ACADEMIC REGULATIONS (R-20)
COURSE STRUCTURE
AND
DETAILED SYLLABI

M.Tech Regular (Full Time) Two Year Post Graduate Degree Programme

(For the Batches Admitted From the Academic Year 2020-2021)

COMPUTER SCIENCE AND ENGINEERING

Department of Computer Science and Engineering

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY (AUTONOMOUS)

Accredited by NBA, New Delhi, Accredited by NAAC, Bengaluru |Affiliated to JNTUA, Ananthapuramu, Recognized by UGC under 12(B) & 2(F) | Approved by AICTE, New Delhi)

R.V.S. NAGAR, TIRUPATI ROAD, CHITTOOR- 517 127 (AP)-INDIA
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FOREWORD

The autonomy conferred Sri Venkateswara College Engineering and technology by JNT University, Ananthapuramu based on performance as well as future commitment and competency to impart quality education. It is a mark of its abilityto function independently in accordance with the set norms the monitoring bodies UGC and AICTE. It reflects the confidence of the affiliating University in the autonomous institution to uphold and maintain standards it expects to deliver on its own behalf and thus awards degrees on behalf of college. Thus, an autonomous institution is given the freedom to have its own curriculum, examination system and monitoring mechanism, independent of the affiliating University but under its observance.

Sri Venkateswara College of Engineering and Technology is proud to win the confidence of all the above bodies monitoringthe quality in education and has gladly accepted the responsibility of sustaining, the standards and ethics it has been striving for more than a decade in reaching its present standing in the arenaof contemporary technical education.

As a follow up, statutory bodies like Academic Council and Boards of Studies are constituted with the guidance of the Governing Body of the College and recommendations of the JNTUA, Ananthapuramu to frame the regulations, course structure and syllabi under autonomous status.

The autonomous regulations, course structure and syllabi have been prepared after prolonged and detailed interaction with several expertise solicited from academics, industry and research, to produce quality

engineering graduates to the society.

All the faculty, parents and students are requested to go through all the rules and regulations carefully. Any clarifications needed are to be sought at appropriate time and with principal of the college, without presumptions, to avoid unwanted subsequent inconveniences and embarrassments. The cooperation of all the stake holders is sought for the successful implementation of the autonomous system in the larger interests of the college and brighter prospects of engineering graduates.

Principal

Vision, Mission, Quality Policy of the Institute

Vision

- To carve the youth as dynamic, competent, valued and knowledgeable professionals who shall lead the Nation to a better future and to mould the institution into a Academic Excellence and Advanced Research.

Mission

- To provide quality education, student-centered teaching- learning processes and state-of-art infrastructure for professional aspirants hailing from both rural and urban areas.
- To impart technical education that encourages independent thinking, develops strong domain of knowledge, own contemporary skills and positive attitudes towards holistic growth of young minds.

Quality policy

Sri Venkateswara College of Engineering and Technology strides towards excellence by adopting a system of quality policies and processes with continued improvements to enhance student's skills and talent for their exemplary contribution to the society, the nation and the world.

Vision and Mission of the Department under R20 Regulations

Department Vision:

- To develop as a Centre of Excellence in the diverse areas of Computer Sciences through teaching, innovation, research and collaboration thereby addressing the challenges of emerging needs.

Department Mission:

- Produce globally competent professionals in through delivering knowledge in emerging technologies of computer science to solve real world problems.
- Develop domain and research skills that enable them to undertake challenging careers and pursue Higher Education.
- Imbibe morals and values among students for developing a strong professional etiquette and with a zeal for continuous learning.
- Create an ecosystem for faculty to develop further in domain competence, research aptitude and pedagogical skills.
- Develop infrastructure and facilities for different academic and research activities.

PROGRAMME EDUCATIONAL OBJECTIVES

PEO1: To produce post graduates who can contribute in research and development to the advancementof computer science and engineering.

PEO 2: To Engage in professional practices to promote the development of innovative systems andoptimized solutions.

PEO3: To develop team work capability so that they can work on multidisciplinary projects andexhibits high level of professional and ethical values.

PROGRAMME SPECIFIC OUTCOMES

PSO1: Ability to take up higher studies, Research & Development andEntrepreneurships in the modern computing environment.

PSO2: Analyze software products, processes in a systematic way by applying problemsolving skills and employable in product oriented Industry.

SRI VENKATESWARA COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)
R.V.S. NAGAR, CHITTOOR - 517127, A.P.

COURSE STRUCTURE AND SCHEME OF EXAMINATION FOR M.TECH-COMPUTER SCIENCE AND ENGINEERING

M.TECH, I-SEMESTER

S.NO	SUBJECT CODE	SUBJECT	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
			L	T	P		CIE	SEE	TOTAL
1	20BCS01	Advanced Data Structures And Algorithms	3	0	0	3	40	60	100
2	20BCS02	Cloud Computing	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE – I									
3	20BCS03	Inter-Networking with TCP/IP	3	0	0	3	40	60	100
	20BCS04	Soft Computing							
	20BCS05	Artificial Intelligence							
PROFESSIONAL ELECTIVE – II									
4	20BCS06	Wireless Sensor Networks	3	0	0	3	40	60	100
	20BCS07	Parallel Computing							
	20BCS08	Operating Systems							
5	20BMB21	Research Methodology	2	0	0	2	40	60	100
6	20BCS09	Computer Science Applications Lab-I	0	0	4	2	40	60	100
7	20BCS10	Computer Science Applications Lab-II	0	0	4	2	40	60	100
8	20BDS11	Audit Course – I: English for Research Paper Writing	2	0	0	-	-	-	-
		TOTAL	**16**	**0**	**8**	**18**	**280**	**420**	**700**

M.TECH, II-SEMESTER

S.NO	SUBJECT CODE	SUBJECT	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
			L	T	P		CIE	SEE	TOTAL
1	20BCS11	Big Data Analytics	3	0	0	3	40	60	100
2	20BCS12	Internet Of Things	3	0	0	3	40	60	100
PROFESSIONAL ELECTIVE – III									
3	20BCS13	Cryptography and Network Security	3	0	0	3	40	60	100
	20BCS14	Deep Learning							
	20BCS15	Advanced Databases							
PROFESSIONAL ELECTIVE – IV									
4	20BCS16	Ethical Hacking	3	0	0	3	40	60	100
	20BCS17	Block chain Technology							
	20BCS18	Pattern Recognition							
5	20BCS19	Mini Project	0	0	4	2	100	00	100
6	20BCS20	Computer Science Applications Lab-III	0	0	4	2	40	60	100
7	20BCS21	Computer Science Applications Lab-IV	0	0	4	2	40	60	100
8	20BDS23	Audit Course - II :Value Education	2	0	0	-	-	-	-
		TOTAL	**14**	**0**	**12**	**18**	**340**	**360**	**700**

M.TECH, III SEMESTER

S.NO	SUBJECT CODE	SUBJECT	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
			L	T	P		CIE	SEE	TOTAL
PROFESSIONAL ELECTIVE – V									
1	20BDS12	Optimization Techniques	3	0	0	3	40	60	100
	20BCS22	Semantic web and Social Networks							
	20BCS23	Software Architecture and Design Patterns							
PROFESSIONAL ELECTIVE – VI									
2	20BCS24	Mobile application Development	3	0	0	3	40	60	100
	20BCS25	Computer Vision							
	20BCS26	Smart Sensors and Internet of Things							
3	20BCS27	**DISSERTATION PHASE-I**	-	-	20	10	40	60	100
TOTAL			**6**	**0**	**20**	**16**	**120**	**180**	**300**

M.TECH, IV-SEMESTER

S.NO	SUBJECT CODE	SUBJECT	PERIODS			CREDITS	SCHEME OF EXAMINATION (MAXIMUM MARKS)		
			L	T	P		CIE	SEE	TOTAL
1	20BCS28	**DISSERTATION PHASE-II**	-	-	32	16	120	180	300
TOTAL						**16**	**120**	**180**	**300**

M.TECH- I Semester CSE   **L T P C**
                                                             3 0 0 3

20BCS01   ADVANCED DATA STRUCTURES AND ALGORITHMS

Course Outcomes:

At the end of the course the student will be able to:
1. Distinguish between the applications data structures and the advanced ones.
2. Apply advanced data structures to solve the real world problems.
3. Understand the significance of advanced data structures.
4. Formulate and solve graph problems by using advanced data structures.

UNIT I

Overview of Data Structures: Review of Arrays, Stacks, Queues, linked lists, Linked stacks and Linked queues, Applications, Efficiency of algorithms, Asymptotic Notations, Time complexity of an algorithm using O Notation, Average, Best, and Worst-case Complexities.

UNIT II

TreesandGraphs: Introduction,DefinitionandBasicterminologiesoftrees,binarytreesandbinarysearch trees, Representation of trees and Binary trees, Binary tree Traversals, Operations and applications of Binary search trees, AVL Trees and B trees, Graphs-basic concepts, representation and traversals.

UNIT III

Red – Black Trees, Splay Trees and Hash Tables

Red–Black Trees, Splay Trees and its applications. Hash Tables: Introduction, Hash Tables, Hash Functions and its applications.

Design of Algorithms:

General Method: Divide and Conquer, Binary Search, Finding Maximum and Minimum, Strassen's Matrix Multiplication, Greedy Method**-** General Method, Minimum Cost Spanning Trees, Single Source Shortest Path.

UNIT IV

Dynamic Programming:

General Method, All Pairs Shortest Path, Single Source Shortest Path, 0 / 1 Knapsack problem, Reliability Design, Traveling Sales Person's Problem.

UNIT V

Back Tracking and Branch – and – Bound

General Method, 8 – Queen's Problem, Graph Coloring. Branch – and – Bound: The Method, LC Search, Control Abstraction, Bounding, 0 / 1 Knapsack Problem.

