w.e.f July 2020

PROGRAMME GUIDE

MASTER OF TECHNOLOGY (COMPUTER SCIENCE)

(M. Tech CSE)

*Scheme of Examination (CBCS/ELECTIVE)
*Detailed Structure of Syllabus

DR. C.V. RAMAN UNIVERSITY

KARGI ROAD, KOTA, BILASPUR, CHATTISGARH
PHONE:07753-253737, Fax: 07753-253728
Website: www.cvru.ac.in

w.e.f July 2020

MASTER OF TECHNOLOGY

Duration: 24 Months (2 Years)

Eligibility: BE (CS)/ (IT)/MCA in a Related Field with Qualified Marks

COURSE STRUCTURE OF M.TECH – COMPUTER SCIENCE AND ENGINEERING SEMESTER Ist

Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
6TMMA 101	**Core-I**	Advanced Computational Mathematics	100	50	17	20	07	30	15	2	1	0	3
6TMCS 102	**Core- II**	Advanced Computer Architecture	100	50	17	20	07	30	15	2	1	0	3
6TMCS 103	**Core- III**	Advanced Data structure and algorithm	100	50	17	20	07	30	15	2	1	0	3
6TMCS 104	**Core- IV**	Object Oriented Technology	100	50	17	20	07	30	15	2	1	0	3
6TMCS 105	**Core-V**	Advanced Computer Network	100	50	17	20	07	30	15	2	1	0	3
6TMCS 106	**Program Elective-1**	**Audit Course-I** 1. English for research paper writing 2. Pedagogy studies 3. Stress management by Yoga	-	-	-	-	-	-	-	-	-	-	-
Practical Group				**Term End Practical Exam**				**Sessional**					
6TMCS 107	**Core- II**	Advanced Data structure and algorithm	50	25	12			25	12	-	-	1	1
6TMCS 108	**Core- III**	Object Oriented Technology	50	25	12			25	12	-	-	1	1
Grand Total			**600**							**10**	**5**	**2**	**17**

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%,

Three Class Tests/ Lab Performance Assignment 50%

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Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
6TMCS 201	Core-VI	Internet of things	100	50	17	20	07	30	15	2	1	0	3
6TMCS 202	Core-VII	Big Data	100	50	17	20	07	30	15	2	1	0	3
6TMCS 203	Core-VIII	Advanced Concept in Database	100	50	17	20	07	30	15	2	1	0	3
6TMCS 204	Core-IX	Web Technology and commerce	100	50	17	20	07	30	15	2	1	0	3
6TMCS 205*	Program Elective-I	Professional Elective-1	100	50	17	20	07	30	15	2	1	0	3
6TMST 206	Program Elective-2	**Audit Course-II** 1.Disaster management 2- Personality Development through life enlightenment skills 3- Value addition	-	-	-	-	-	-	-	-	-	-	-
Practical Group				Term End Practical Exam				Sessional					
6TMCS 206	Core-VIII	Advanced Concept in Database	50	25	12			25	12	-	-	1	1
6TMCS 207	Core-IX	Web Technology and commerce	50	25	12			25	12	-	-	1	1
Grand Total			600							10	5	2	17

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

*** Professional Elective-1**

1. **6TMCS 205(A) Data structure and Algorithm using Python**
2. **6TMCS 205(B) Information theory, coding and Cryptography**
3. **6TMCS 205(C) Data Analytic using R-Programming**
4. **6TMCS 205(D) Ad-hoc Network**
5. **6TMCS 205(E)Image Processing**

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COURSE STRUCTURE OF M.TECH – COMPUTER SCIENCE AND ENGINEERING SEMESTER IIIrd													
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Theory Group													
6TMCS 301*	Program Elective-II	Professional Elective-II	100	50	17	20	07	30	15	2	1	0	3
6TMCS 302**	Program Elective-III	Professional Elective-III	100	50	17	20	07	30	15	2	1	0	3
Practical Group				Term End Practical Exam				Sessional					
6TMCS 303	Seminar	Seminar	100	50	25			50	25	-	-	10	10
6TMCS 304	Dissertation -I	Dissertation -I	200	120	60			80	40	-	-	1	1
Grand Total			500							4	2	11	17

