-	1
CO2		1		-	1	1	-	-	-	-	-	1
CO3	1	2	2	-	1	1	-	-	-	-	-	1
CO4	1	1	1	-	1	1	-	-	-	-	-	1

Dr. BALAJI VICHARAPU
M.Tech., Ph...
Head
Department of Computer Science & Engineering
SK ANU College of Engineering & Tech...
Acharya Nagarjuna University, Nagarjuna Nagar...

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowda
GUNTUR - 522 019. A.P.

AM/CS 314-C	Knowledge Representation & Reasoning (ELECTIVE -I)	L T P M C 3 0 0 100 3

Course Objectives:

1. To investigate the key concepts of knowledge representation (KR) techniques and different notations.
2. To integrate the KR view as a knowledge engineering approach to model organizational Knowledge.
3. To introduce the study of ontologies as a KR paradigm and applications of ontologies.
4. To understand various KR techniques.
5. To understand process, knowledge acquisition and sharing of ontology.

Course Outcomes:

- Analyze and design knowledge based systems intended for computer implementation.
- Acquire theoretical knowledge about principles for logic-based representation and reasoning.
- Ability to understand knowledge-engineering process
- Ability to implement production systems, frames, inheritance systems and approaches to handle uncertain or incomplete knowledge..

UNIT - I:

The Key Concepts: Knowledge, Representation, Reasoning, Why knowledge representation and reasoning, Role of logic

Logic: Historical background, Representing knowledge in logic, Varieties of logic, Name, Type, Measures, Unity Amidst diversity

UNIT - II:

Ontology: Ontological categories, Philosophical background, Top-level categories, Describing physical entities, Defining abstractions, Sets, Collections, Types and Categories, Space and Time

UNIT - III:

Knowledge Representations: Knowledge Engineering, Representing structure in frames, Rules and data, Object-oriented systems, Natural language Semantics, Levels of representation

UNIT - IV:

Processes: Times, Events and Situations, Classification of processes, Procedures, Processes and Histories, Concurrent processes, Computation, Constraint satisfaction,

Change Contexts: Syntax of contexts, Semantics of contexts, First-order reasoning in contexts, Modal reasoning in contexts, Encapsulating objects in contexts.

UNIT - V:

Knowledge Soup: Vagueness, Uncertainty, Randomness and Ignorance, Limitations of logic, Fuzzy logic, Nonmonotonic Logic, Theories, Models and the world, Semiotics Knowledge Acquisition and Sharing: Sharing Ontologies, Conceptual schema, Accommodating multiple paradigms, Relating different knowledge representations, Language patterns,

Dr. BALAJI VICHARAPU
Head
Department of Computer Science & Engineering
SK ANU College of Engineering & Tech
Acharya Nagarjuna University, Nagarjuna Nag

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

TEXT BOOKS:

1. Knowledge Representation logical, Philosophical, and Computational Foundations by John F. Sowa, Thomson Learning.
2. Knowledge Representation and Reasoning by Ronald J. Brachman, Hector J. Levesque, Elsevier.

Reference books

- Schank, Roger C., Robert P. Abelson: Scripts, Plans, Goals, and Understanding: An Inquiry into Human Knowledge Structures. Hillsdale, NJ: Lawrence Erlbaum, 1977.
- R. C. Schank and C. K. Riesbeck: Inside Computer Understanding: Five Programs Plus Miniatures, Lawrence Erlbaum, 1981.
- Murray Shanahan: A Circumscriptive Calculus of Events. Artif. Intell. 77(2), pp. 249-284, 1995.

MAPPING OF CO&PO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1	1	-	2	1	-	-	-	-	-	1
CO2		1		-	1	1	-	-	-	-	-	1
CO3	1	2	2	-	1	1	-	-	-	-	-	1
CO4	1	1	1	-	1	1	-	-	-	-	-	1

Dr BALAJI VICHARA
M.Tech., Ph.D.
Head
Department of Computer Science & Engineering
Sri ANU College of Engineering & Technology
Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR-522 019. A.P.

AM/CS/DS-314-D	Software Engineering (ELECTIVE -I)	L	T	P	M	C
		3	0	0	100	3

Course Objectives

1. The aim of the course is to provide an understanding of the working knowledge of the techniques for estimation, design, testing and quality management of large software development projects.
2. Topics include process models, software requirements, software design, software testing, software process/product metrics, risk management, quality management and UML diagrams

Course Outcomes

1. Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
2. Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
3. Will have experience and/or awareness of testing problems and will be able to develop a simple testing report

UNIT-I

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths.

A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI), process patterns, process assessment, personal and team process models.

Process models: The waterfall model, incremental process models, evolutionary process models, the unified process.

UNIT-II

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, Interface specification, the software requirements document.

System models: Context models, behavioral models, data models, object models, structured methods.

UNIT-III

Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, class diagrams, sequence diagrams, collaboration diagrams, use case diagrams, component diagrams.

UNIT-IV

Testing Strategies: black-box and white-box testing, validation testing, system testing, the art of debugging.

Product metrics: Software quality, metrics for analysis model, metrics for design model, metrics for source code, metrics for testing, metrics for maintenance.

UNIT-V

Metrics for Process and Products: Software measurement, metrics for software quality.

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM, RMMM plan.

Dr. BALAJI VICHARAPU M.Tech., Ph.D Head Department of Computer Science & Engineering Dr. YSR ANU College of Engineering & Technology Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department Computer Science & Engineering (DS) R.V.R. & J.C. College of Engineering Chowdavaram, GUNTUR-522019

PRINCIPAL R.V.R. & J.C College of Engineering Chandramoulipuram, Chowdavaram GUNTUR - 522 019, A.P

Quality Management: software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

TEXTBOOKS:

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
   The unified modeling language user guide Grady Booch, James Rambaugh, Ivar Jacobson, Pearson Education.

REFERENCEBOOKS:

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw- Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.

Mapping of CO &PO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	2	1	3	-	2	1	-	-	-	-	-	1
CO2	2	1	3	-	2	1	-	-	-	-	-	1
CO3	2	2	3	-	2	1	-	-	-	-	-	1
CO4	2	2	3	-	2	1	-	-	-	-	-	1

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

Dr. BALAM VICHARAPU
M.Tech., Ph.D
Head
Department of Computer Science & Engineering
ANU College of Engineering &
Acharya Nagarjuna University, Nagarjuna Nagar

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

AM/CS 315-E	Embedded Systems (ELECTIVE -II)	L	T	P	M	C
		3	0	0	100	3

Course Objectives:

1. To provide an overview of principles of Embedded System
2. To provide a clear understanding of role of firmware, operating systems in correlation with hardware systems.

Course Outcomes:

1. Expected to understand the selection procedure of processors in the embedded domain.
2. Design procedure of embedded firm ware.
3. Expected to visualize the role of realtime operating systems in embedded systems.
4. Expected to evaluate the correlation between task synchronization and latency issues

UNIT - I

Introduction to Embedded Systems: Processor embedded into a system, Embedded Hardware units and devices in a system, Embedded software in a system, Design process of an embedded system, classification of embedded systems, application areas of embedded systems , characteristics and quality attributes of an embedded systems

UNIT - II

Introduction to processor/microcontroller: Architecture, Real world interfacing, processor and memory organization, memory types, memory maps and addresses, interrupt sources and interrupt service mechanism.

UNIT - III

On board Communication Basics: serial communication devices, Parallel devices, Wireless devices, Real time clock, Serial bus communication Protocols - I2C, SPI; Parallel buss communication - ISA, PCI.

UNIT - IV

Embedded Firmware Development: Overview of programming concepts - in assembly language and in high level language 'C', C Program elements- Heads, Source files, Processor Directives, Macros, Functions, Data types and Data Structures

UNIT - V

OS Based Embedded Systems: OS services - Process/Task Management, Memory Management, I/O subsystem manager, Inter Process/Task communications - Tasks, Task states, Shared data, Signals, Message Queues, Mailbox, Pipes and concepts of Semaphores.

TEXT BOOK:

1. Embedded Systems, Raj Kamal, 2nd edition, Tata Mc Graw Hill

2. Shibu K V, "Introduction to Embedded Systems", Second Edition, Mc Graw Hill

Dr. BALAJI VICHARAPU M.Tech., Ph.D.
Head
Department of Computer Science & Engineering
ANU College of Engineering & Technology
Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

REFERENCE BOOKS:

1. Rajkamal, Embedded Systems Architecture, Programming and Design, Tata McGraw-Hill
2. Frank Vahid and Tony Givargis, "Embedded Systems Design" - A Unified Hardware/Software Introduction, John Wiley
3. Lyla, "Embedded Systems" –Pearson
4. David E. Simon, An Embedded Software Primer, Pearson Education Asia, First Indian Reprint 2000.