TEXT BOOKS:
1. G.A.V. Pai, "Data Structures and Algorithms", 2009,TMH.
2. Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran Fundamentals of Computer Algorithms, 2nd edition, 2008, University Press.
3. Cormen, Leiserson, Rivest, stein, Introduction to algorithms", Prentice Hall of India,2006.

REFERENCE BOOKS:
1. D. Samanta "*Classic Data Structures*", 2005, PHI
2. Aho, Hopcraft, Ullman "*Design and Analysis of Computer Algorithms*", 1998, PEA.
3. E. Horowitz, S. Sahni and Rajasekharan, "F*undamentals of computer Algorithms",* 3rd Edition, Galgotia publishing pvt. Ltd,1999.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

M.TECH- I Semester CSE   **L   T   P   C**
                                                            3   0   0   3

20BCS02   **CLOUD COMPUTING**
Course Outcomes:
At the end of this course student will be able to:
1. Identify issues with current cloud computing architecture concerning IoT and Big Data
2. Identify problems, explain, analyze and evaluate various Cloud computing solutions
3. Attempt to generate new innovative ideas utilizing cloud computing
4. Apply cloud computing for real-time applications

UNIT I
INTRODUCTION

Introduction to Cloud Computing – Definition of Cloud – Roots of Cloud Computing –Layers and types of cloud-Desired Features of Cloud

Migrating into the cloud—Introduction – Broad approaches to Migrating into the Cloud- Seven steps into Migrating into the Cloud

UNIT II BUSINESS CASE FOR GOING TO THE CLOUD
Accessing Cloud-Platforms-Web Applications-Web API- Web Browsers

Business case-Cloud Computing Services—Business Benefits—Hardware and Infrastructure

UNIT III CLOUD ARCHITECTURE, SERVICES AND STORAGE
Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds – IaaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT IV ARCHITECTURE FOR FEDERATED CLOUD
Introduction—A typical use case—Basic principles of cloud computing—A model for federated cloud computing—Security consideration

UNIT V GOVERENCE AND CASE STUDIES
Introduction—Basic concepts of organizational rediness—Drivers for change—Common change management model—change management maturity model—Organizational readiness and self

Assessment

Legal issues in cloud computing- Introduction-Data Privacy and security issues-Cloud Contracting Models—Jurisdictional issues raised by Virtualisation and Data Location

TEXTBOOKS:
1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski - Cloud Computing Principles and Paradigms (Wiley Series on Parallel and Distributed Computing) (2011, Wiley) - libgen.lc (3)

REFERENCE BOOKS:
1. Toby Velte, Anthony Velte, Robert Elsenpeter - Cloud Computing, A Practical Approach (2009, McGraw-Hill Osborne Media) - libgen.lc

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

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M.TECH- I Semester CSE   **L T P C**
                                                              3 0 0 3

20BCS03   **INTERNETWORKING WITH TCP/IP**
                    (Professional Elective- I)

Course Outcomes:
At the end of this course student will be able to:
1. Describe the architecture, design and behaviors of the internet and of the TCP/IP suite of protocols.
2. Describe the concepts and techniques that have been used to design and implement the TCP/IP Internet technology
3. Describe the issues that are driving the development of new protocols to broaden and enhance the operation of the Internet.

UNIT I

INTRODUCTION:

Introduction to internetworking, Overview of OSI Model TCP/IP protocol suite, Basics ofSwitching technologies and switches, Comparisons of different models, Gateways.

UNIT II

INTERNET PROTOCOL: Purpose of Internet Protocol, Internet datagram, Options, Checksum, ARP and RARP, Routing Methods: Routing Table and Routing module, ICMP, IGMP. IP Addresses: Introduction, Address classification, A sample internet with class full addressing, Subnetting, Super netting, Classless addressing, Security at the IP Layer, IPSec, IPv4 and IPv6 packet formats.

UNIT III

ROUTING PROTOCOLS: UNICAST ROUTING PROTOCOLS Interior and Exterior routing, RIP, OSPF, BGP, Multicasting: Introduction, Multicast Routing, Multicast Routing Protocols, Multicast Trees, DVMRP, MOSPF,CBT,PIM, MBONE.

UNIT IV

 TRANSPORT CONTROL PROTOCOL: TCP operation, Segment, Sliding window, Silly window, Options, TCP state machine, Karn's Algorithm, Congestion control- Leaky bucket and Token bucket algorithms. UDP: User Datagram, UDP operations, Checksum calculation.

UNIT V

 TCP/IP OVER ATM NETWORKS: ISDN and B-ISDN, ATM reference model, ATM Switch, Interconnection Network, Virtual circuit in ATM, Paths, Circuits and identifiers, ATM cell transport and

adaptation layers, packet type and multiplexing, IP Address binding in an ATM Network, Logical Subnet Concept and Connection Management.

TEXT BOOKS:
1. Internetworking with TCP/IP by Comer (Vol. 1)(PHI Pub.)
2. TCP/IP Protocol suite by Behrouz A. Forouzan.(TMH Pub.)

REFERENCE BOOKS:
1. Computer Networking by James F. Kurose, Keith W. Ross (Pearson Education)
2. TCP/IP Illustrated By Wright and Stevens (Vol.2) (Pearson Education)
3. An Introduction to Computer Networks by Kenneth C. Mansfield Jr. James L. Antonakes (PHI)

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

M.TECH- I Semester CSE   **L   T   P   C**
                                                              3   0   0   3

20BCS04   **SOFT COMPUTING**
                                     (Professional Elective- I)

Course Outcomes:

After completion of course, students would be able to:

1. Apply various soft computing concepts for practical applications
2. Use fuzzy rules and reasoning to develop decision making and expert system
3. Choose and design suitable neural network for real time problems
4. Apply optimization techniques and genetic Algorithm
5. Review the various hybrid soft computing techniques and apply in real time problems

UNIT I

INTRODUCTION TO SOFT COMPUTING AND NEURALNETWORKS:

Evolution of Computing: Soft Computing Constituents, From Conventional AI to Computational Intelligence: Machine Learning Basics

UNIT II

FUZZY LOGIC: Fuzzy Sets, Operations on Fuzzy Sets, Fuzzy Relations, Membership Functions: Fuzzy Rules and Fuzzy Reasoning, Fuzzy Inference Systems, Fuzzy Expert Systems, Fuzzy Decision Making.

UNIT III

NEURAL NETWORKS: Machine Learning Using Neural Network, Adaptive Networks, Feed forward Networks, Supervised Learning Neural Networks, Radial Basis Function Networks : Reinforcement Learning, Unsupervised Learning Neural Networks, Adaptive Resonance architectures, Advances in Neural networks

UNIT IV

GENETIC ALGORITHMS: Introduction to Genetic Algorithms (GA), Applications of GA in Machine Learning : Machine Learning Approach to Knowledge Acquisition.

UNIT V

Matlab/Python Lib: Introduction to Matlab/Python, Arrays and array operations, Functions and Files, Study of neural network toolbox and fuzzy logic toolbox, Simple implementation of Artificial Neural Network and Fuzzy Logic

TEXT BOOK:

1.Abraham Silberschatz , Peter B. Galvin, Greg Gagne," *Operating System Concepts*," John Wiley and Sons**,** Eighth Edition, 2009.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- I Semester CSE   **L T P C**
                                                             3 0 0 3

20BCS05   **ARTIFICIAL INTELLIGENCE**
                            (Professional Elective- I)

Course Outcomes:
At the end of the course, the students would be able to
1. Apply the various characteristics of Intelligent agents
2. Solve the problem by using different search in AI
3. Implement to represent knowledge in solving AI problems
4. Design the different ways of Reasoning.
5. Gaining the uncertain knowledge of Learning and Reasoning.

UNIT I

Introduction to Artificial Intelligence, Problems, Problem Spaces and Search The AI Problems - The underlying assumption - What is an AI technique? - The levels of the model - Criteria of success - Some general REFERENCES - One final word and beyond - Defining the problem as a State space search - Production systems - Problem characteristics - Production system characteristics - Issues in the design of search programs

UNIT II

Problem Solving, Un-informed Search Strategies, Informed Search and Exploration

Uninformed search strategies - Avoiding repeated states - Informed (Heuristic) search strategies - Heuristic functions - Local search algorithms and optimization problems - Local search in continuous spaces - Backtracking search for CSPs

UNIT III

Knowledge and Reasoning

Logical agents – Knowledge based agents - The wumpus world – Logic - Propositional logic

a very simple logic - Reasoning patterns in propositional logic - Effective propositional

inference - Agents based on propositional logic

UNIT IV

First-Order Logic, Inference in First-Order Logic, Knowledge Representation

Representation revisited - Syntax and semantic of first order logic - Using first order logic - Knowledge engineering in first order logic - Propositional vs. First order inference - Ontological engineering -

Categories and objects - Actions, Situations and Events - The internet shopping world - Reasoning systems for categories - Reasoning with default information - Truth maintenance systems

UNIT V

Uncertain Knowledge and Reasoning, and Learning

Uncertainty - Acting under uncertainty - Basic probability notation - The axioms of probability - Inference using full joint distributions – Independence - Baye's rule and its use - Learning from observations - Forms of learning - Inductive learning - Learning decision trees-Ensemble Learning - Why Learning Works: Computational learning theory - Knowledge in Learning - A logical formulation of learning - Knowledge inlearning.

TEXT BOOKS:
1. "Artificial Intelligence A Modern Approach", 2/e, 2003, Stuart Russell and Peter Norvig, Pearson Education, New Delhi, India.
2. "Artificial Intelligence", 3/e, 2004, Elaine Rich, Kevin Knight and Shiva Shankar B Nair, Tata McGraw Hill, Hyderabad, India.