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%, Three Class Tests/ Lab Performance Assignment 50%

***Professional Elective-II**

6TMCS 301(A) **Data Science**

6TMCS 301(B) **Machine learning**

6TMCS301(C) **Real time operation system**

6TMCS301(D) **Parallel Algorithm**

*** Professional Elective-III**

6TMCS302(A) **Deep Learning**

6TMCS302(B) **Privacy and security in online social Media**

6TMCS302(C) **Grid Computing**

6TMCS302(D) **Software Testing & Quality Assurance**

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COURSE STRUCTURE OF M.TECH – COMPUTER SCIENCE AND ENGINEERING SEMESTER IVth														
Course Details				External Assessment		Internal Assessment				Credit Distribution			Allotted Credits
Course Code	Course Type	Course Title	Total Marks	Major		Minor		Sessional ***		L	T	P	Subject wise Distribution
				Max Marks	Min Marks	Max Marks	Min Marks	Max Marks	Min Marks				
Practical Group				Term End Practical Exam				Sessional					
6TMCS-401	Dissertation -II	Dissertation Part-II	500	300	150	-	-	200	100	-	-	17	17
Grand Total			500									17	17

Minimum Passing Marks are equivalent to Grade D **L- Lectures T- Tutorials P- Practical**

Major- Term End Theory / Practical Exam

Minor- Pre University Test

Sessional weightage – Attendance 50%,

Three Class Tests/ Lab Performance Assignment 50%

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SEMESTER- 1st **Subject Code:** 6TMMA 101
Course: M. Tech (CSE) **Theory Max. Marks:50**
SUBJECT: ADVANCED COMPUTATIONAL MATHEMATICS **Theory Min. marks:17**
COURSE OBJECTIVE:

- Apply critical thinking and communication skills to solve applied problems.
- Use knowledge and skills necessary for immediate employment or acceptance into a graduate program.
- Maintain a core of mathematical and technical knowledge that is adaptable to changing technologies and provides a solid foundation for future learning.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Linear Algebra: Linear transformation, vector spaces, hash function, Hermite polynomial, Heavisite's unit function and error function. Elementary concepts of Modular mathematics	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Solution of Partial Differential Equation (PDE) by separation of variable method, numerical solution of PDE (Laplace, Poisson's, Parabolic) using finite difference methods, Elementary properties of FT, DFT, WFT, Wavelet transform, Haar transform.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Probability, compound probability and discrete random variable. Binomial, Normal and Poisson's distributions, Sampling distribution, elementary concept of estimation and theory of hypothesis, recurred relations.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Stochastic process, Markov process transition probability transition probability matrix, just and higher order Markov process, Application of Eigen value problems in Markov Process, Markov chain. Queuing system, transient and steady state, traffic intensity, distribution queuing system, concepts of queuing models (M/M/1: Infinity/ Infinity/ FC FS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming inMATLAB scripts, functions and their application.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

- Apply mathematical concepts and principles to perform computations
- Apply mathematics to solve problems
- Create, use and analyze graphical representations of mathematical relationships
- Communicate mathematical knowledge and understanding
- Apply technology tools to solve problems
- Perform abstract mathematical reasoning
- Learn independently

Text Books:

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- Higher Engineering Mathematics B.V. Ramana, TMH pub.
- Advance Engineering Mathematics Ervin Kreszig, Wiley Easten.
- Applied Numerical Methods with MATLAB Steven C Chapra, TMH.
- Advance Engg Mathematics O' Neil, Cengage (Thomson)
- Introductory Methods of Numerical Analysis S.S. Shastry,

Reference Books:

- Introduction of Numerical Analysis Forberg
- Numerical Solution of Differential Equation M. K. Jain
- Numerical Mathematical Analysis James B. Scarborogh
- Fourier Transforms J. N. Sheddon
- Fuzzy Logic in Engineering T. J. Ross
- Fuzzy Sets Theory & its Applications H. J. Zimmersoms

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Matlab developer, Data scientist	Able to understand linear algebra. Able to understand partial differential equation. Gain knowledge about MATLAB.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 1st **Subject Code:** 6TMCS 102
Course: M. Tech (CSE) **Theory Max. Marks:50**
SUBJECT: ADVANCED COMPUTER ARCHITECTURE **Theory Min. marks:17**