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

Dr. BALAJI VICHARAPU
M.Tech., Ph.D
Head
Department of Computer Science & Engineering
ANU College of Engineering & Technology
Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

AM/CS/DS 315-F	Information Retrieval (ELECTIVE -II)	L	T	P	M	C
		3	0	0	100	3

COURSE OBJECTIVES:

1. To understand the concepts of information Retreival.
2. To Implement the Concept of Indexing and Natural language.
3. To Understand & Implement the Data Structures for retrieval .
4. To Implement Search Techniques.

COURSE OUTCOMES:

1. Describe the objectives of information retrieval systems.
2. Implement concepts of Indexing.
3. Understand & Implement the Data Structures for retrieval
4. Implement Search Techniques.

UNIT – I:

Definition, Objectives, Functional Overview, Relationship to DBMS, Digital libraries and Data Warehouses. **Information Retrieval System Capabilities:** Search, Browse, Miscellaneous

UNIT – II:

Cataloging and Indexing:

Objectives, Indexing Process, Automatic Indexing, Information Extraction.

Automatic Indexing:

Classes of automatic indexing, Statistical indexing, Natural language, Concept indexing, Hypertext linkages

UNIT – III:

Introduction, Stemming Algorithms, Inverted file structures, N-gram data structure, PAT data structure, Signature file structure, Hypertext data structure.

UNIT – IV:

User Search Techniques:

Search statements and binding, Similarity measures and ranking, Relevance feedback, Selective dissemination of information search, weighted searches of Boolean systems, Searching the Internet and hypertext.

UNIT – V:

Text Search Algorithms:

Introduction , Software text search algorithms, Hardware text search systems.

Information System Evaluation:

Introduction, Measures used in system evaluation, Measurement example

Dr. BALAJI VICHALA (M.Tech., Ph.D.)
Head
Department of Computer Science & Engineering
ANU College of Engineering
Acharya Nagarjuna University

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

TEXT BOOKS:

1. Kowalski, Gerald, Mark T Maybury: Information Retrieval Systems: Theory and Implementation, Kluwer Academic Press, 1997.
2. Gerald J Kowalski, Mark T Maybury Information Storage and Retrieval Systems: Theory and Implementation, Springer, 2004.

REFERENCE BOOKS:

1. Frakes, W.B., Ricardo Baeza-Yates: Information Retrieval Data Structures and Algorithms,Prentice Hall, 1992.
2. SoumenChakrabarti, Mining the Web : Discovering Knowledge from Hypertext Data, Morgan – Kaufmann Publishers, 2002.
3. Christopher D Manning, PrabhakarRaghavan, HinrichSchutze, An Introduction to Information Retrieval By Cambridge University Press, England, 2009.
4. Modern Information Retrival By Yates Pearson Education.
5. Information Storage & Retieval By Robert Korfhage

MAPPING OF CO&PO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1	1	-	1	1	-	-	-	-	-	1
CO2		1		-	1	1	-	-	-	-	-	1
CO3	1	1	1	-	1	1	-	-	-	-	-	1
CO4	1	1	1	-	1	1	-	-	-	-	-	1

Dr. BALAJI VICHARAPU M.Tech., Ph.D
Head
Department of Computer Science & Engineering
Dr. YSR ANU College of Engineering & Technology
Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

CS-315-G **Fundamentals of Machine Learning (ELECTIVE -II)**

L	T	P	M	C
3	0	0	100	3

Prerequisites:

1. Mastery of introduction-level algebra , statistics and probability theory
2. Data Modeling and Evaluation

Course Objectives:

1. Recognize the basic terminology and fundamental concepts of machine learning.
2. Understand the concepts of Supervised Learning models with a focus on recent advancements.
3. Relate the Concepts of Neural Networks Models of supervised Learning
4. Discover Unsupervised learning paradigms of machine learning
5. Understand the concepts of Reinforcement learning and Ensemble methods

Course Outcomes:

1. Explain the concepts and able to prepare the dataset for different Machine learningmodels.
2. Identify and Apply appropriate Supervised Learning models.
3. Design Neural Network models for the given data.
4. Perform Evaluation of Machine Learning algorithms and Model Selection.
5. Devise un-supervised and Reinforcement learning models.

UNIT-I:

Introduction: Introduction to Machine learning, Goals and applications of Machine learning, Issues in machine learning, Types of machine learning. Supervised learning, Unsupervised learning,Reinforcement learning.

Feature Selection: Filter, Wrapper, Embedded methods.

Feature Normalization:- min-max normalization, z-score normalization, and constant factor normalization

Introduction to Dimensionality Reduction: Principal Component Analysis(PCA), Linear Discriminant Analysis(LDA)

UNIT-II:

Supervised Learning – I (Regression/Classification)

Regression models: Simple Linear Regression, multiple linear Regression, Logistic Regression.

Performance Metrics: Mean Absolute Error (MAE), Mean Squared Error (MSE),R-Squared error, Adjusted R Square.

Classification models: Decision Trees-ID3, CART, Naive Bayes, K-Nearest-Neighbours(KNN) Support Vector Machines (SVM)

UNIT-III:

Supervised Learning – II (Neural Networks)

Neural Network Representation : Perceptrons, Activation Functions, ArtificialNeural Networks (ANN) , Back Propagation Algorithm. Convolutional Neural Networks - Convolution and Pooling layers, , Recurrent NeuralNetworks (RNN).

Classification Metrics: Confusion matrix, Precision, Recall, Accuracy, F-Score.

UNIT-IV:

Model Validation in Classification : Cross Validation - Holdout Method, K-Fold, Regularization.

Ensemble Methods: Boosting, Bagging, Random Forest.

UNIT-V:

Unsupervised Learning : Clustering-K-means, Hierarchical clustering.

Reinforcement Learning: Overview, Example, Markov Decision Process,Uses of Reinforcement Learning

Dr. BALAJI M.Tech., Ph.D Head of the Department Computer Science & Engineering (DS) R.V.R. & J.C. College of Engineering Chowdavaram, GUNTUR-522019

PRINCIPAL R.V.R. & J.C College of Engineering Chandramoulipuram, Chowdavaram GUNTUR

Text Books:

1. Machine Learning – Tom M. Mitchell, -MGH
2. Kevin Murphy, Machine Learning: A Probabilistic Perspective, MIT Press,2012
3. R. S. Sutton and A. G. Barto. Reinforcement Learning - An Introduction.MIT Press.1998.

References:

1. Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning, Springer2009
2. Christopher Bishop, Pattern Recognition and Machine Learning, Springer,2007.
3. Machine Learning Yearning, AndrewNg.
4. Data Mining–Concepts and Techniques -Jiawei Han and MichelineKamber,MorganKaufmann

MAPPING OF CO&PO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1	1	-	2	1	-	-	-	-	-	1
CO2		1		-	1	1	-	-	-	-	-	1
CO3	1	2	2	-	1	1	-	-	-	-	-	1
CO4	1	1	1	-	1	1	-	-	-	-	-	1

Dr. BALAJI VICHARAPU
M.Tech., Ph.D
Head
Department of Computer Science & Engineering
ANU College of Engineering
Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

CS 315-H	Computer Graphics (ELECTIVE -II)	L	T	P	M	C
		3	0	0	100	3

Course Objectives

1. The aim of this course is to provide an introduction of fundamental concepts and theory of computer graphics.
2. Topics covered include graphics systems and input devices; geometric representations and 2D/3D transformations; viewing and projections; illumination and color models; animation; rendering and implementation; visible surface detection;

Course Outcomes

1. Acquire familiarity with the relevant mathematics of computer graphics.
2. Be able to design basic graphics application programs, including animation
3. Be able to design applications that display graphic images to given specifications

UNIT - I

Introduction: Application areas of Computer Graphics, overview of graphics systems, video-display devices, raster-scan systems, random scan systems, graphics monitors and work stations and input devices

Output primitives: Points and lines, line drawing algorithms (Bresenham's and DDA Algorithm), midpoint circle and ellipse algorithms

Polygon Filling: Scan-line algorithm, boundary-fill and flood-fill algorithms

UNIT – II

2-D geometrical transforms: Translation, scaling, rotation, reflection and shear transformations, matrix representations and homogeneous coordinates, composite transforms, transformations between coordinate systems

2-D viewing: The viewing pipeline, viewing coordinate reference frame, window to view-port coordinate transformation, viewing functions, Cohen-Sutherland algorithms, Sutherland –Hodgeman polygon clipping algorithm.