REFERENCE BOOKS:
1. "Artificial Intelligence Structures and Strategies for Complex Problem Solving", 5/e, 2005, George F. Luther, Pearson Education, New Delhi, India.
2. "Introduction to Artificial Intelligence", 1/e, 1985, Eugene Charniak and Drew McDermott, Pearson Education, New Delhi, India.
3. "Artificial Intelligence: The Basics", 1/e, 2012, Kevin Warwick, Wearset ltd, Boldon.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- I Semester CSE　　　　　　　　　　　　　**L　T　P　C**
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20BCS06　　　　　　　　**WIRELESS SENSOR NETWORKS**
　　　　　　　　　　　　　　　　(Professional Elective- II)

Course Outcomes:
At the end of the course, the students would be able to
1. Understand the WSN application and its layered stacks
2. Implement the simulation of NS-3
3. Acquire the knowledge of Markov chain classification and analysis
4. Understand of various routing protocol and Advance in WSN.

UNIT I

Introduction to Wireless Sensor Networks: Course Information, Introduction to Wireless Sensor Networks: Motivations, Applications, Performance metrics, History and Design factors Network Architecture: Traditional layered stack, Cross-layer designs, Sensor Network Architecture Hardware Platforms: Motes, Hardware parameters

UNIT II

Introduction to ns-3: Introduction to Network Simulator 3 (ns-3), Description of the ns-3 core module and simulation example.

UNIT III

Medium Access Control Protocol design: Fixed Access, Random Access, WSN protocols: synchronized, duty-cycled Introduction to Markov Chain: Discrete time Markov Chain definition, properties, classification and analysis MAC Protocol Analysis: Asynchronous duty-cycled. X-MAC Analysis(Markov Chain)

UNIT IV

Security: Possible attacks, countermeasures, SPINS, Static and dynamic key distribution

UNIT V

Routing protocols: Introduction, MANET protocols Routing protocols for WSN: Resource- aware routing, Data-centric, Geographic Routing, Broadcast, Multicast Opportunistic Routing Analysis: Analysis of opportunistic routing (Markov Chain) Advanced topics in wireless sensor networks.

TEXT BOOKS:
1. W. Dargie and C. Poellabauer, "Fundamentals of Wireless Sensor Networks –Theory and Practice", Wiley 2010
2. KazemSohraby, Daniel Minoli and TaiebZnati, "wireless sensor networks-Technology, Protocols, and Applications", Wiley Interscience2007
3. Takahiro Hara,Vladimir I. Zadorozhny, and Erik Buchmann, "Wireless Sensor Network Technologies for the Information Explosion Era", springer2010

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

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M.TECH- I Semester CSE   **L   T   P   C**
                                                              3   0   0   3

20BCS07   **PARALELL COMPUTING**
                              (Professional Elective- II)

Course Outcomes:
   At the end of the course, the students would be able to

1.   Awareness of the GPU architecture and its programming.
2.   Design parallel programs for GPU.
3.   Design & develop OpenMP and CUDA programs.
4.   Analyze and apply various parallel algorithms.

UNIT I

Introduction to Parallel Computing Thinking in Parallel, Parallelism Vs. Concurrency, Types and levels of parallelism, Different grains of parallelism, Introduction to parallelization and vectorization: Data dependencies, SIMD technology, Definition of thread and process, Parallel programming models, Decomposition methodologies for parallel program development, The message passing paradigm,load balancing issues for parallel programs,PRAM computational model, Flynn's Taxonomy,current issues in parallel processing, Parallel Processing speedup issues: including Amdahl's and Gustafason's Laws.

UNIT II

Motivation for Heterogeneous Computing, Introduction to heterogeneous architectures- GPU in particular Modern GPU architecture. Introduction to GPU computing (general purpose computation on GPU), GPU architecture case studies: NVIDIA Fermi Tesla C2050/Kepler K20, languages for parallel computing, including:MPI and OpenMP Parallel Programming

UNIT III

CUDA Architecture, CUDA programming model, execution model, thread organization: Concept of grid, block and thread, thread index generation, warp; memory model: Introduction to global, shared, local memories, usage of cache, texture cache, constant memory, memory banks and bank conflicts. CUDA structure, API and library (CUDPP, CUBALS, FFT etc.) details. CUDA example programs (Vector dot product, Matrix multiplication (with the usage of tiling and shared memory) etc.).

UNIT IV

Fundamentals of Shared Memory Programming, Basic OpenMP concepts, PARALLEL directive, data scoping rules, basic OpenMP constructs/directives/calls, examples, parallelizing an existing code using OpenMP, More advanced OpenMP directives and functions, OpenMP performance issues

UNIT V

Problem solving using GPUs:-Single vs double precision, solving problems that involves Vectors, Matrices, Binomial coefficients, Bernstein coefficients and etc. Instructor will choose the problems from several domains with which students are already aware. Optimizations and Tools: Memory coalescing, Reduction operation using prefix sum example. Usage of shared memory optimally, Performance issues in algorithms deciding parallelization of a part of algorithm and selecting the highest parallelism, Need of profilers and analyzers, Introduction to CUDA Tools: Mem Check, Command line & Visual Profilers.

TEXT BOOKS:
1. William E. Perry, Effective *Methods for Software Testing,* Second Edition, Wiley India,2006.
2. Mordechai Ben-Menachem/Garry S. Marliss, Software*Quality*, BS *Publications,2014.*

REFERENCE BOOKS:
1. Gao,TsaoandWu,*TestingandQualityAssuranceforComponent-basedSoftwar*e,Artech House Publishers(August2003)
2. G. Gordon Schulmeyer, James I.McManus ,*Handbook of Software Quality Assurance*, Second Edition, International Thomson ComputerPress
3. William E.Lewis, Gunasekaran Veerapillai , *Software Testing and continuous Quality Improvement*, Second Edition, AuerbachPublications

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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(Autonomous)

M.TECH- I Semester CSE   **L   T   P   C**
                                                              3   0   0   3

20BCS08   **OPERATING SYSTEMS**
(Professional Elective- II)

Course Outcomes:
At the end of the course, the students would be able to
1. Understand the concepts of operating system services.
2. Understand the concepts of concurrency and synchronization.
3. Acquire knowledge in file system implementation and storage structure.
4. Acquire knowledge in Remote Procedure Call and Group Communication

UNITI
Operating System Introduction, Structures - Simple Batch, Multi programmed, time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating-System services, System Calls, Virtual Machines, System Design and Implementation.

Process and CPU Scheduling - Process concepts and scheduling, Operation on processes, Cooperating Processes, Threads, and Interposes Communication Scheduling Criteria, Scheduling Algorithm, Multiple -Processor Scheduling, Real-Time Scheduling.

UNITII
Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging. Demand Paging, Performance of Demanding Paging, Page Replacement, Page Replacement Algorithm, Allocation of Frames, Thrashing.

File System Interface and Implementation - Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management, Directory Management, Directory Implementation, Efficiency and Performance.

UNITIII
Deadlocks - System Model, Dead locks Characterization, Methods for Handling Dead locks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

Process Management and Synchronization -The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors.

UNITIV

Operating System Security Issues - Introduction to the topic of Security in Operating Systems, Principles of Information Security, Access Control Fundamentals, Generalized Security Architectures.

Introduction to Distributed systems - Goals of distributed system, hardware and software Concepts, design issues

Elementary introduction to the terminologies within Modern Oss - Parallel, Distributed, Embedded & Real Time, Mobile, Cloud and Other Operating System Models.

UNITV

Clock Synchronization, Logical Clocks, Mutual Exclusion, Global Positioning of Nodes, Data- Centric Consistency Models, Client-Centric Consistency Models, Consistency Protocols.

Introduction to Fault Tolerance, Process Resilience, Reliable Client-Server Communication, Reliable Group Communication, Distributed Commit, Recovery, Secure Channels, Access Control, Security Management

Case Study - Over View Of UNIX, LINUX, Windows NT, Android and IOS Operating systems

TEXT BOOKS:

1.Modern Operating Systems, Andrew S Tanenbaum 2nd edition Pearson/PHI
2.Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
3.Operating Systems, Dhamdhere, TMH
4.Distributed Operating System - Andrew. S. Tanenbaum, PHI.

REFERENCE BOOKS:

1. Andrew. S. Tanenbaum, "*Distributed Operating System*," New Delhi, PrenticeHall,1995.
2. William Stallings, "*Operating Systems – Internals and Design Principles*," New Delhi, Fifth Edition, Pearson Education,2008
3. Charles Crowley "*Operating Systems - A Design Approach*," New Delhi, First Edition, TMH, 2009.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

Sri Venkateswara College of Engineering and Technology
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M.TECH- I Semester CSE (DS)　　　　　　　　　　　**L　T　P　C**

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20BMB21　　　　　　　**RESEARCH METHODOLOGY**

Course Outcomes:
After Completion of the course the student will be able to

After completion of the course, the students will be able to:

1. Explain the concepts, objectives, and process of research (Understanding).

2. Formulate the research problem and develop a sufficiently coherent research design (Creating).

3. Identify the measuring and scaling procedure used in research (Applying).

4. Use statistical tools for descriptive and inferential analysis (Applying).

5. Outline the key elements of report writing (Remembering).

UNITI

Reaearch: Meaning, Objective, Motivation in Research, Types of Research, Research Approaches, Research Process; Validity and Reliability in Research; Research Design: Features of Good Design, Types of Research Design, and Basic Principles of Experimental Design

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UNITII

Sampling Design: Meaning ,Steps in Sampling Design, Characteristics of a Good Sample Design, Random Samples and Random Sampling Design; Measurement and Scaling Techniques: Errors in Measurement, Tests of Sound Measurement, Scaling and Scale Construction techniques, Forecasting Techniques, Time Series Analysis, Interpolation and Extrapolation.