COURSE OBJECTIVE:

- Give students a broad and deep knowledge of contemporary computer architecture issues and techniques.
- Give students knowledge of advanced hardware-based techniques for exploiting instruction level parallelism.
- Give students knowledge of various architectures and techniques used for building high performance scalable multithreaded and multiprocessor systems.
- Give students ability to apply the learned knowledge to conduct computer architecture research using performance simulators.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Flynn'sand Handler's Classification of parallel computing structures. Pipelined and Vector Processors.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Data and control hazards and method to resolve them. SIMD multiprocessor structures. I	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Interconnection Networks. Parallel Algorithms for array processors, Search algorithms, MIMD multiprocessor systems,	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Scheduling and load balancing in multiprocessor systems, Multiprocessing control and algorithms.	Usage of ICT like PPT, Video Lectures,Black board

Course outcomes:

- Identify the factors affecting performance in superscalar processors and the key components, options and tradeoffs that a designer has to consider when designing such processors.
- Identify various simulation techniques used to study superscalar processor performance. Compare a trace cache to conventional instruction cache and explain advantages and disadvantages of each approach.
- Explain advanced branch prediction techniques such as 2-level branch prediction, perception- based branch prediction, combined predictors, indirect branch prediction and branch confidence estimation.
- Describe the hardware needed to properly order loads and stores execution in a superscalar processor, and methods to optimize, predict, and perform load store ordering in large instruction window processors.
- Explain how data speculation and dynamic instruction reuse work, why they work, and compare the two techniques.
- Explain different dynamic optimization techniques and the hardware support needed to perform these optimizations in a superscalar processor.
- Compare checkpoint architectures to conventional speculative execution methods, such as reorder buffer.

Text Books:

- Advance Computer Architecture parthsarthy, Cengage (Thomson)

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Reference Books:

- Computer Architecture and Organisation- John Hays McGraw-Hill.
- Computer Architecture and Parallel Processing Hwang And Briggs TMH.

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Computer architecture engineer	Able to understand pipelined and vector processor. Able to understand load balancing in multiprocessor system.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 1st
Course: M. Tech (CSE)
SUBJECT: ADVANCED DATA STRUCTURES AND ALGORITHM

Subject Code: 6TMCS 103
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVE:

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

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: Basic concepts of OOPs - Templates - Algorithm Analysis - ADT -List (Singly, Doubly and Circular) Implementation - Array, Pointer, Cursor Implementation	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Basic Data Structures: Stacks and Queues - ADT, Implementation and Applications - Trees- General, Binary, Binary Search, Expression Search, AVL, Splay, B-Trees- Implementations - Tree Traversals.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Advanced Data Structures: Set - Implementation - Basic operations on set -Priority Queue - Implementation - Graphs - Directed Graphs - Shortest Path Problem - Undirected Graph - Spanning Trees- Graph Traversals	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Memory Management: Issues - Managing Equal Sized Blocks- Garbage Collection Algorithms for Equal Sized Blocks - Storage Allocation for Objects with Mixed Sizes - Buddy Systems - Storage Compaction	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Searching, Sorting and Design Techniques: Searching Techniques, Sorting - Internal Sorting - Bubble Sort, Insertion Sort, Quick Sort, Heap Sort, Bin Sort, Radix Sort - External Sorting - Merge Sort, Multi-way Merge Sort, Polyphase Sorting - Design Techniques- Divide and Conquer - Dynamic Programming - Greedy Algorithm - Backtracking - Local Search Algorithms	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

- Students develop knowledge of basic data structures for storage and retrieval of ordered or unordered data. Data structures include: arrays, linked lists, binary trees, heaps, and hash tables.
- Students develop knowledge of applications of data structures including the ability to implement algorithms for the creation, insertion, deletion, searching, and sorting of each data structure.
- Students learn to analyze and compare algorithms for efficiency using Big-O notation. Students implement projects requiring the implementation of the above data structures.