UNIT - III

3-D object representation: Polygon surfaces, quadric surfaces, spline representation, Hermite curve, Bezier curve and B-Spline curves, Bezier and B-Spline surfaces. Basic illumination models, polygon rendering methods.

UNIT – IV

3-D Geometric transformations: Translation, rotation, scaling, reflection and shear transformations, composite transformations.

3-D viewing: Viewing pipeline, viewing coordinates, view volume and general projection transforms and clipping.

Dr. BALAJI VICHARAPU M.Tech., Ph.D. Head Department of Computer Science & Engineering Dr. YSR A.U. College of Engineering & Tech. Acharya Nagarjuna University, Nagarjuna Nagar

Head of the Department Computer Science & Engineering (DS) R.V.R. & J.C. College of Engineering Chowdavaram, GUNTUR-522019

PRINCIPAL R.V.R. & J.C College of Engineering Chandramoulipuram, Chowdavaram GUNTUR - 522 019. A.P.

UNIT – V

Computer animation: Design of animation sequence, general computer animation functions, raster animation, computer animation languages, key frame systems, motion specifications

Visible surface detection methods: Classification, back-face detection, depth-buffer, BSP-tree methods and area sub-division methods

TEXT BOOKS:

1. "Computer Graphics C version", Donald Hearn and M. Pauline Baker, Pearson Education
2. "Computer Graphics Principles & practice", second edition in C, Foley, Van Dam, Feiner and Hughes, Pearson Education.
3. Computer Graphics, Steven Harrington, TMH

REFERENCE BOOKS:

1. Procedural elements for Computer Graphics, David F Rogers, Tata Mc Graw hill, 2nd edition.
2. Principles of Interactive Computer Graphics", Neuman and Sproul, TMH.
3. Principles of Computer Graphics, Shalini Govil, Pai, 2005, Springer.

MAPPING OF CO&PO:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	1	1		-	2	1	-	-	-	-	-	1
CO2		1		-	1	1	-	-	-	-	-	1
CO3	1		2	-	1	1	-	-	-	-	-	1
CO4	1	1	1	-	1	1	-	-	-	-	-	1

Dr. BALAJI VICHARAPU M.Tech, Ph.D
Head
Department of Computer Science & Engg.
R.V.R. & J.C College of Engineering

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

AM/CS 316	INTELLECTUAL PROPERTY RIGHTS	L	T	P	M	C
		3	0	0	100	0

Course Objectives:

1. To explain the art of interpretation and documentation of research work
2. To explain various forms of intellectual property rights
3. To discuss leading International regulations regarding Intellectual Property Rights

Course Outcomes: Upon the Successful Completion of the Course, the Students would be able to:

1. Understand types of Intellectual Property
2. Analyze trademarks and its functionality
3. Illustrate law of copy rights and law of patents

UNIT- I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT - II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT - III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT - IV

Trade Secrets: Trade secret law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT - V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT BOOKS & REFERENCES:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd.

CO-PO/PSO Mapping Matrix:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	3	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	3	-	-	-	-	-	-
CO3	3	-	3	-	-	3	-	3	-	-	-	-	-	-

Dr. P. RAJI VIGHARAPU M.Tech., Ph.D. Head of the Department Computer Science & Engineering (DS) R.V.R. & J.C. College of Engineering

Head Department of Computer Science & Engineering Dr. YSR ANU College of Engineering

PRINCIPAL R.V.R. & J.C College of Engineering Chandramoulipuram

CS/CY/DS 351 **Computer Network Lab**

L	T	P	M	C
0	0	2	100	1.5

Course Objectives:

- To understand the working principle of various communication protocols.
- To understand the network simulator environment and visualize a network topology and observe its performance
- To analyze the traffic flow and the contents of protocol frames

Course Outcomes:

- Implement data link layer farming methods
- Analyze error detection and error correction codes.
- Implement and analyze routing and congestion issues in network design.
- Implement Encoding and Decoding techniques used in presentation layer
- To be able to work with different network tools

List of Experiments

1. Implement the data link layer farming methods such as character-stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol; and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting techniques used in buffers.

TEXT BOOK:

1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PIII.

REFERENCE BOOKS:

1. An Engineering Approach to Computer Networks, S. Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

MAPPING OF CO's &PO's:

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength ofcorrelations (3:Substantial, 2: Moderate, 1:Slight)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1					1		1						
CO2	1					1		1						
CO3	1					1		1						
CO4														
CO5														

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

CS 352	Web Technology Lab	L	T	P	M	C
		0	0	2	100	1.5

COURSE OBJECTIVES:

- Demonstrate the ability to retrieve data from a database and present it in a web page.
- Use FTP to transfer web pages to a server.
- Construct pages that meet, guidelines for efficient download and cater to the needs of an identified audience.
- Evaluate the functions of specific types of web pages in relationship to an entire web site.
- Create web pages that meet accessibility needs of those with physical disabilities and apply the effects of CSS in web page creation.
- To develop the PHP and Data access

ACTIVITIES:

1) INSTALLATIONS:

a) Installation of XAMPP and WAMP servers

2. HTML

a) Create a table to show your class time table.
b) Use tables to provide layout to your HTML page describing your college infrastructure.
c) Use and tags to provide a layout to the above page instead of a table layout.

3. HTML

a) Use frames such that page is divided into 3 frames 20% on left to show contents of pages, 60% in centre to show body of page, remaining on right to show remarks.
b) Embed Audio and Video into your HTML web page.

4. HTML

a) Create a webpage with HTML describing your department use paragraph and list tags.
b) Apply various colors to suitably distinguish key words, also apply font styling like italics, underline and two other fonts to words you find appropriate, also use header tags.
c) Create links on the words e.g. Wi-Fi and LAN to link them to Wikipedia pages.
d) Insert an image and create a link such that clicking on image takes user to other page.
e) Change the background color of the page; At the bottom create a link to take user to the top of the page.

5. HTML

a) Design the following static web pages required for an online book store web site.

1) HOME PAGE: The static home page must contain three frames.

Top frame: Logo and the college name and links to Home page, Login page, Registration page, Catalogue page and Cart page (the description of these pages will be given below).

Left frame: At least four links for navigation, which will display the catalogue of respective links. For e.g.: When you click the link "CSE" the catalogue for CSE Books should be displayed in the Right frame.

Right frame: The pages to the links in the left frame must be loaded here. Initially this page contains description of the web site.

Dr. BALAJI VICHARAPU
M.Tech., Ph.D.
Head
Department of Computer Science & Engineering
College of Engineering
Acharya Nagarjuna University

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Description of the Web Site			

Fig 1.1

2) LOGIN PAGE: This page looks like below:

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE ECE EEE CIVIL	Login : Password: Submit Reset			

2) CATOLOGUE PAGE:

The catalogue page should contain the details of all the books available in the web site in a table.

The details should contain the following:

1. Snap shot of Cover Page.
2. Author Name.
3. Publisher.
4. Price.
5. Add to cart button.

Logo	Web Site Name			
Home	Login	Registration	Catalogue	Cart
CSE		Book : XML Bible Author : Winston Publication : Wiely	$ 40.5	Add to cart
ECE		Book : AI Author : S.Russel Publication : Princeton hall	$ 63	Add to cart
EEE		Book : Java 2 Author : Watson Publication : BPB publications	$ 35.5	Add to cart
CIVIL		. HTML in 24 hours Author : Sam Peter Publication : Sam publication	$ 50	Add to cart

Dr. RAJA VICHARAPU M.Tech., Ph.D. Head of the Department Computer Science & Engineering (DS) R.V.R. & J.C. College of Engineering Chowdavaram, GUNTUR-522019

PRINCIPAL R.V.R. & J.C College of Engineering Chandramoulipuram, Chowdavaram GUNTUR - 522 019. A.P.