UNITIII

Methods of Data Collection: Primary Data, Questionnaire and Interviews, Collection of Secondary Data, Cases and Schedules. Professional Attitude and Goals, Concept of Research Excellence, Ethics in Science and Engineering, Frauds in Science and Research.

UNIT-IV

Correlation and Regression Analysis, Method of Least Squares, Regression Vs. Correlation, Correlation Vs. Determination, Types of Correlation and Their Specific Applications; Statistical Interference: Tests of

Hypothesis, Parametric Vs. Non-Parametric Tests, Procedure for Testing Hypothesis, Use Statistical Techniques for Testing Hypothesis, Sampling Distribution, Sampling T Chi-Square Test, Analysis of Variance and Covariance, Multivariable Analysis

UNIT V

interpretation of Data and Report Writing, Layout of a Research Paper, Techniques o f Interpretation. Making Scientific Presentation at Conferences and Popular Lectures to Semi Technical Audience, Participating in Public Debates on Scientific Issues.

TEXT BOOKS:

1. Garg, C. K. (2019). Research Methodology: Methods And Techniques (4 ed.). New Delhi: New Age International Publisher.
2. Bhattacharyya, D. K. (2006). Research Methodology (2 ed.). New Delhi: Excel Books.
3. O.R. Krishnaswamy and D.Obul Reddy,(2009),Research Methodology and Statistical Analysis, Himalaya Publication,(2nd Edition)

MAPPING COs WITH POs:

COURSE OUTCOMES	PROGRAM OUTCOMES										
	1	2	3	4	5	6	7	8	9	10	11
CO1				2	3					1	
CO2				2	3					2	
CO3					3					2	
CO4				2	3					1	
CO5				2	2						
3- High Mapping		**2-Medium Mapping**			**1- Low Mapping**						

M.TECH- I Semester CSE

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20BCS09   COMPUTER SCIENCE APPLICATIONS LAB-I

Course Outcomes:

After Completion of the course the student will be able to

1. Develop program for linear and non-linear data structure such as stack, searching, sorting, tree operation and graph.

2. Develop programs for implementing classical problem for Synchronization.

3. Implement unix commands

4. Solve the problems for various system calls and its operations.

List of Experiments

1. Design and implement the following using a singly linkedlist.

　　　　　a) Stack ADT   b) Queue ADT

2. Develop to implement the dequeue (double endedqueue) ADT using a doubly linked

list and an array.

3. Develop a programs for the implementation of Write C++ programs that use non-

recursive functions to traverse the given binarytree in

　　　　　a)Preorder   b) Inorder and c) Postorder

4. Develop a programs for implementing the following sorting methods

a) Merge sort b) Heapsort

5. Design a program to perform the following operations

a)Insertion intoan AVL-tree b) Deletion from an AVL- tree

6. Develop a program to implement 0/1 KNAPSACK PROBLEM using the following techniques

a)Dynamic Programming b) Branch and Bound

7. Design a program to implement 8-QUEEN'S PROBLEM by using backtracking technique.

8. Design a program to implement GRAPH COLORING algorithm

9. Implement a program to simulate the following file organization techniques a) Single level directory

b) Two level directory c) Hierarchical

10. Design and Implement the program for file manipulation for displays the file and directory in memory

11. Design a program to imitate the concept of Dining-Philosophers problem.

12. Design and develop a program to implement lazy buddy algorithm.

13. Use ECOS operating System to develop a program for controlling accessing to a pool of resources using mutexes and condition variables

14. Design and develop a program to realize the virus classification such as boot sector,file infector and macro virus

15. Design a program to emulate the Unix ls-l command.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- I Semester CSE   **L T P C**
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20BCS10   COMPUTER SCIENCE APPLICATIONS LAB-II

Course Outcomes:
After Completion of the course the student will be able to
   1. To provide an overview of concepts of Cloud Computing
   2. To understand security features, user management of Cloud
   3. Tounderstand the basics concepts of various protocol and their importance
   4. To analyze the services and features of unicast and multicast routing protocol
   5. To analyze ATM reference model and virtual circuit in ATM protocols

LIST OF EXPERIMENTS

   1. To study cloud architecture and cloud computing model

   2. Installation and configuration of virtualization using KVM

   3. To study and implementation of Infrastructure as a Service

   4. To study and implementation of Storage as a Service

   5. To study Cloud Security management.

   6. Implementation of ARP and RARP protocol using java

   7. Implementation of IGMP and ICMP protocol using java

   8. Implementation of OSPF unicast routing protocol using java

   9. Implementation of MOSPF multicast routing protocol using java

   10. Implementation of sliding window protocol using java

   11. Implementation of karn's algorithm using java

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- II Semester CSE

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20BCS11   **BIG DATAANALYTICS**

Course Outcomes:

At the end of the course, the students would be able to

1. Acquire knowledge in big data platform and data analytic tools.
2. Acquire knowledge in Streams Concepts –Stream Data Model and Architecture.
3. Get knowledge in Handling Large data Sets in Main Memory.

Understand emerging trends and technologies-Industry challenges and. application of Analytics

UNIT I

Introduction to Big Data:

Introduction to Big Data Platform Traits of Big data -Challenges of Conventional Systems – Preprocessing of data, Web Data –Evolution of Analytic Scalability -Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools -Statistical Concepts: Sampling Distributions -Re- Sampling - Statistical Inference -Prediction Error.

UNIT II
Data Analysis:

Regression Modeling -Multivariate Analysis -Bayesian Modeling -Inference and Bayesian Networks - Support Vector and Kernel Methods -Analysis of Time Series: Linear Systems Analysis

-Nonlinear Dynamics -Rule Induction -Neural Networks: Learning and Generalization -

Competitive Learning -Principal Component Analysis

UNIT III

Mining Data Streams:

Introduction To Streams Concepts –Stream Data Model and Architecture -Stream Computing - Sampling Data in a Stream –Filtering Streams –Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window –Decaying Window -Real time Analytics Platform(RTAP) Applications -Case studies -Real Time Sentiment Analysis, Stock Market Predictions.

UNIT IV

Frequent Item sets And Clustering:

Mining Frequent Item sets -Market Based Model – Apriori Algorithm –Handling Large data Sets in

Main Memory –Limited Pass Algorithm –Counting Frequent Item sets in a stream –Clustering Techniques –Hierarchical –K-Means –Clustering High Dimensional Data –CLIQUE And PROCLUS –Frequent Pattern based Clustering Methods –Clustering in Non-Euclidean Space –Clustering for Streams and Parallelism.

UNIT V

Frameworks and Visualization:

MapReduce–Hadoop,Hive,MapR–Sharding–NoSQLDatabases-S3-HadoopDistributedFile Systems– Visualizations-VisualDataAnalysisTechniques-InteractionTechniques;Systems and Analytics Applications -Analytics using Statistical packages-Approaches to modeling in Analytics

–correlation,regression,decisiontrees,classification,association-Spark Tool- Introduction to Apache spark,pypsark

TEXT BOOKS:
1. Michael Berthold, David J. Hand, *"Intelligent Data Analysis",* Springer, 2007.
2. Anand Rajaraman and Jeffrey David Ullman, *"Mining of Massive Datasets"*, Cambridge University Press, 2012.

REFERENCE BOOKS:
1. Tom White " *Hadoop: The Definitive Guide*" Third Edition, O'reilly Media, 2012.
2. Bill Franks, "*Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics*", John Wiley & sons, 2012.
3. Glenn J. Myatt, *"Making Sense of Data",* John Wiley & Sons,2007
4. Jiawei Han, Micheline Kamber "*Data Mining Concepts and Techniques*", Second Edition, Elsevier, Reprinted2008.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- II Semester CSE
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20BCS12   INTERNET OF THINGS

Course Outcomes:

At the end of the course, the students would be able to

1. Understand the vision of IoT from the global context.
2. Determine the market perspective of IoT
3. Use of devices ,gateways and data management in IoT
4. Designing the state of Architecture for IoT

UNITI

INTRODUCTION AND CONCEPTS: Introduction to Internet of Things , Physical Design of IoT,

Logical Design of IoT – IoT Enabling Technologies – IoT levels & Deployment Templates.

Domain Specific IoTs: Introduction – Home Automation – Cities , Environment – Energy – Retail,

Logistics – Agriculture , Industry, Health & Lifestyle.

UNITII

IOT AND M2M: Introduction – M2M, Difference between IoT and M2M, SDN and NFV for IoT, IoT

System management with NETCONF,YANG , Need for IoT Systems Management –Simple network

Management protocol(SNMP) – Network operator requirements, NETCONF,YANG, IOT systems

management with NETCONF,YANG – NETOPEER.

UNITIII

DEVELOPING INTERNET OF THINGS: IoT Platforms Design Methodology , Introduction, IoT

Design Methodology, Case Study on IoT System for Weather Monitoring – Motivation for Using Python

–Iot Systems, logical Design using Python, installing Python,Python Data Types &Data Structures,

Control flow, functions, Modules, Packages, File Handling, Data/Time Operations, Classes,Python

Packages of Interest for IoT.

UNITIV

IOT PHYSICAL DEVICES & ENDPOINT: What is an IOT devices,Exemplary Devices: Raspberry

Pi,About the Board, Linux on Raspberry Pi,Raspberry Pi Interfaces,Programming Raspberry Pi with

Python– Other IoT Devices.

UNITV

IOT PHYSICAL SERVERS & CLOUD OFFERINGS: Introduction to Cloud Storage Models

& Communication APIs, WAMP, AutoBahn for IoT, Xively Cloud for IoT, Python Web Application

Framework, Django, Designing a Restful Web API, Amazon Web services for IoT, SkyNet IoT Messaging

Platform.