Course Code: 6TMCS- 103
List of Experiments:

- Write C++ program to implement the following using an array
  a) Stack ADT b) Queue ADT
- Write C++ programs to implement the following using a singly linked list

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a) Stack ADT b) Queue ADT

- Write C++ program to implement the dequeue (double ended queue) ADT using a doubly linked list
- Write a C++ program to perform the following operations:
  a) Insert element into a binary search tree.
  b) Delete an element from a binary search tree
  c) Search for a key element in a binary search tree
- Write a C++ program to implement circular queue ADT using an array
- Write a C++ programs that use non-recursive functions to traverse the given binary tree in
  a) Preorder b) in order c) post order
- Write a C++ programs for the implementation of bfs and dfs for a given graph
- Write C++ programs for implementing that following sorting methods:
  a) Quick sort b) Merge sort c) Heap sort
- Write a C++ program to perform the following operations
  a) Insertion into a B-tree b) Deletion from B-tree
- Write a C++ program to perform the following operations
  a) Insertion into an AVL tree b) Deletion from an AVL tree
- Write a C++ program to implement kruskal's algorithm to generate a minimum spanning Tree.
- Write a C++ program for implement prim's algorithm to generate a minimum spanning Tree.
- Write a C++ program to implement all the functions of a dictionary (ADT) using hashing

Text Books:

- "Data Structures and Algorithm Analysis in C++" Mark Allen Weiss Pearson P
- "Data Structures and Algorithms", Aho, Hopcroft, Ullman Pearson Education P
- Data Structures and algorithm in Jawa Drozdek, Cengage (Thomson)

Reference Books :

- Data structures Using C++, Gilberg Cengage
- "Computer Algorithms", Horowitz, Sahni, RajasekaranGalgotia,

Job opportunity	**Employability skill developed**	**Local/National/UNDP Goal Achieved**	**Entrepreneurship Opportunity**
Assistant Professor, Software developer	Able to understand coding. Able to understand stack and queue. Able to understand dynamic programming. Able to understand memory management.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 1st **Subject Code:** 6TMCS 104
Course: M. Tech (CSE) **Theory Max. Marks:50**
SUBJECT: OBJECT ORIENTED TECHNOLOGY **Theory Min. marks:17**

COURSE OBJECTIVE:

Its main objective is to teach the basic concepts and techniques which form the object oriented programming paradigm

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Overview of object oriented concepts: Need for object oriented programming, characterization of object oriented languages.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Object oriented Design: Object structure concepts, methodology for object oriented design (Booch, and chen and chen),Design modelling , system design life cycle.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Object oriented programming: An overview of C++ programming, loops and decisions, structures and functions, objects and classes, Array and pointers, Inheritance, virtual function, files and stream.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Object oriented Databases: Relational v/s object oriented databases, the architecture of 00 databases, Query languages for 00 databases, Gemstone/02/Orion.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Distributed object oriented systems: Object management group, CORBA.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

- Understand the features of C++ supporting object oriented programming
- Understand the relative merits of C++ as an object oriented programming language
- Understand how to produce object-oriented software using C++
- Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism
- Understand advanced features of C++ specifically stream I/O, templates and operator overloading

Text books:

- Object Oriented Analysis and Design Satzinger, Cengage(Thomson).
- Object Oriented S/W Development Gregor & Sykes DA, Van Nostrand.
- OOP in C++ Lafore, Galgotia Pub.
- The C++ Programming Language Stroustrup B Addison Wesely.
- Introduction to OOP Witt KV Galgotia Pub.

Reference Books:

- Object Data Management Cartel R. Addison Wesely.
- Modern Data Base System Kim W. ACM Press AddisonWesely.

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- OOP by Blaschek G, Springer Verlag.

Practical:

- Write a C++ program that overloads the + operator and relational operators (suitable) to perform Concatenation of two strings.
- Write a C++ program that illustrates the order of execution of constructors and destructors when new class is derived from more than one base class.
- Write a C++ program that illustrates the role of virtual base class in building class.
- Write a C++ program that uses a function to delete all duplicate characters in the given.
- Write C++ programs that illustrate how the following forms of inheritance are supported
  (a) Single inheritance (b) Multiple inheritance (c) Multi level inheritance (d) Hierarchical inheritance.
- Consider a payroll system; construct its Class diagram, use-case diagram, sequence diagram and activity diagram.
- Consider a calculator, Draw Class, State, sequence and DFD for this system.
- Consider a railway reservation system, Draw Class, State, sequence and DFD for this.
- Consider a Telephone system, Draw Class, State, sequence and DFD for this system.
- Draw class, state, sequence diagram and DFD for online sales system.
- Programs Using Functions (a) Functions with default arguments (b) Implementation of Call by Value, Call by Address and Call by Reference.
- Compile time Polymorphism (a) Operator Overloading including Unary and Binary Operators (b) Function Overloading.
- Runtime Polymorphism (a) Inheritance (b) Virtual functions (c) Virtual Base Classes (d) Templates.
- File Handling Sequential access and Random access.