4) CART PAGE:

The cart page contains the details about the books which are added to the cart.The cart page should look like this:

Logo	Web Site Name				
Home	Login	Registration		Catalogue	Cart
CSE ECE EEE CIVIL	**Book name** Java 2 XML bible **Total amount** - $130.5	**Price** $35.5 $40.5	**Quantity** 2 1	**Amount** $70 $40.5	

5) REGISTRATION PAGE:

Create a —*registration form* —with the following fields

1) Name (Text field) 2) Password (password field)

3) E-mail id (text field)

4) Phone number (text field)

5) Sex (radio button)

6) Date of birth (3 select boxes)

7) Languages known (check boxes – English, Telugu, Hindi, Tamil)

8) Address (text area)

6. CASCADING STYLE SHEET

Write an HTML page that contains a selection box with a list of 5 countries, when the user selects a country, its capital should be printed next to the list; Add CSS to customize the properties of the font of the capital (color, bold and font size).

7. JAVASCRIPT

a) Write a java script program to test the first character of a string is uppercase or not.

b) Write a pattern that matches e-mail addresses.

c) Write a java script function to print an integer with commas as thousands separators.

8. JAVASCRIPT

a) Write a java script program to sort a list of elements using quick sort.

b) Write a java script for loop that will iterate from 0 to 15 for each iteration, it will check ifthe current number is odd or even, and display a message to the screen.

9. JAVASCRIPT

a) Write a java script program which compute, the average marks of the following studentsthen this average is used to determine the corresponding grade.

b) Write a java script program to sum the multiple s of 3 and 5 under 1000.

c) To design the scientific calculator and make event for each button using java script.

10. Write an XML file which will display the Book information which includes the following:

1) Title of the book

2) Author Name

3) ISBN number

4) Publisher name

5) Edition

6) Price

Dr. BALAJI VICHARAPU
M.Tech., Ph.D.
Head
...ent of Computer Science & Engineering
College of Engineering
...Nagarjuna University, ...

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

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Chandramoulipuram, Chowdavaram

Write a Document Type Definition (DTD) to validate the above XML file.

11. Display the XML file as follows.

The contents should be displayed in a table. The header of the table should be in colorGREY. And the Author names column should be displayed in one color and should be capitalizedand in bold. Use your own colors for remaining columns.

Use XML schemas XSL and CSS for the above purpose.

11.1) Install TOMCAT web server and APACHE.

While installation assign port number 4040 to TOMCAT and 8080 to APACHE. Make surethat these ports are available i.e., no other process is using this port.

11.2) Access the above developed static web pages for books web site, using these servers by putting the web pages developed in week-1 and week-2 in the document root.

Access the pages by using the urls: http://localhost:4040/rama/books.html (for tomcat) http://localhost:8080/books.html (for Apache)

12. Develop and demonstrate PHP Script for the following problems:

a) Write a PHP Script to find out the Sum of the Individual Digits.
b) Write a PHP Script to check whether the given number is Palindrome or not
c) Write PHP program to convert a string, lower to upper case and upper case to lower caseor capital case.
d) Write PHP program to change image automatically using switch case.
e) Write PHP program to calculate current age without using any pre-define function.
f) Write PHP program to upload image to the server using html and PHP.

13. Implement the following web applications using

a) PHP
b) Servlets
c) JSP

14. Implement the web applications with Database using

(a) PHP, (b) Servlets and (c) JSP.

15. Modify the above PHP program to use an xml instead of database

16. Write a program to design a simple calculator using

(a) JavaScript (b) PHP (c) Servlet and (d) JSP.

REFERENCE BOOKS:

1) Uttam K Roy, Web Technologies, Oxford University Press, 1st Edition, 2010.
2) Steven Holzner, The Complete Reference PHP, Tata McGraw-Hill, 1st Edition, 2007
3) HTML Black Book – Steve Holzner.
4) The complete Reference Java 2 Fifth Edition by Patrick Naughton and Herbert Schildt.TMH
5) Java Server Pages –Hans Bergsten, SPD O'Reilly

CS 353-C	Python for AI Lab	L T P M C 1 0 2 100 2

1. Write a Program to Implement Breadth First Search using Python.
2. Write a Program to Implement Depth First Search using Python.
3. Write a Program to Implement Tic-Tac-Toe game using Python.
4. Write a Program to Implement 8-Puzzle problem using Python.
5. Write a Program to Implement Water-Jug problem using Python.
6. Write a Program to Implement Travelling Salesman Problem using Python.
7. Write a Program to Implement Tower of Hanoi using Python
8. Write a Program to Implement Monkey Banana Problem using Python.
9. Write a Program to Implement Alpha-Beta Pruning using Python.
10. Write a Program to Implement 8-Queens Problem using Python.

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R.V.R. & J.C. College of Engineering
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Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

Dr. BALAJI VICHARAPU
M.Tech., Ph.D
Head
Department of Computer Science & Engineering
College of Engineering & Technology
Acharya Nagarjuna University, Nagarjuna Nagar

CS 353-D	Mobile Application Development Lab	L	T	P	M	C
		1	0	2	100	2

OBJECTIVES:

• To understand the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.

• To understand how to work with various mobile application development frameworks.

• To learn the basic and important design concepts and issues of development of mobile applications.

• To understand the capabilities and limitations of mobile devices.

LIST OF EXPERIMENTS:

1. Develop an application that uses GUI components, Font and Colours.
2. Develop an application that uses Layout Managers and event listeners.
3. Develop an application that makes use of databases.
4. Develop an application that makes use of Notification Manager.
5. Develop a Simple Android Application to display different shapes..
6. Develop a native application that uses GPS location information.
7. Implement an application that for basic calculator.
8. Implement an application that creates an alert upon receiving a message.
9. Write a mobile application that makes use of RSS feed.
10. Develop a mobile application for Creating an Alarm.
11. Develop a mobile application to send an email.
12. Develop a Mobile application for simple needs (Mini Project).

OUTCOMES:

Upon Completion of the course, the students will be able to:

• Develop mobile applications using GUI and Layouts.

• Develop mobile applications using Event Listener.

• Develop mobile applications using Databases.

• Develop mobile applications using RSS Feed, Internal/External Storage, SMS and GPS.

• Analyse and discover own mobile app for simple needs.

REFERENCES:

1. Build Your Own Security Lab, Michael Gregg, Wiley India

Head
Department of Computer Science & Engineering
R.V.R. & J.C. College of Engineering
Acharya Nagarjuna University

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Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
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Chandramoulipuram, Chowdavaram
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CS 353-F	Tableau Lab	L	T	P	M	C
		1	0	2	100	2

1. Introduction to Tableau and Installation
2. Connecting to Data and preparing data for visualization in Tableau
3. Data Aggregation and Statistical functions in Tableau.
4. Creating common visualizations (bar charts, line charts etc.)
5. Data Storytelling
    - Intro to data storytelling
    - Creating a data story in Tableau.
6. Transform the data
    - Creating simple calculations in Tableau
    - Using table calculations
7. Basic Dashboards in Tableau.

REFERENCES BOOKS:

1. Interactive Data Visualization for the Web by Scott Murray 2nd Edition (2017)
2. D3.js in Action by Elijah Meeks 2nd Edition (2017)
3. Semiology of Graphics by Jacques Bertin (2010)
4. Data visualization with python: create an impact with meaningful data insights using interactive and engaging visuals, Mario Dobler, Tim Grobmann, Packt Publications, 2019
5. Practical Tableau: 100 Tips, Tutorials, and Strategies from a Tableau Zen Master, Ryan Sleeper, Oreilly Publications, 2018 .

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Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
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Chandramoulipuram, Chowdavaram
GUNTUR - 522 019. A.P.

ACHARYA NAGARJUNA UNIVERSITY

SCHEME OF INSTRUCTION AND EXAMINATION, w.e.f. 2022

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING(CSE)

III/IV B. Tech II-SEMESTER

S.No.	Course Details		Category	Scheme of Instruction			Scheme of Examination		
				Hours in a Week			Marks		
	Code	Subject Name		L	T	P	Internal	External	Credits
1	AM/CS/CY/DS 321	Automata Theory and Compiler Design	PC	3	0	0	30	70	3
2	AM/CS 322	Cryptography & Network Security	PC	3	0	0	30	70	3
3	CS 323	Design and Analysis of Algorithms	PC	3	0	0	30	70	3
4	CS 324	Elective-III	PC	3	0	0	30	70	3
5	CS 325	Open Elective [Moocs]	PC	3	0	0	30	70	3
6	AM/CS 326	Constitution of India	MC	3	0	0	30	70	0
7	CS 361	Design and Analysis of Algorithms	PC	0	0	2	30	70	1.5
8	CS 362	Elective III-Lab	PC	0	0	2	30	70	1.5
9	AM/CS/CY/DS 363	Soft Skill Lab	SC	1	0	2	30	70	2
10	AM/CS/CY/DS 364	Mini Project/Internship	PC	0	0	3	100	0	1.5
Total Credits									**21.5**
Honors/Minor courses (The hours distribution can be 3-0-2 or 3-1-0 also)									**4**

Elective-III and Lab(362)	
AM/CS 324-A	Network Programming
AM/CS 324-B	Cloud Computing Architecture And Its Application
CS 324-C	Software Testing Methodology
AM/CS 324-D	Artificial Neural Network

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AM/CS/CY/DS 321 Automata Theory & Compiler Design	L	T	P	M	C
	3	0	0	100	3

Course Objectives:

- Illustrating finite state machines to solve problems in computing.
- Understanding deterministic and non-deterministic machines.
- To familiarize regular grammars, context frees grammar.
- To understand the differences between decidability and undecidability.
- To explain the hierarchy of problems arising in the computer sciences.