TEXT BOOKS:
1. Arshdeep Bahga,Vijay K.Madisetti",Internet of Things", A HANDS,ON,APPROACH,Universities
Press,2014
REFERENCE BOOKS :
1. Adrian Mcewen,Hakin Cassimally,"Designing The Internet of Things",EILEY Publications,2015
2. Jan Holler, Vlasios Tsiatsis, Catherine Mulligan, Stefan Avesand, David Boyle, Stamatis
Karnouskos,"From Machine‑ to‑ Machine to the Internet of Things",Academic Press ,2014

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

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M.TECH- II Semester CSE   **L   T   P   C**
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20BCS13   **CRYPTOGRAPHY AND NETWORK SECURITY**
                              (Professional Elective- III)

Course Outcomes:

At the end of the course, the students would be able to
   1. Apply various classical encryption techniques for real time application
   2. Compare various Cryptographic Techniques
   3. Design Secure applications
   4. Inject secure coding in the developed applications

UNIT I

Introduction and Modern Techniques

Attacks - Services and mechanisms - Security attacks - Security services - A Model for network security - Classical encryption techniques - Symmetric cipher model – Substitution techniques – Transposition techniques – Rotor machines – Steganography.

Modern Techniques: Simplified DES - Block cipher principles - Data Encryption Standard - Strength of DES - Differential and linear cryptanalysis - Block Cipher Design Principles

UNIT II

Conventional Encryption and Public Key Cryptography and Hash and Mac Algorithms

Confidentiality Using Symmetric Encryption: Placement of encryption function - Traffic confidentiality - Key distribution - Random Number Generation-**Public Key Cryptography:** Principles - RSA Algorithm - Key management - Diffie- Hellman key exchange-**Hash and Mac Algorithms:** Secure hash algorithm – Whirlpool – HMAC - CMAC

UNIT III

Digital signatures, Authentication protocols and Authentication Applications

Digital signatures - Authentication protocols - Digital signature standard -**Authentication Applications:** Kerberos - X.509 Authentication service – Public key infrastructure

UNIT IV

Electronic Mail Security and IP Security

Electronic Mail Security -Pretty Good Privacy - S/MIME -IP Security: Overview - Architecture –

Authentication header - Encapsulating security Payload - Combining security associations - Key management

UNIT V

Web Security and Intruders

Web Security Considerations - Secure socket layer and transport layer security - Secure Electronic Transaction - **Intruders:** Intruders - Intrusion detection - Password management – Firewalls - Firewall design principles - Trusted systems

TEXT BOOKS:
1. "Cryptography and Network Security", 4/e, 2006, William Stallings , Pearson Education, New Delhi ,India.
2. "Network Security Essentials (Applications and Standards)", 3/e, 2007, William Stallings, Pearson Education, New Delhi, India.

REFERENCE BOOKS:
1. "Security in Computing", 4/e, 2009, Charles P. Pfleeger, Shari Lawrence Pfleeger, Deven Shah, Pearson Education, New Delhi, India.
2. "Principles and Practices of Information Security", 4/e, 2012, Michal E. Whitman and Herbert J. Mattord, Cengage Learning, New Delhi.

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

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M.TECH- II Semester CSE

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3 0 0 3

20BCS14   **DEEP LEARNING**
                               (Professional Elective- III)

Course Outcomes:
After Completion of the course the student will be able to
1. Understand the concepts of Tensor Flow, its main functions, operations and the execution pipeline.
2. Implement deep learning algorithms, understand neural networks and traverse the layers of data abstraction which will empower the student to understand data more precisely.
3. Learn topics such as Convolutional neural networks, recurrent neural networks, training deep networks and high-level interfaces
4. Build deep learning models in Tensor Flow and interpret the results
5. Understand the language and fundamental concepts of artificial neural networks Troubleshoot and improve deep learning models
6. Differentiate between machine learning, deep learning and artificial intelligence

UNIT I

Introduction to TensorFlow: Computational Graph, Key highlights, Creating a Graph, Regression example, Gradient Descent, Tensor Board, Modularity, Sharing Variables, Keras Perceptrons: What is a Perceptron, XOR Gate.

UNIT II

Activation Functions: Sigmoid, ReLU, Hyperbolic Fns, Softmax Artificial Neural Networks: Introduction, Perceptron Training Rule, Gradient Descent Rule.

UNIT III

Gradient Descent and Back propagation: Gradient Descent, Stochastic Gradient Descent, Back propagation, Some problems in ANN Optimization and Regularization: Overfitting and Capacity, Cross Validation, Feature Selection, Regularization, Hyper parameters.

UNIT IV

Introduction to Convolutional Neural Networks: Introduction to CNNs, Kernel filter, Principles behind CNNs, Multiple Filters, CNN applications.

Introduction to Recurrent Neural Networks: Introduction to RNNs, Unfolded RNNs,Seq2Seq RNNs, LSTM, RNN applications

UNIT V

Deep Learning applications: Image Processing, Natural Language Processing, Speech Recognition, Video Analytics.

TEXT BOOKS:

1. Goodfellow, I., Bengio,Y., and Courville, A., Deep Learning, MIT Press, 2016.

REFERENCE BOOKS:

1. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006.
2. Yegnanarayana, B., Artificial Neural Networks PHI Learning Pvt. Ltd, 2009.
3. Golub, G.,H., and Van Loan,C.,F., Matrix Computations, JHU Press,2013.
4. Satish Kumar, Neural Networks: A Classroom Approach, Tata McGraw-Hill Education, 2004.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3						2		2				2
CO2	2						3		3				
CO3	3						2		2				1
CO4	2						2		3				
CO5	3						1		2			2	
CO6	3						1		2				3

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

M.TECH- II Semester CSE
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20BCS15   **ADVANCED DATA BASES**
                        (Professional Elective- III).

Course Outcomes:

At the end of the course, the students would be able to
1.Select the appropriate high performance database like parallel and distributed database
2.Represent the data using XML database for better interoperability
3.Represent the basics of new trends such as: XML in relational databases, spatial data, multimedia databases.
4.Design the process and optimize database transactions.

UNIT I

Object Based Databases: Overview - complex Data Types - Structured Types and Inheritance in SQL - Table Inheritance - Array and Multiset Types in SQL – Object-Identity and Reference Types in SQL - Implementing O-R features - Persistent Programming Languages - Object Relational Mapping - Object Oriented versus Object Relational.

UNIT II

XML: Motivation - Structure of XML data - XML Document schema - Querying and Transformation - Application Program Interface to XML - Storage of XML data - XML applications.

UNIT III

Query processing: Overview - Measures of Query Cost - Selection operating - sorting - Join operation - Other Operations - Evaluation of Expressions.

Query Optimization: Overview - Transformation of Relational Expressions - Estimating Statistics of Expressing Results - Choice of Evaluation plans - Materialized Views.

UNIT IV

Parallel Databases: Introduction - I/O Parallelism - Interquery Parallelism – Interquery Parallelism- Interoperation Parallelism - Query Optimization - Design of Parallel Systems.

Distributed Databases: Homogenous and Heterogeneous Databases - Distributed data storage- Distributed Transactions - Commit Protocols - concurrency Control in Distributed Databases –

Availability - Distributed Query Processing - Heterogeneous Distributed Databases - cloud Based Databases - Directory systems.

UNITV

Advanced Application development: PerformanceTuning - Performance Benchmarks - Other Issues in Application Development – Standardization.

Spatial and Temporal Data and Mobility: Motivation- Time in Databases - spatial and Geographical Data - Multimedia Databases - Mobility and Personal databases.

TEXT BOOKS:
1. Abraham Silbershatz, Henry F Korth, S Sudharshan, "Database System Concepts", McGrawHill International Edition, Sixth Edition,2010.
2. R.Elmasri, S.B.Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", Pearson Education, Fourth Edition, 2006.

REFERENCE BOOKS:
1. C.J.Date, A.Kannan and S.Swamynathan, "An Introduction to Database Systems", Eighth Edition, Pearson Education,2006.
2. Raghu Ramakrishnan, Johannes Gehrke, "Database Management Systems", McGraw Hill, Third Edition2004.
3. Thomas Cannolly and Carolyn Begg, "Database Systems, A Practical Approach to Design, Implementation and Management", Third Edition, Pearson Education,2007.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

M.TECH- II Semester CSE   **L T P C**

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20BCS16   **ETHICAL HACKING**

(Professional Elective- IV)

Course Outcomes:

At the end of the course, the students would be able to

1   Evaluate where information networks are most vulnerable.
2   Perform penetration tests into secure networks for evaluation purposes.
3   identifying tools for vulnerability in windows.

Develop an ongoing security strategy

UNITI

Ethical Hacking Overview: Introduction to Ethical Hacking, overview of TCP/IP,IP Addressing, Overview of numbering systems, Network and computer Attacks: malicious software(malware), viruses, macro viruses, worms, Trojan programs, spyware, adware, Protecting against malware attacks

UNIT II

Intruder attacks on networks and computers, Addressing Physical Security, Foot printing and social Engineering: using web tools for foot printing, conducting competitive Intelligence, using domain name system zone transfers, introduction to social engineering.

UNIT III

Introduction to port scanning, using port scanning tools, conducting ping sweeps, understanding scripting, **Enumeration:** Introduction to enumeration, enumerating   windows operating systems, enumerating the NetWare operating systems

UNIT IV

Programming for security professionals: Introduction to computer programming, Anatomy of a C Program, Understanding HTML basics, Understanding Perl, understanding Object oriented programming concepts, Windows OS vulnerability, tools for identifying vulnerability in windows, Best practices for handling windows systems.

UNIT V

Hacking Wireless Networks: Understanding Wireless Technologies, Wireless Network Standards, Authentication, war driving, Wireless hacking.