Job opportunity	**Employability skill developed**	**Local/National/UNDP Goal Achieved**	**Entrepreneurship Opportunity**
Assistant Professor, Software developer, Database admin, IT data analyst.	Able to understand programming concepts. Able to understand design modeling.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 1st
Course: M. Tech (CSE)
SUBJECT: ADVANCED COMPUTER NETWORKING

Subject Code: 6TMCS 105
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVE:

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

- Build an understanding of the fundamental concepts of computer networking.
- Familiarize the student with the basic taxonomy and terminology of the computer networking area.
- Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.
- Allow the student to gain expertise in some specific areas of networking such as the design and maintenance of individual networks.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Review of Networking and OS. fundamentals, ISO-OSI Model, different layers and their functions, LAN, MAN, WAN, Communication media & principles IEEE standards etc.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Internetworking with TCP/IP, Basic concepts, Principles, Protocols and Architecture, Address handling Internet protocols and protocol layering. DNS, Applications: TELNET, RLOGN , FTP, TFTP, NFS, SMTP, POPL, IMAP, MIME, HTTP,STTP,DHCP, VOIP, SNMP.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Introduction to Router, Configuring a Router, Interior & Exterior Routing, RIP, Distance Vector Routing, OSPF, BGP, Uni-cast, Multicast and Broadcast. Multicast routing protocols: DVMRP, MOSPF, CBT, PIM, MBONE, EIGRP, CIDR, Multicast Trees, Comparative study of IPv6 and IPv4.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	VPN addressing and routing, VPN Host management, ATM Concepts, Services Architecture, Equipments and Implementation	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Introduction to wireless transmission and medium access control, wireless LAN: IEEE 802.11, Hipher LAN, Bluetooth Mobile Network and Transport layer, WAP GSM and CDMA: Network architecture and management	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

After completing this course the student must demonstrate the knowledge and ability to:

- Independently understand basic computer network technology.
- Understand and explain Data Communications System and its components.
- Identify the different types of network topologies and protocols.
- Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.
  5. Identify the different types of network devices and their functions within a network
- Understand and building the skills of subnetting and routing mechanisms.
- Familiarity with the basic protocols of computer networks, and how they can be used to assist in network design and implementation.

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Text Books:

- Computer Networks: Tanenbaum.
- Internetworking with TCP/IP Comer.
- Data Communications Stalling.

Reference Books:

- Mobile Communication Schiller Pearson Education
- Computer Communications and network Technology, Gallo Cengage (Thomson)
- Wireless and Mobile Network Architecture: Yi Bing Lin, Wiley
- ATM Network: Kasara, TMH
- TCP/IP protocol Suite Forouzan TMH

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Network administrator, Hardware and networking engineer.	Able to understand about networking. Able to understand about CDMA.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 1st
Course: M. Tech (CSE)
SUBJECT: ENGLISH FOR RESEARCH PAPER WRITING
AUDIT 1 and 2: ENGLISH FOR RESEARCH PAPER WRITING

Subject Code:
Theory Max. Marks:
Theory Min. marks

COURSE OBJECTIVES:

Students will be able to:

1. Understand that how to improve your writing skills and level of readability
2. Learn about what to write in each section
3. Understand the skills needed when writing a Title
   Ensure the good quality of paper at very first-time submission

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticising, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts. Introduction	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature,	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions	Usage of ICT like PPT, Video Lectures,Black board
Unit - VI	Useful phrases, how to ensure paper is as good as it could possibly be the first-time submission	

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor,		Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 1st
Course: M. Tech (CSE)
SUBJECT: AUDIT COURSE-I
PEDAGOGY STUDIES