Course Outcomes:

1. Understand the basic properties of formal languages and grammars.
2. Differentiate regular, context-free and recursively enumerable languages.
3. Make grammars to produce strings from a specific language.
4. Including decidability and intractability.

UNIT-I

Finite Automata & Regular Languages: Fundamentals & Finite Automata: Alphabet, Strings, Language, Operations, Finite state machine, definitions, finite automaton model, deterministic finite automaton and non-deterministic finite automaton, Finite Automata with output- Moore and Mealy machines.

Regular Languages: Regular sets, regular expressions, identity rules, Constructing finite Automata for a given regular expressions, Conversion of Finite Automata to Regular expressions. Pumping lemma of regular sets.

UNIT-II

Grammars & Context-free Languages (CFLs)

Regular grammars: right linear and left linear grammars, Context free grammar, derivation trees, and sentential forms. Rightmost and leftmost derivation of strings.

Context-free Languages: Ambiguity in context free grammars. Chomsky normal form, Pumping Lemma for Context Free Languages. Pushdown Automata (PDA).

UNIT-III

Turing Machines & Computability - Introduction to Turing Machines, definition, model, design of TM, Multi-tape Turing machines. Recursive and Recursively enumerable languages.

Computability Theory: Chomsky hierarchy of languages, decidability of problems, Undecidability of Halting Problem..

UNIT-IV

Introduction to Compiler - Phases and passes, Bootstrapping, Finite state machines and regular Expressions and their applications to lexical analysis, Implementation of lexical analysis. Basic Parsing Techniques- Parsers, top-down parsing, bottom-up parsing, LR parsing.

UNIT-V

Syntax-directed Translation - Syntax-directed Translation schemes, Implementation of Syntax directed Translators, Intermediate code, postfix notation, Parse trees & syntax trees, three address code, quadruple & triples. Symbol Tables: Data structure for symbols tables.

Introduction to code optimization- Loop optimization, the DAG representation of basic blocks, Global Data-Flow analysis.

Text Books:

1. Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, MonicaS. Lam, Ravi Sethi, Jeffry D. Ullman, Pearson.
2. "Introduction to Automata Theory Languages and Computation". Hopcroft H.E. and Ullman J. D.Pearson Education.
3. "Theory of Computer Science – Automata languages and computation". Mishra and Chandra shekaran, 2nd edition, PHI.

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R.V.R. & J.C. College of Engineering
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GUNTUR-522

Reference Books:

1) Automata and Computability, Dexter C. Kozen, Springer Publishers, 2007.
2) Introduction to Automata Theory, Languages and Computation, Hopcroft, Motwani, and Ullman, Pearson Publishers, Third Edition, 2006.
3) Elements of the Theory of Computation, H. R. Lewis and C.H. Papadimitriou, Prentice Hall Publishers, 1981
4) Introduction to Languages and the Theory of Computation, John. C. Martin, Tata McGraw-Hill, 2003.
5) Formal Languages and Automata Theory, E.Srinivasa Reddy, B.S. Publications.
6) Compilers: Principles, Techniques and Tools, Second Edition, Alfred V. Aho, Monica S.Lam, Ravi Sethi, Jeffry D. Ullman, Pearson.
7) Compiler Construction-Principles and Practice, Kenneth C Louden, Cengage Learning.
8) Modern compiler implementation in C, Andrew W Appel, Revised edition, Cambridge University Press.
9) Introduction to compiler design, Torben Egdius Mogensen, Pearson Education 2011.

E-resources:

https://archive.nptel.ac.in/courses/106/105/106105190/

CO-PO mapping Matrix

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

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Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
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Chandramoulipuram, Chowdavaram,
GUNTUR-522 019. (A.P.)

AM/CS 322	Cryptography and Network Security	L T P M C 3 0 0 100 3

Course Objectives:

- Learn the basic categories of threats to computers and networks.
- Understand various cryptographic algorithms and be familiar with public-key cryptography.
- Apply authentication functions for providing effective security.
- Analyse the application protocols to provide web security.
- Discuss the place of ethics in the information security area.

Course Outcomes:

1. Understand the basic concepts on attacks of computer, computer security.
2. Understand the concepts of symmetric key ciphers.
3. To describe about the message authentication algorithm and hash functions.
4. Understand the concepts of e-mail security.
5. Understand the concepts of web security.

UNIT I

Attacks on computers and computer security: Introduction, the need for security, security approaches, principles of security, types of security attacks, security services, security mechanism, a model for network security.

Cryptography concepts and techniques: Introduction, plain text and cipher text, encryption and decryption, symmetric and asymmetric key cryptography, substitution techniques, transposition techniques steganography, key range and key size, Fermat's and Euler's theorem.

UNIT-II

Symmetric key ciphers: Block cipher principles and algorithms (DES, AES, Blowfish), differential and linear cryptanalysis, block cipher modes of operation, stream ciphers, RC4 location, and placement of encryption function, key distribution;

Asymmetric key ciphers: Principles of public key cryptosystems, algorithms (RSA Diffie – Hellman,ElGamal), key distribution.

UNIT III

Message authentication algorithm and hash functions: Authentication requirements, functions, message, MD5 message digest algorithm, authentication codes, hash functions, secure hash algorithm, HMAC, CMAC, digital signatures, Elgamal based digital signatures, knapsack algorithm.

Authentication application: Kerberos, X.509 authentication service, public –key infrastructure.

UNIT IV

E-mail Security: Pretty Good Privacy; S/MIME IP Security: IP security overview, IP security architecture, authentication header, encapsulating security payload, combining security associations.

UNIT V

Web security: Web security considerations, secure socket layer and transport layer security, secure electronic transaction protocol.

Intruders, Virus and firewalls: Intruders, intrusion detection password management, virus and related threats, countermeasures, firewall design principles; Types of firewalls

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

PRINCIPAL
R.V.R. & J.C. College of Engineering
Chandramoulipuram, Chowdavaram
GUNTUR-522 019, (A.P.)

Reference Books:

1. William Stallings, Cryptography and Network Security, Pearson Education, 2006
2. AtulKahate, "Cryptography and Network Security", McGraw-Hill, 2nd Edition, 2009.
3. C K Shymala, N Harini, Dr. T R Padmanabhan, "Cryptography and Network Security", Wiley India, 1st Edition, 2016.
4. Behrouz A. Forouzan Dedeep Mukhopadhyay, "Cryptography and Network Security", McGraw Hill, 2nd Edition, 2010.
5. Eric Cole, Dr. Ronald Kurtz and James W. Conley, Network Security Bible, Wiley Publishers, 2009
6. Jason Albanese and Wes Sonnenreich, Network Security Illustrated, MGH Publishers, 2003

CO-PO Mapping Matrix:

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

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Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

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R.V.R. & J.C. College of Engineering
Chandramoulipuram, Chowdavaram,
GUNTUR-522 019, (A.P.)

CS 323	Design & Analysis of Algorithms	L	T	P	M	C
		3	0	0	100	3

Course Objectives:

- Analyse the asymptotic performance of algorithms.
- Write rigorous correctness proofs for algorithms.
- Demonstrate a familiarity with major algorithms and data structures.
- Apply important algorithmic design paradigms and methods of analysis.
- Synthesize efficient algorithms in common engineering design situations.

Course Outcomes:

1. Analyse time efficiency of algorithms using Divide and Conquer Strategy.
2. solve Optimization problems using Greedy strategy.
3. Distinguish Dynamic Programming and Greedy Strategies.
4. Test the efficient algorithms using Back Tracking, Branch & Bound for solving problems.
5. Examine computational problems into P, NP, NP-Hard and NP-complete.