Network Protection Systems: Understanding Routers, Firewalls, Intrusion Detection and Prevention System, Honey pots.

4   .

TEXT BOOKS:
1. Michael T. Simpson, Kent Backman, James E.Corley, "*HandsOn Ethical Hacking and Network Defence*", Second Edition, CENGAGE Learning, 2010.

REFERENCE BOOKS:
1. Steven DeFino, Barry Kaufman, Nick Valenteen, "*Official Certified Ethical Hacker Review Guide*", CENGAGE Learning,2009.
2. Patrick Engebretson, "*The Basics of Hacking and Penetration Testing: Ethical Hacking and Penetration Testing Made Easy*", Syngress Basics Series – Elsevier, August 4,2011.
3. Whitaker & Newman, "Penetration *Testing and Network Defence*", Cisco Press, Indianapolis, IN, 2006.

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

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M.TECH- II Semester CSE **L T P C**
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20BCS17   **BLOCK CHAIN TECHNOLOGY**
(Professional Elective- IV)

Course Outcomes:

At the end of the course, the students would be able to
1. Understand emerging abstract models for Blockchain Technology.
2. Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain.
3. Provide conceptual understanding of the function of Blockchain as a method of securing distributed ledgers, how consensus on their contents is achieved, and the new applications that they enable.
4. Apply hyper ledger Fabric and Etherum platform to implement the Block chain Application.

UNIT I

BITCOIN AND CRYPTOCURRENCY: A basic crypto currency, Creation of coins, Payments and double spending, FORTH – the precursor for Bitcoin scripting, Bitcoin Scripts, Bitcoin P2P Network, Transaction in Bitcoin Network, Block Mining, Block propagation and block relay, Consensus introduction, Distributed consensus in open environments-Consensus in a Bitcoin network.

UNIT II

INTRODUCTION TO BLOCKCHAIN: Blockchain-Public Ledgers, Blockchain as Public Ledgers - Bitcoin, Blockchain 2.0, Smart Contracts, Block in a Blockchain, Transactions-Distributed Consensus, The Chain and the Longest Chain - Crypto currency to Blockchain 2.0 - Permissioned Model of Blockchain, Cryptographic -Hash Function, Properties of a hash function-Hash pointer and Merkle tree.

UNIT III

BITCOIN CONSENSUS: Bitcoin Consensus, Proof of Work (PoW)- Hashcash PoW , Bitcoin PoW, Attacks on PoW ,monopoly problem- Proof of Stake- Proof of Burn - Proof of Elapsed Time - Bitcoin Miner, Mining Difficulty, Mining Pool-Permissioned model and use cases, Design issues for Permissioned Blockchains, Execute contracts- Consensus models for Permissioned block chain-Distributed consensus in closed environment-Paxos.

UNIT IV

DISTRIBUTED CONSENSUS: RAFT Consensus-Byzantine general problem, Byzantine fault tolerant system-Agreement Protocol, Lamport-Shostak-Pease BFT Algorithm-BFT over Asynchronous systems, Practical Byzantine Fault Tolerance.

UNIT V

HYPER LEDGER FABRIC & ETHERUM: Architecture of Hyperledger fabric v1.1-Introduction to Hyperledger fabric v1.1, chain code- Ethereum: Ethereum network, EVM, Transaction fee, Mist Browser, Ether, Gas, Solidity, Smart contracts, Truffle-Design and issue Crypto currency, Mining, DApps, DAO.

BLOCKCHAIN APPLICATIONS: Internet of Things-Medical Record Management System-Blockchain in Government and Blockchain Security-Blockchain Use Cases –Finance.

TEXT BOOKS:

1. Melanie Swan, "Blockchain: Blueprint for a New Economy", O'Reilly, 2015.
2. Andreas Antonopoulos, "Mastering Bitcoin: Unlocking Digital Crypto currencies", O'Reilly, 2014.

REFERENCE BOOKS:

1. Iran Bashir "Mastering Blockchain", Second Edition Paperback, 2018.
2. Daniel Drescher, "Blockchain Basics", First Edition, Apress, 2017.
3. Ritesh Modi, "Solidity Programming Essentials: A Beginner's Guide to Build Smart Contracts for Ethereum and Blockchain", Packt Publishing.
4. Mastering Blockchain: Deeper insights into decentralization, cryptography, Bitcoin, and popular Blockchain frameworks by Bashir, Imran,2017.
5. Arvind Narayanan, Joseph Bonneau, Edward Felten, Andrew Miller, and Steven Gold feder. Bitcoin and crypto currency technologies: a comprehensive introduction. Princeton University Press, 2016.
6. Joseph Bonneau et al, SoK: Research perspectives and challenges for Bitcoin and crypto currency, IEEE Symposium on security and Privacy, 2015.

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

Sri Venkateswara College of Engineering and Technology
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M.TECH- II Semester CSE   **L   T   P   C**
                                                           3   0   0   3

20BCS18   **PATTERN RECOGNITION**
                          (Professional Elective- IV)

Course Outcomes:
At the end of the course, the students would be able to
1. Apply the mathematical foundations for recognition of patterns.
2. Acquire the knowledge of pattern selection and Extraction.
3. Identify the pattern Recognition models.
4. Gathered deep knowledge of various methods used in classifer
5 . Apply the clustering techniques in pattern Recognition in real time applications.

UNITI   INTRODUCTION
Basic concepts- Definitions-Types of data for Pattern Recognition,-Structure of a typical pattern recognition system-Design cycle of Pattern Recognition- Learning and Adaptation-Mathematical foundations: Linear algebra – Probability theory – Expectation – Mean and Covariance – Normal distribution – Multivariate normal densities – Chi square test of hypothesis.

UNITII
FEATURES EXTRACTION : Principal Component Analysis (PCA), Kernel PCA

UNITIII   MODELS
Parameterestimationmethods:Maximum-Likelihoodestimation–BayesianParameterestimation – Dimension reduction methods – Principal Component Analysis (PCA) – Fisher Linear discriminant analysis – Expectation – maximization (EM) – Hidden Markov Models (HMM) – Gaussian mixture models.

UNITIV   PATTERN CLASSIFICATION
Pattern classification using Statistical classifiers - Bayes' classifier - Classification performance measures – Risk and error probabilities. Linear Discriminant Function, Mahalanobis Distance, K-NN Classifier, Fisher's LDA, Single Layer Perceptron, Multi-layer Perceptron, Training set, test set; standardization and normalization

UNITV   CLUSTERING TECHNIQUES
Unsupervised Learning and Clustering: Criterion functions for clustering – Clustering Techniques: Iterative square – Error partitional clustering – K-Means – agglomerative hierarchical clustering – Cluster validation.

TEXT BOOKS:

1.   Devi V.S.; Murty, M.N. (2011) Pattern Recognition: An Introduction, Universities Press, Hyderabad.
2. R.O.Duda, P.E.Hart and D.G.Stork, Pattern Classification, John Wiley, 2006.
3. Statistical pattern Recognition; K. Fukunaga; Academic Press, 2000.
4. S.Theodoridis and K.Koutroumbas, Pattern Recognition, 4th Ed., Academic Press, 2009.

REFERENCES

1. Bishop, Christopher M., "Pattern Recognition and Machine Learning", First Edition, Springer,2009.
2. S. Theodoridis, K. Koutroumbas, "Pattern Recognition", Fourth Edition, Academic Press, 2009.
3. Keinosuke Fukunaga, "Introduction to Statistical Pattern Recognition", Second Edition, Academic Press,2003.
4. Sergios Thedoridis, Konstantinos Koutroumbas, "Pattern Recognition", Fourth Edition, Academic Press,2009.

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

M.TECH- II Semester CSE

	L	T	P	C
	0	0	4	2

(20BCS19)   **MINI PROJECT**

Sri Venkateswara College of Engineering and Technology
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M.TECH- II Semester CSE

L T P C
0 0 4 2

20BCS20   COMPUTER SCIENCE APPLICATIONS LAB-III

Course Outcomes:
  After Completion of the course the student will be able to
    1.Create and work on object oriented databases and work with parallel database.
    2.Work on weka tool for clustering and classification.
    3.Represent the database using XML and work on it.
        4. Students will be able to write file management program inHadoop.
        5. Handle Hive commands and develop scripting language of PigLatin

LIST OF EXPERIMENTS
ADVANCEDDATABASELAB

DISTRIBUTED DATABASE:
1. Consider a distributed database for a bookstore with 4 sites called S1, S2, S3 and S4.
Consider the following relations:
Books (ISBN, primary Author, topic, total Stock, price)
Book Store (store No, city, state, zip, inventory Value)
Stock (store No, ISBN, Qty)
Total Stock is the total number of books in stock and inventory Value is the total inventory value for the store in dollars.
Consider that Books are fragmented by price amounts into:
F1: Books: price up to $20
F2: Books: price from $20.01 to $50 F3:
Books: price from $50.01 to $100 F4:
Books: price $100.01 and above
Similarly, Book Stores are divided by ZIP codes into:
S1: Bookstore: Zip up to 25000 S2:
Bookstore: Zip 25001 to50000 S3:
Bookstore: Zip 50001to75000
S4: Bookstore: Zip 75001 to 99999 Task:
Write SQL query for the following
1. Insert and Display details in eachtable.
2. Find the total number of books in stock where price is between $15and$55.
3. Update the book price of book No=1234 from $45 to $55 at siteS3.
4. Find total number of book atsiteS2.

OBJECT ORIENTED DATABASE:
2. A University wants to track persons associated with them. A person can be an Employeeor Student. Employees are Faculty, Technicians and Project associates. Students are Full time students, Part time students and TeachingAssistants.

a) Design an Enhanced Entity Relationship (EER) Model for universitydatabase.
Write OQL for the following
i. Insert details in each object.
ii. Display the Employeedetails.
iii. Display StudentDetails.
iv. Modify persondetails.
v. Delete person details.
b) Extend the design by incorporating the following information. Students are registering for courses which are handled by instructor searchers (graduate students).Faculty are advisors to graduate students. Instructor researchers' class is a category with super class of faculty and graduate students. Faculty are having sponsored research projects with a grant supporting instruction researchers. Grants are sanctioned by different agencies. Faculty belongs to different departments. Department is chaired by a faculty. Implement for the Insertion and Display of details in eachclass.

PARALLEL DATABASE:

3. Consider the application for University Counseling for Engineering Colleges. The college, departmentandvacancydetailsaremaintainedin3sites.Studentsareallocatedcollegesinthese3
sites simultaneously. Implement this application using parallel database [State any assumptions you have made]

ACTIVE DATABASE:
4. Create triggers and assertions for Bank database handling deposits and loan and admission database handling seat allocation and vacancy position. Design the above relational database schema and implement the following triggers andassertions.
   a. Whenadepositismadebyacustomer,createatriggerforupdatingcustomersaccount andbank account.
   b. When a loan is issued to the customer, create a trigger for updating customer'sloan account and bankaccount.
   c. Create assertion for bank database so that the total loan amount does not exceed the total balance in thebank.
   d. When an admission is made, create a trigger for updating the seat allocation detailsand vacancyposition.

DEDUCTIVE DATABASE:

5. Construct a knowledge database for kinship domain (family relations) with facts. Extract the following   relations   using   rules.
Parent,Sibling,Brother,Sister,Child,Daughter,Son,Spouse,Wife,husband,Grandparent,Grandchild
, Cousin, Aunt and Uncle.

WEKA TOOL:

6.Work with Weka tool classification and clustering algorithms using the given training data and test with the unknown sample. Also experiment with different scenarios and largedataset.

RID	Age	Income	Student	Credit rating	Class: buys_computer
1	youth	high	no	Fair	no
2	youth	high	no	Excellent	no
3	middle-aged	high	no	Fair	yes
4	senior	medium	no	Fair	yes
5	senior	low	yes	Fair	yes
6	senior	low	yes	excellent	no
7	middle-aged	low	yes	excellent	yes
8	youth	medium	no	Fair	no
9	youth	low	yes	Fair	yes
10	senior	medium	yes	Fair	yes
11	Youth	medium	yes	excellent	yes
12	middle-aged	medium	no	excellent	yes
13	middle-aged	high	yes	Fair	yes

QUERY PROCESSING:

7. Implement Query Optimizer with Relational Algebraic expression construction and execution plan generation for choosing an efficient execution strategy for processing the given query. Also design employee database and test the algorithm with following samplequeries.

a) Select empid, empname from employee where experience>5
b) Find all managers working at LondonBranch

XML:

8. Design XML Schema for the given company database
   Department (deptName, deptNo, dept Manager SSN, dept Manager Start Date, Dept Location)
   Employee (empName, empSSN, empSex, empSalary, empBirthDate,empDeptNo, EmpSupervisorSSN, empAddress,empWorksOn)
   Project (projName, projNo, projLocation, projDeptNo, projWorker)
   a. Implement the following queries using XQueryandXPath
      i. Retrieve the department name, manager name, and manager salaryfor everydepartment'
      ii. Retrieve the employee name, supervisor name and employee salary for each employee who works in theResearchDepartment.
      iii. Retrieve the project name, controlling department name, numberof employees and total hours worked per week on the project for each project.
      iv. Retrieve the project name, controlling department name, numberof employees and total hours worked per week on the project for each project with more than one employee workingonit.
   b. Implement a storage structure for storing XML database and test with the aboveschema.

BIG DATA ANALYTICSLAB

9. Perform some tasks by using web based tools of Hadoopsystem.

10.   Implement the following file management tasks inHadoop:

- Adding file and directories
- Creating file, Retrieving file and deleting files

11.   Using Hive; create, insert, update, alter, delete, and drop thetables.

12.   Write Pig Latin scripts using several functions to analyze yourdata.

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

3-Highmapping   **2-MediumMapping**   **1- LowMapping**

Sri Venkateswara College of Engineering and Technology
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M.TECH- II Semester CSE   **L T P C**
                                                     0 0 4 2

20BCS21   COMPUTER SCIENCE APPLICATIONS LAB-IV

Course Outcomes:
 After Completion of the course the student will be able to
  1. Implement various algorithms to solve problems.
  2. Design and implement various machine learning algorithms in a wide range of real-   world applications.
  3. Implement various IoT Applications using Raspberry Pi and ThingSpeak

LIST OF EXPERIMENTS

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Construct a Bayesian network considering medical data. Use this model to demonstrate the diagnosis of heart patients using standard Heart Disease Data Set. You can use Java/Python ML library classes/API.
4. Implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.
5. Apply EM algorithm to cluster a set of data stored in a .CSV file. Use the same data set for clustering using *k*-Means algorithm. Compare the results of these two algorithms and comment on the quality of clustering. You can add Java/Python ML library classes/API in the program.
6. Implement *k*-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
7. Build an Artificial Neural Network by implementing the Backpropagation algorithm and test the same using appropriate data sets.
8. Study and implement the Temperature sensor to monitor temperature using Arduino
9. Familiarize with ThingSpeak and understand the procedure of creation of a Channel over ThingSpeak.
10. Understand the integrated procedure of creation, analysis, scheduling and visualization of a Channel.
11. Read Light Sensor data from ThingSpeak channel and store it into database through Raspberry pi2.
12. Setting up wireless access point using Raspberry Pi.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- II Semester CSE (DS)   **L   T   P   C**
                                           2   0   0   0

20BDS23   **VALUE EDUCATION**
                     (AUDIT COURSE-II)

Course Outcomes:
After Completion of the course the student will be able to
1. Familiar with the design process to develop visualization methods and visualization systems, and methods for their evaluation.
2. Preparation and processing of data, visual mapping and the visualization
3. Have an understanding of large-scale abstract data

UNIT I

Values and self-development –Social values and individual, attitudes. Work ethics, Indian vision of humanism, Moral and non- moral valuation. Standards and principles, Value judgements

UNIT II
Importance of cultivation of values, Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness, Honesty, Humanity. Power of faith, National Unity, Patriotism. Love for nature, Discipline.

UNITIII

Personality and Behavior Development - Soul and Scientific attitude., Positive Thinking. Integrity and discipline, Punctuality, Love and Kindness, Avoid fault Thinking, Free from anger, Dignity of labour.

UNITIV

Universal brotherhood and religious tolerance, True friendship, Happiness Vs suffering, love for truth, Aware of self-destructive habits, Association and Cooperation, Doing best for saving nature.

UNIT -V

Character and Competence –Holy books vs Blind faith, Self-management and Good health, Science of reincarnation, Equality, Nonviolence, Humility, Role of Women, All religions and same message, Mind your Mind, Self-control, Honesty, Studying effectively

TEXT BOOKS:

1. Ward, Grinstein Keim, Interactive Data Visualization: Foundations, Techniques, and Applications. Natick: A K Peters, Ltd.

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M.TECH- III Semester CSE (DS)　　　　　　　　**L　T　P　C**
　　　　　　　　　　　　　　　　　　　　　　　　3　0　0　3

20BDS12　　　　**OPTIMIZATION TECHNIQUES**

(Professional Elective- V)

Course Outcomes:
After Completion of the course the student will be able to

1. Understand the overview of optimization techniques, concepts of design　space, constraint surfaces and objective function.
2. Review differential calculus in finding the maxima and minima of functions of several　variables.
3. Formulate real-life problems with linear programming.
4. Apply dynamic programming to optimize multi stage decision problems.

UNIT I

UNCONSTRAINED OPTIMIZATION: Optimizing Single-Variable Functions, conditions for Local Minimum and Maximum, Optimizing Multi-Variable Functions.

UNIT II

CONSTRAINED OPTIMIZATION: Optimizing Multivariable Functions with Equality Constraint: Direct Search Method, Lagrange Multipliers Method, Constrained Multivariable Optimization with inequality constrained: Kuhn-Tucker Necessary conditions, Kuhn – Tucker Sufficient Conditions.

UNIT III

OPTIMIZATION: Quasi-Newton Methods and line search, least squares optimization, Gauss-Newton, Levenberg- Marquartd, Extensions of LP to Mixed Integer Linear Programming (MILP), Non-Liner Programming, The Newton Algorithm, Non-Linear Least Squares, Sequential Quadratics Programming (SQP), Constrained Optimization, SQP Implementation, Multi-Objective Optimization, Branch and Bound Approaches, Genetic Algorithms and Genetic Programming, Singular Based Optimization, On-Line Real-Time Optimization, Optimization in Econometrics Approaches – Blue.

UNIT IV

OPTIMIZATION AND FUNCTIONS OF A COMPLEX VARIABLE AND NUMERICAL ANALYSIS: The Finite Difference Method for Poisson's Equation in two Dimensions and for the Transient Heat Equation, Eulers Method, The Modified Euler Method and the Runga-Kutta Method for Ordinary Differential Equations, Gaussian Quardative Tranzoidal Rule and Simpson's 1/3 and 3/8 Rules, the Newton Raphson in one and two Dimensions, Jacobi's Iteration Method.

55

UNIT V

OPTIMIZATION IN OPERATION RESEARCH: Dynamic Programming, Transportation – Linear

Optimization Simplex and Hitchcock Algorithms, Algorithms, Minimax and Maximum Algorithm, Discrete Simulation, Integer Programming – Cutting Plane Methods, Separable Programming, Stochastic Programming, Goal Programming, Integer Linear Programming, Pure and Mixed Strategy in theory of Games, Transshipment Problems, Heuristic Methods.