Unit I

Background: Introduction, algorithms specification, time and space complexity, performance analysis.
Divide and Conquer: Binary search, merge sort, quick sort, Strassen's matrix multiplication, maximum and minimum problem.

Unit II

Greedy Methods: General method, Activity Selection Problem, optimal merge patterns, Knapsack problem, job scheduling problem, single source shortest path problem.

Unit III

Dynamic Programming: General method, multistage graphs, 0/1 Knapsack problem, longest common subsequence, string editing, travelling salesman problem, optimal binary search trees.

Unit IV

Back Tracking: General method, N-queen problem, sum of subset problem, graph colouring, Hamiltonian cycles.

Unit V

Branch and Bound: General method, 0/1 knapsack problem, travelling salesman problem.
NP Hard and NP Complete: deterministic and nondeterministic algorithms, NP Hard and NP complete, Example NP-complete Problems.

Text Books:

1. Cormen T. H, Leiserson C. E, Rivest R. L, and Stein C., Introduction to Algorithms, Prentice- Hall of India, 2nd Ed., 2001.
2. Horowitz E., Computer Algorithms, Galgotia Publications, 1998.

Reference Books:

1. Cormen T. H, Leiserson C. E, Rivest R. L, and Stein C., Introduction to Algorithms, Prentice- Hall of India, 2nd Ed., 2001.
2. Brassard G., Fundamentals of Algorithmics, Prentice-Hall of India, 2003.
3. Aho A. V., Design and Analysis of Algorithms, Addison Wesley, 2001.

Head of the Department
Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
Chowdavaram, GUNTUR-522019

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R.V.R. & J.C. College of Engineering
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GUNTUR-522 019, (A.P.)

CO PO-PSO Articulation Matrix:

Mapping	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	2	2	1	0	0	0	0	0	0	3	3	2	1
CO2	3	3	3	2	2	0	0	0	0	1	0	2	2	3	2
CO3	2	3	2	3	2	0	0	1	0	1	0	2	2	2	3
CO4	3	3	3	3	3	1	1	1	1	2	2	3	3	3	2

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Computer Science & Engineering (DS)
R.V.R. & J.C. College of Engineering
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GUNTUR-522 019, (A.P.)

ELECTIVE-III

Network Programming

AM/CS 324 -A	L	T	P	M	C
	3	0	0	100	3

Course Objectives:

- Demonstrate mastery of main protocols comprising the Internet.
- Develop skills in network programming techniques.
- Implement network services that communicate through the Internet.
- Apply the client- server model in networking applications.
- Practice networking commands available through the operating systems.

Course Outcomes:

1. Understand the key protocols which support the Internet
2. Create applications using techniques such as multiplexing, forking, multithreading
3. Apply knowledge of Unix/Linux operating systems to build robust client and server software for this environment;
4. Learn advanced programming techniques such as IPv6 Socket Programming, Broadcasting, Multicasting.

UNIT-I

Introduction to Network Programming: OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application.

Sockets: Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.

UNIT-II

TCP client server: Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host.

Elementary UDP sockets: Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP.

I/O Multiplexing and socket options: I/O Models, select function, Batch input, shutdown function, poll function.

UNIT-III

Socket options: getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.

Advanced I/O Functions: Introduction, Socket Timeouts, recv and send Functions, readv and writev Functions, recvmsg and sendmsg Functions, Ancillary Data, How Much Data Is Queued?, Sockets and Standard I/O, T/TCP: TCP for Transactions.

UNIT-IV:

Elementary name and Address conversions: DNS, gethost by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.

Daemon Processes and inetd Superserver: Introduction, syslogd Daemon, syslog Function, daemon_init Function, inetd Daemon, daemon_inetd Function.

Broadcasting: Introduction, Broadcast Addresses, Unicast versus Broadcast, dg_cli Function Using Broadcasting, Race Conditions.

UNIT-V

Remote Login: Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.

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Chandramoulipuram, Chowdava
GUNTUR-522 019, (A.P.)

Text Books:

1. UNIX Network Programming, W. Richard Stevens, Bill Fenner, Andrew M. Rudoff, Third Edition, Pearson Education,2015
2. UNIX Network Programming, W. Richard Stevens. Second Edition Pearson,2015
3. UNIX Network Programming, Vol. I, Sockets API, 2nd Edition. - W.Richard Stevens, Pearson Edn. Asia.
4. UNIX Network Programming, 1st Edition, - W.Richard Stevens. PHI.
5. UNIX Systems Programming using C++ T CHAN, PHI.
6. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education.

Reference Books:

1. UNIX for Programmers and Users, 3rd Edition Graham GLASS, King abls, Pearson Education.
2. Advanced UNIX Programming 2nd Edition M. J. ROCHKIND, Pearson Education.

CO-PO/PSO Mapping Matrix:

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

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ELECTIVE-III

AM/CS 324 -B Cloud Computing Architecture and its Application L T P M C
3 0 0 100 3

Course Objectives:

- Students will be able to learn about cloud environment.
- Students will be able to learn about the key dimensions of the challenges of cloud computing.
- Student encounters with building software systems and components which scale millions of users in modern internet.
- students will be able to deal with various cloud service models such as Iaas, Paas, Saas
- Students will be able to learn about the storage and management of resources concepts in the cloud.
- Students will learn about the components that scale to millions of users in modern internet, cloud concepts capabilities across the various cloud service models including Iaas, Paas, Saas, and developing cloud-based software applications on top of cloud platforms.

Course Outcomes:

1. Summarize the key dimensions of the challenge of Cloud Computing (Understanding –L1)
2. Assessment of the economics, financial, and technological implications for selecting cloud computing for own organization (Evaluating – L3)
3. Assessing the financial, technological, and organizational capacity of employer's for actively initiating and installing cloud-based applications. (Evaluating – L2)
4. Assessment of own organizations' needs for capacity building and training in cloud computing related IT areas. (Evaluating – L3)

UNIT-I

Computing Paradigms: High-Performance Computing, Parallel Computing, Distributed Computing, Cluster Computing, Grid Computing, Cloud Computing, Bio computing, Mobile Computing, Quantum Computing, Optical Computing, Nano computing.
Cloud Computing Fundamentals: Motivation for Cloud Computing, The Need for Cloud Computing, Defining Cloud Computing, Definition of Cloud computing, Cloud Computing Is a Service, Cloud Computing Is a Platform, Principles of Cloud computing, Five Essential Characteristics, Four Cloud Deployment Models.

UNIT-II

Cloud models: Introduction, Collaboration to cloud, Cloud Models, Cloud Applications and Architecture, Cloud Computing Architecture, Cloud Infrastructure Models, Cloud Infrastructure Self Service, Scaling a cloud infrastructure. Architectural Design of Compute and Storage Clouds, Public Cloud Platforms, Inter Cloud Resource Management, Cloud Security and Trust Management. Service Oriented Architecture, Message Oriented Middleware.

UNIT-III

Cloud Service Models: Infrastructure as a Service: Characteristics of IaaS. Suitability of IaaS, Pros and Cons of IaaS, Summary of IaaS Providers. Platform as a Service: Characteristics of PaaS, Suitability of PaaS, Pros and Cons of PaaS, Summary of PaaS Providers. Software as a Service: Characteristics of SaaS, Suitability of SaaS, Pros and Cons of SaaS, Summary of SaaS Providers, Other Cloud Service Models.

UNIT-IV

Concurrent and Data Intensive Computing: Thread Programming, Programming Applications with Threads, What is a Thread?, Thread APIs, Techniques for Parallel

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Computation with Threads, Multithreading with Aneka, Introducing the Thread Programming Model, Aneka Thread vs. Common Threads, Programming Applications with Aneka Threads, Aneka Threads Application Model.

High-Throughput Computing: Task Programming, Task Computing, Characterizing a Task, Computing Categories, Frameworks for Task Computing, Task-based Application Models, MPI Applications, Workflow Applications with Task Dependencies,

UNIT-V:

Data Intensive Computing and Cloud Platforms in Industry: Map-Reduce Programming, What is Data-Intensive Computing?, Characterizing Data-Intensive Computations, Challenges Ahead, Historical Perspective, Technologies for Data-Intensive Computing.

Cloud Platforms in Industry, Amazon Web Services, Compute Services, Storage Services, Communication Services, Additional Services, Google AppEngine, Architecture and Core Concepts, Application Life-Cycle, Cost Model.

Text Books:

1. Essentials of cloud Computing: K. Chandrasekhran, CRC press, 2014
2. Distributed and Cloud Computing, Kai Hwang, Geoffry C. Fox, Jack J. Dongarra MK Elsevier.
3. Cloud Computing, Theory and Practice, Dan C Marinescu, MK Elsevier.
4. Cloud Computing, A Hands-on approach, ArshadeepBahga, Vijay Madisetti, University Press

Reference Books:

1. Cloud Computing, A Practical Approach, Anthony T Velte, Toby J Velte, Robert Elsenpeter, TMH
2. Mastering Cloud Computing, Foundations and Application Programming, Raj Kumar Buyya, Christen vecctiola, S Tammaraiselvi.

Online Resources:

1. **https://nptel.ac.in/courses/106/105/106105167/**
2. **https://cloudacademy.com/courses/**
3. **www.slideshare.net**

CO-PO Mapping Matrix

Mapping	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO 1	PSO 2
CO1		2	2		2					1	2	1	1	2
CO2		2	2		2					1	2	1	1	2
CO3		2	2		2					1	2	1	1	2
CO4		2	2		2					1	2	1	1	2
CO5		2	2		2					1	2	1	1	2

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ELECTIVE-III

CS 324 -C	**Software Testing Methodology**	L T P M C 3 0 0 100 3

Course Objectives:

- To study the fundamental concepts of software testing which includes objectives,process, criteria, strategies, and methods.
- To discuss various software testing types and levels of testing like black and white box testing along with levels unit test, integration, regression, and system testing.
- It also helps to learn the types of bugs, testing levels with which the student can very well identify a bug and correct as when it happens.
- It provides knowledge on transaction flow testing and data flow testing techniques so that the flow of the program is tested as well.
- To learn the domain testing, path testing and logic based testing to explore the testing process easier.

Course Outcomes:

1. Know the basic concepts of software testing and its essentials.
2. Able to identify the various bugs and correcting them after knowing the consequences of the bug.
3. Use of program's control flow as a structural model is the corner stone of testing.
4. Performing functional testing using control flow and transaction flow graphs

UNIT-I

Introduction: Purpose of testing, Dichotomies, model for testing, consequences of bugs, taxonomy of bugs.

Flow graphs and Path testing: Basics concepts of path testing, 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, domain and interface testing, domains and testability.

UNIT-IV:

Paths, Path products and Regular expressions: Path products &path expression, reduction procedure, applications, regular expressions & flow anomaly detection.

Logic Based Testing: Overview, decision tables, path expressions, k v charts, specifications.

UNIT-V:

State, State Graphs and Transition testing: S tate graphs, good & bad state graphs, state testing, Testability tips.

Graph Matrices and Application: Motivational overview, matrix of graph, relations, power of a matrix, node reduction algorithm, building tools

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Text Books:

1. Software Testing techniques – Boris Beizer, Dreamtech, second edition.
2. Software Testing Tools – Dr.K.V.K.K.Prasad, Dreamtech.

Reference Books:

1. The craft of software testing – Brian Marick, Pearson Education.
2. Software Testing Techniques – SPD(Oreille)
3. Software Testing in the Real World – Edward Kit, Pearson.
4. Effective methods of Software Testing, Perry, John Wiley.

CO-PO Mapping Table

CO/PO	PO1	PO2	PO3	PO4	PO5	PO7	PO10	PO12
CO1	3	3	2	1	2	1	1	1
CO2	3	3	3	2	3	2	2	2
CO3	2	2	2	1	3	1	2	2
CO4	2	3	2	2	2	1	3	1
CO5	2	3	3	3	3	2	2	2

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ELECTIVE-III

AM/CS 324 -D **Artificial Neural Networks** **L T P M C**
3 0 0 100 3

Course description and objectives:
On completion of this course the students will be able to expose themselves towards intelligence systems and knowledge based systems. It also provides knowledge of learning networks.

Course Outcomes:
Students can able to learn
1. Understand the difference between biological neuron and artificial neuron
2. Understand the application areas of neural networks
3. Understand building blocks of Neural Networks.
4. Develop neural network models
5. Design and develop applications using neural networks.

UNIT -I
Introduction to Artificial Neural Networks: Introduction, Artificial Neural Networks, , Biological Neural Networks, Comparison Between them and the Computer, Comparison Between Artificial and Biological Neural Network ,
Activation Functions: ReLU, Sigmoid, Tanh, Softmax, etc., Basic Building Blocks of Artificial Neural Networks, Artificial Neural Network (ANN) terminologies.

UNIT - II
Fundamental Models of Artificial Neural Networks: Introduction, McCulloch - Pitts Neuron Model,
Learning Rules: Hebbian Learning Rule Perceptron Learning Rule, Delta Learning Rule (Widrow-Hoff Rule or Least Mean Square(LMS)Rule, Competitive Learning Rule, UNSupervised learning, supervised Learning, Reinforcement learning.

UNIT III:
Perceptron Networks : Introduction, Single Layer Perceptron, Brief Introduction to Multilayer Perceptron Networks.
Adaline and Madaline Networks: Introduction, Adaline, Madaline
Associative Memory Networks: Introduction, Algorithms for Pattern Association, Hetero Associative Memory Neural Networks, Auto Associative Memory Network, Bi- directional Associative Memory.

UNIT – IV
Feedback Networks: Introduction, Discrete Hopfiled Net, Continuous Hopfiled Net, Relation between BAM and Hopfiled Nets.
Feed Forward Networks: Introduction, Back Propagation Network (BPN), Radial Basis Function Network (RBFN).

UNIT – V
Self-Organizing Feature Map : Introduction, Methods Used for Determining the Winner, Kohonen Self Organizing Feature Maps, Learning Vector Quantization (LVQ),Max Net, Maxican Hat, Hamming Net
Adaptive Resonance Theory : Introduction, ART Fundamentals, ART 1, ART2

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Text Books:

1. Sivanandam, S Sumathi, S N Deepa; "Introduction to Neural Networks", 2nd ed.,TATA McGraw HILL : 2005.
2. Neural Networks A Classroom Approach— Satish Kumar, McGraw HillEducation (India) Pvt. Ltd, Second Edition.
3. Artificial neural nretworks : B.yegnanarayana prentice hall publications

References Books:

1. Simon Haykin, "Neural networks A comprehensive foundations", 2nd ed., Pearson Education, 2004.
2. B Yegnanarayana, "Artificial neural networks", 1st ed., Prentice Hall of India P Ltd, 2005.
3. Li Min Fu, "Neural networks in Computer intelligence", 1st ed., TMH, 2003

CO-PO Mapping Matrix:

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

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CS 325	OPEN ELECTIVE [MOOCS]	L	T	P	M	C
		3	0	0	100	3

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AM/CS 326	Constitution of India	L	T	P	M	C
		3	0	0	100	0

Course Objectives:

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of india and election commission of india.
- To understand the central and state relation financial and administrative.

Course Outcomes:

At the end of the semester/course, the student will be able to have a clear knowledge on the following:

- Understand historical background of the constitution making and its importance for building a democratic India.
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

1. Know the sources, features and principles of Indian Constitution.
2. Learn about Union Government, State government and its administration.
3. Get acquainted with Local administration and Pachayati Raj.
4. Be aware of basic concepts and developments of Human Rights.
5. Gain knowledge on roles and functioning of Election Commission

UNIT-I

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

UNIT-II

Union Government and its Administration Structure of the Indian Union: Federalism, Centre- 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: Organisation, Structure and Functions

UNIT-IV

A.Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy

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UNIT-V

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

References Books:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash 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.Sreevai, 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:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

CO-PO/PSO Mapping Matrix:

COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	3	-	-	-	-	-	-
CO2	-	2	-	-	-	-	-	3	-	-	-	-	-	-
CO3	3	-	3	-	-	3	-	3	-	-	-	-	-	-

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CS 361 **Design & Analysis of Algorithms LAB**

Course Objectives:

1. To learn how to analyze the complexity of algorithms
2. To compare and evaluate algorithms in terms of time and space complexity
3. To program brute force, divide and conquer, decrease and conquer, transform and conquer,
4. greedy, and dynamic techniques

Course Outcomes:

1. Ability to solve and analyze general algorithms based on space and time complexity.
2. Ability to implement and empirically compare fundamental algorithms and data structures to real-world problems.
3. Knowledge about different algorithmic paradigms and optimization.