TEXT BOOKS:

1. Winston W L: (01-Jan-2008) Operations Research: Applications and Algorithms, Thomson Business Press.
2. Singiresu S. Rao, S. S. Rao(2009), Engineering Optimization: Theory and Practice, (4th edition, John Wiley & Sons.

REFERENCE BOOKS:

1. Williams H.P. (2013): Model Building in Mathematics Programming, (5th ed.), John Wiley.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- III Semester CSE (DS)   **L T P C**
                                                          3 0 0 3

20BCS22   SEMANTIC WEB ANDSOCIAL NETWORKS
(Professional Elective- V)

Course Outcomes:

At the end of the course, the students would be able to
1. Analyze the Semantic Web architectures, Perform Ontology reasoning.
2. Apply Ontology programming using Jena API.
3. Develop Ontology using Protégé editor, Perform queries on Ontology.
4. Develop Semantic Web Applications

UNIT -I
Web Intelligence

Thinking and Intelligent Web Applications, The Information Age ,The World Wide Web, Limitations of Today's Web, The Next Generation Web, Machine Intelligence, Artificial Intelligence, Ontology, Inference engines, Software Agents, Berners-Lee www, Semantic Road Map, Logic on the semantic Web.

UNIT- II
Knowledge Representation for the Semantic Web

Ontologies and their role in the semantic web, Ontologies Languages for the Semantic Web – Resource Description Framework(RDF) / RDF Schema, Ontology Web Language(OWL), UML, XML/XML Schema.

UNIT-III
Ontology Engineering

Ontology Engineering, Constructing Ontology, Ontology Development Tools, Ontology Methods, Ontology Sharing and Merging, Ontology Libraries and Ontology Mapping, Logic, Rule and Inference Engines.

UNIT-IV
Semantic Web Applications, Services and Technology

Semantic Web applications and services, Semantic Search, e-learning, Semantic Bioinformatics, Knowledge Base ,XML Based Web Services, Creating an OWL-S Ontology for Web Services, Semantic Search Technology, Web Search Agents and Semantic Methods.

UNIT-V
Social Network Analysis and semantic web

What is social Networks analysis, development of the social networks analysis, Electronic Sources for Network Analysis – Electronic Discussion networks, Blogs and Online Communities, Web Based Networks. Building Semantic Web Applications with social network features.

TEXT BOOKS

1. Berners Lee, Godel and Turing , ”*Thinking on the Web*”, Wiley ,2008.
2. Peter Mika, “*Social Networks and the Semantic Web*, Springer,2007.

REFERENCE BOOKS:

1. J.Davies, R.Studer, P.Warren, *Semantic Web Technologies, Trends and Research in Ontology Based Systems*,John Wiley &Sons,2006.
2. Liyang Lu Chapman ,*Semantic Web and Semantic Web Services* ,Hall/CRC Publishers,2007.
3. Heiner Stucken Schmidt, Frank Van Harmelen, *Information Sharing on the semantic Web*, SpringerPublications,2006.

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

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M.TECH- III Semester CSE (DS)   **L   T   P   C**
                                            3   0   0   3

20BCS23   SOFTWARE ARCHITECTURE AND DESIGN PATTERNS

(Professional Elective- V)

Course outcomes:

At the end of the course, the students would be able to
1. Design and implement codes with higher performance and lower complexity
2. Be aware of code qualities needed to keep code flexible
3. Experience core design principles and be able to assess the quality of a design with respect to these principles.
4. Capable of applying these principles in the design of object oriented systems.
5. Demonstrate an understanding of a range of design patterns.

Unit I

Introduction: what is a design pattern? describing design patterns, the catalog of design pattern, organizing the catalog, how design patterns solve design problems, how to select a design pattern, how to use a design pattern. What is object-oriented development? , key concepts of object oriented design other related concepts, benefits and drawbacks of the paradigm .

UNIT II
Analysis a System: overview of the analysis phase, stage 1: gathering the requirements functional requirements specification, defining conceptual classes and relationships, using the knowledge of the domain. Design and Implementation, discussions and further reading.

UNITIII
Design Pattern Catalog: Structural patterns, Adapter, bridge, composite, decorator, facade, flyweight, proxy.

UNIT IV
Interactive systems and the MVC architecture: Introduction , The MVC architectural pattern, analyzing a simple drawing program , designing the system, designing of the subsystems, getting into implementation , implementing undo operation , drawing incomplete items, adding a new feature , pattern based solutions.

UNITV

Designing with Distributed Objects: Client server system, java remote method invocation, implementing an object oriented system on the web (discussions and further reading) a note on input and output, selection statements, loops arrays.

Text Books:

1. Object-oriented analysis, design and implementation, brahma dathan, sarnath rammath,universities press,2013

2. Design patterns, erich gamma, Richard helan, Ralph johman , john vlissides ,PEARSON ublication,2013.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- III Semester CSE (DS)   **L T P C**
                                                     3 0 0 3

20BCS24   **MOBILE APPLICATION DEVELOPMENT**
                              (Professional Elective- VI)

Course Outcomes:

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

1. Identify various concepts of mobile programming that make it unique from programming for other platforms,
2. Critique mobile applications on their design pros and cons,
3. Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces,
4. Program mobile applications for the Android operating system that use basic and advanced phone features.
5. Deploy applications to the Android marketplace for distribution.

UNIT I

Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

UNIT II

Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions.

UNIT III

Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

UNIT IV

Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

UNITV

Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite, Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 2nd ed. (2011)

REFERENCE BOOKS:

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd 2. R2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd 3. R3. Android Application Development All in one for Dummies by Barry Burd, Edition:

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

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M.TECH- III Semester CSE (DS)   **L T P C**

                                                 3 0 0 3

20BCS25   **COMPUTER VISION**
                                  (Professional Elective- VI)

Course Outcomes:
After completing the course, students will able to
1. Describe different image representation, their mathematical representation and different their data structures used.
2. Classify different segmentation algorithm for given input .
3. Create a 3D object from given set of images .
4. Detect a moving object in video using the concept of motion analysis .
5. Recognize the object using the concept of computer vision.

UNIT I

The image, its representations and properties – image representations a few concepts, Image digitization, Digital image properties, Color images, Cameras : an overview. Mathematical and physical background – Linear integral transforms, Images as stochastic processes, Image formation physics.

UNIT II

Data structures for image analysis- levels of image data representation, traditional image data structures, and Hierarchical data structures. Image understanding-fitting via random sample consensus, point distribution model .

UNIT III

Segmentation II – Mean Shift Segmentation , Active contour models – snakes, Geometric deformable model – level sets and geodesic active contours, Fuzzy connectivity, Towards 3D graph – based image segmentation, Graph cut segmentation

UNIT IV

3 D Vision Geometry – 3 D Vision tasks, basics of projective geometry, A Single perspective camera, Scene reconstruction from multiple views, two camera stereopsis, Use of 3D vision Shape from X, Full 3D objects, 3D model-based vision, 2D view based representations of a 3D scene.

UNIT V

Motion Analysis- Different Motion Analysis methods, Optical flow, analysis based on correspondence of interest points, Detection of specific motion patterns, video tracking.

TEXT BOOK :

1. Milan Sonka, Vaclav Hlavac, Roger Boyle, "Digital Image Processing and Computer Vision" Cengage Learning, 1st Edition, 2008

REFERENCE BOOK:

1.Digital image processing, by Gonzales Woods 3rd Edition, Pearson Education 2) Fundamental of Digital Image Processing by Anil K. Jain, PHI Pub.

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

3- High mapping   2-Medium Mapping   1- Low Mapping

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M.TECH- III Semester CSE (DS)   **L   T   P   C**

                                                          3   0   0   3

20BCS26   **SMART SENSORS AND INTERNET OF THINGS**
(Professional Elective- VI)

Course Outcomes

After completing the course, students will able to
1. Understand the vision of IoT from a global context.

2. Determine the Market perspective of IoT.

3. Use of Devices, Gateways and Data Management in IoT.

4. Application of IoT in Industrial and Commercial Building Automation and Real World

5. Building state of the art architecture in IoT.

UNIT I

Environmental Parameters Measurement and Monitoring: Why measurement and monitoring are important, effects of adverse parameters for the living being for IOT

UNIT II

Sensors: Working Principles: Different types; Selection of Sensors for Practical Applications Introduction of Different Types of Sensors such as Capacitive, Resistive, Surface Acoustic Wave for Temperature, Pressure, Humidity, Toxic Gas etc

UNIT III

Important Characteristics of Sensors: Determination of the Characteristics Fractional order element: Constant Phase Impedance for sensing applications such as humidity, water quality, milk quality Impedance Spectroscopy: Equivalent circuit of Sensors and Modeling of Sensors Importance and Adoption of Smart Sensors

UNIT IV

Architecture of Smart Sensors: Important components, their features Fabrication of Sensor and Smart Sensor: Electrode fabrication: Screen printing, Photolithography, Electroplating Sensing film deposition: Physical and chemical Vapor, Anodization, Sol-gel

UNIT V

Interface Electronic Circuit for Smart Sensors and Challenges for Interfacing the Smart Sensor, Usefulness of Silicon Technology in Smart Sensor And Future scope of research in smart sensor

TEXT BOOKS:

1. Yasuura, H., Kyung, C.-M., Liu, Y., Lin, Y.-L., Smart Sensors at the IoT Frontier,Springer International Publishing .

2. Kyung, C.-M., Yasuura, H., Liu, Y., Lin, Y.-L., Smart Sensors and Systems, Springer International Publishing

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

3- High mapping   **2-Medium Mapping**   **1- Low Mapping**

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20BCS27   **DISSERTATION PHASE-I**

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20BCS28   **DISSERTATION PHASE-II**