List of Experiments:

1. Estimating worst-case/average-case complexity of algorithms via programs
2. Implement Randomized quicksort.
3. Implementing strassens multiplication problem
4. Implementing merge sort using divide and conquer
5. Implementing knapsack problem using dynamic programming
6. Implementation of Dijkstras algorithm
7. Implementing Warshalls algorithm
8. Implementation of Prims algorithm
9. Implementation of 8-Queens problem using back tracking
10. Implementation of sum of subsets problem using back tracking
11. Implementing travelling sales men problem using branch an bound

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ELECTIVE-III-LAB

AM/CS 362 -A **Network Programming Lab**

Course Objectives:

1. Understand the fundamentals of computer networking and protocols like TCP, UDP, and IP.
2. Develop Socket Programming Skills for Gain hands-on experience in creating client-server applications using socket programming in C, Java, or Python.
3. Implement Network Protocols to design and implement key networking protocols and services.
4. Develop network applications using multi-threading and synchronization techniques.
5. Analyze Network Performance Using network monitoring tools to analyze and optimize network performance.

Course Outcomes:

1. Demonstrate a clear understanding of network architecture, models, and protocols.
2. Implement socket-based communication using TCP and UDP protocols.
3. Design and deploy networking solutions such as chat applications and file transfer systems.
4. Network Debugging Tools for Employ debugging and testing tools like Wireshark to analyze network traffic.
5. Optimize Network Applications to Improve the performance and security of networked applications through efficient coding and best practices.

List of Experiments:

1. Write example script to connect to Google using socket.
2. Design Socket Programming for TCP Socket.
3. Design Socket Programming for UDP Socket.
4. Design TCP iterative Client and server application to reverse the given input sentence.
5. Design TCP client and server application to transfer file.
6. Design a TCP concurrent server to convert a given text into upper case using multiplexing system call "select"
7. Design a TCP concurrent server to echo given set of sentences using poll functions
8. Design UDP Client and server application to reverse the given input sentence
9. Design UDP Client server to transfer a file
10. Design using poll client server application to multiplex TCP and UDP requests for converting a given text into upper case.
11. Design a RPC application to add and subtract a given pair of integers

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ELECTIVE-III-LAB

AM/CS 362 -B Cloud Computing Architecture And Its Applications Lab

Course Objectives:

The student should be made to:

- Be exposed to tool kits for grid and cloud environment.
- Be familiar with developing web services/Applications in grid framework
- Learn to run virtual machines of different configuration.
- Learn to use Hadoop

Course Outcome:

On completion of this course, the students will be able to:

1. Configure various virtualization tools such as Virtual Box, VMware workstation.
2. Design and deploy a web application in a PaaS environment.
3. Learn how to simulate a cloud environment to implement new schedulers.
4. Install and use a generic cloud environment that can be used as a private cloud.
5. Manipulate large data sets in a parallel environment.

List Of Experiments:

1. Install Virtual box/VMware Workstation with different flavours of linux or windows OS on top ofwindows7 or 8.
2. Install a C compiler in the virtual machine created using virtual box and execute Simple Programs
3. Install Google App Engine. Create hello world app and other simple web applications using python/java.
4. Use GAE launcher to launch the web applications.
5. Simulate a cloud scenario using Cloud Sim and run a scheduling algorithm that is not present in Cloud Sim.
6. Find a procedure to transfer the files from one virtual machine to another virtual machine.
7. Find a procedure to launch virtual machine using try stack (Online Open stack Demo Version)
8. Install Hadoop single node cluster and run simple applications like wordcount.

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ELECTIVE-III-LAB

AM/CS 362 -C **Software Testing Methodology Lab**

Course Objectives:

1. To provide knowledge of Software Testing Methods.
2. To develop skills in software test automation and management using latest tools.

Course Outcomes:

1. Design and develop the best test strategies in accordance to the development model

List of Experiments:

1. Write programs in C- Language to demonstrate the working of the following a. constructs: i) do.. .while ii) while….do iii) if…else iv) switch v) for
2. A program written in C- language for Matrix Multiplication fails Introspect the causes for its failure and write down the possible reasons for its failure.
3. A program written in C- language for Matrix Addition´ Introspect the causes for its failure and write down the possible reasons for its failure.
4. Take any system (e.g. ATM system) and study its system specifications and report the various bugs.
5. Write the test cases for any known application (e.g. Banking application)
6. Write the test cases for GMAIL
7. Write the test cases for FACEBOOK,TWITTER etc.,
8. Create a test plan document for any application (e.g. Library Management System)
9. Study of any web testing tool (e.g. Selenium)
10. Test case for calculator in windows application
11. BUG TRACKING TOOL Study of bug tracking tool (e.g. Bugzilla).
12. Study of any open source-testing tool (e.g. Test Link)

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ELECTIVE-III-LAB

AM/CS 362 -D **Artificial Neural Networks Lab**

Course Objectives:

- The objective of this hands-on workshop is to give insight to MATLAB for Artificial Neural Network & Intelligence and
- provide hands-on experience in selected applications.
- This can help to solve complex and dynamic real-time problems.

Course Outcomes:

1. For a given conceptual problem student will be able to analyze the problem and
2. able to visualize using Students will be familiar with different NN models and it implementation.
3. Students will be able to understand the concept of learning in NN and its implementation.
4. To conceptualize about perceptron learning rule works for linearly separable problems

List of Experiments:

1. Write a program to perform the basic matrix operations.
2. WAP to plot the Straight line.
3. WAP to plot the Sine curve.
4. How the weight & bias value effects the output of neurons.
5. How the choice of activation function effect the output of neuron experiment with the following function: ipurelin(n), binary threshold(hardlim(n)haradlims(n)), Tansig(n), logsig(n)
6. How the weight and biased value are able to represent a decision boundary in the feature space.
7. How the Perceptron Learning rule works for Linearly Separable Problem.
8. How the Perceptron Learning rule works for Non-Linearly Separable Problem
9. Write a program to draw a graph with multiple curve.
10. Write a MATLAB program to plot a few activation functions that are being used in neural networks.
11. Generate ANDNOT function using McCulloch-Pitts neural net by a MATLAB program.
12. Generate XOR function using McCulloch-Pitts neuron.
13. Write a MATLAB program to show Back Propagation Network for XOR function with Binary Input and Output.
14. Write a MATLAB program to illustrate ART neural network.

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AM/CS/CY/DS 363 **Soft Skills Lab**

Course Outcomes:

Course Outcome No.	STATEMENT	BTL
CO1	Introspect & develop a planned approach towards his career & life in general.	L4
CO2	Students will apply the fundamental inputs of communication skills in making speech delivery, individual conference, and group communication	L5
CO3	Able to write a functional and chronological resume, reports, circulars etc.	L6
CO4	Develop thinking ability and polish his expression in group discussions.	L4
CO5	Be prepared for the personal interview through mock interviews while being aware of the various kinds of interviews.	L5

Unit I Self-Development

Introduction to soft skills, Self-Management: Self-Evaluation, Self-Discipline, Self-Criticism, Self-awareness, Self-Esteem, Positive Thinking, Perceptions and Attitudes, Values and Belief Systems, Personal success factors, Handling failure, Knowing Yourself, identifying one's strengths and weaknesses, SWOT analysis, Career Planning & Goal setting

Unit II Presentation & Public Speaking

Presentation skills: Professional Presentation, Nature of Oral Presentation, Planning a Presentation, Preparing the Presentation, Delivering the Presentation.
Public Speaking, Group discussion, Interview preparation, Book Review and PPT (a review on any book in form of PPT 5 slides)

Unit III Writing Skills

Business Writing: Letter writing, Writing Formal Letters, Technical Report Writing, Memo, Notices/Circulars Agenda and Minutes of a Meeting, E-Mail, Job Application, Preparation of CV and Resume writing.

Unit IV Stress and Time Management

Introduction, Stress in Today's Time: Identify the Stress Source, Signs of Stress, Ways to Cope with Stress : Healthier Ways to Combat Stress, Steps to be Taken in the Organizations : Open communication, Time Management, Working towards Your Goals, Smart Work, Prioritize your Tasks,4 Ds of Decision Making

Unit V Ethics, Etiquette and Mannerism

Professional Etiquette: Etiquette at Meetings, Etiquette at Dining. Involuntary Awkward Actions, Public Relations Office(PRO)'s Etiquettes, Technology Etiquette : Phone Etiquette, Email Etiquette, Social Media Etiquette, Video Conferencing Etiquette, Interview Etiquette, Dressing Etiquettes : for Interview, offices and social functions, Ethical Values: Importance of Work Ethics, Problems in the Absence of Work Ethics.

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AM/CS/CY/DS 364 Mini Project/Internship

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