Subject Code:
Theory Max. Marks:
Theory Min. marks

COURSE OBJECTIVE:

Students will be able to:

1. Review existing evidence on the review topic to inform programme design and policy making undertaken by the DfID, other agencies and researchers.
2. Identify critical evidence gaps to guide the development.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction and Methodology: Aims and rationale, Policy background, Conceptual framework and terminology, Theories of learning, Curriculum, Teacher education. Conceptual framework, Research questions. Overview of methodology and Searching.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Thematic overview: Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries. Curriculum, Teacher education.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Evidence on the effectiveness of pedagogical practices, Methodology for the in depth stage: quality assessment of included studies. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? Theory of change. Strength and nature of the body of evidence for effective pedagogical practices. Pedagogic theory and pedagogical approaches. Teachers' attitudes and beliefs and Pedagogic strategies.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Professional development: alignment with classroom practices and follow-up support Peer support Support from the head teacher and the community, Curriculum and assessment Barriers to learning: limited resources and large class sizes	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Research gaps and future directions: Research design, Contexts, Pedagogy, Teacher education, Curriculum and assessment, Dissemination and research impact.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

Students will be able to understand:

1. What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?
2. What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
3. How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor,		Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 1st
Course: M. Tech (CSE)
SUBJECT: AUDIT COURSE-I
STRESS MANAGEMENT BY YOGA

Subject Code:
Theory Max. Marks:
Theory Min. marks

COURSE OBJECTIVE:

1. To achieve overall health of body and mind
2. To overcome stress

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Definitions of Eight parts of yog. (Ashtanga)	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Yam and Niyam, Do`s and Don't's in life, i) Ahinsa, satya, astheya, bramhacharya and aparigraha ii) Shaucha, santosh, tapa, swadhyay, ishwarpranidhan	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Asan and Pranayami) Various yog poses and their benefits for mind & body ii) Regularization of breathing techniques and its effects-Types of pranayam	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

Students will be able to:
1. Develop healthy mind in a healthy body thus improving social health also
2. Improve efficiency

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor,		Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: INTERNET OF THINGS

Subject Code: 6TMCS 201
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- To assess the vision and introduction of IoT.
- To Understand IoT Market perspective.
- To Implement Data and Knowledge Management and use of Devices in IoT Technology.
- To Understand State of the Art - IoT Architecture.
- To classify Real World IoT Design Constraints, Industrial Automation in IoT.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: Definition, Characteristics of IOT, IOT Conceptual framework, IOT Architectural view, Physical design of IOT, Logical design of IOT, Application of IOT.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Machine-to-machine (M2M), SDN (software defined networking) and NFV(network function virtualization) for IOT, data storage in IOT, IOT Cloud Based Services.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Design Principles for Web Connectivity: Web Communication Protocols for connected devices, Message Communication Protocols for connected devices, SOAP, REST, HTTP Restful and Web Sockets. Internet Connectivity Principles: Internet Connectivity, Internet based communication, IP addressing in IOT, Media Access control.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Sensor Technology , Participatory Sensing, Industrial IOT and Automotive IOT , Actuator, Sensor data Communication Protocols ,Radio Frequency Identification Technology, Wireless Sensor Network Technology.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	IOT Design methodology: Specification -Requirement, process, model, service, functional & operational view.IOT Privacy and security solutions, Raspberry Pi &arduino devices. IOT Case studies: smart city streetlights control & monitoring.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

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

- Able to understand the application areas of IOT
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
- Able to understand building blocks of Internet of Things and characteristics

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Reference Books:

- Internet Of Things(Architecture & Design principles) Raj Kamal McGraw
- IoT Fundamentals: Networking Technologies,
- Protocols and Use Cases for the Internet of Things David.,Et al Pearson

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, IOT engineer	Able to understand IOT design methodology. Able to understand wireless sensor network technology. Gain knowledge about IOT.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: BIG DATA

Subject Code:6TMCS 202
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms
- To prepare graduates who will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise
- To prepare graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, research, design and implementation skills
- To prepare graduates who will thrive to pursue life-long reflective learning to fulfill their goals

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to Big Data Introduction – distributed file system – Big Data and its importance, Four Vs, Drivers for Big data, Big data analytics, Big data applications. Algorithms using map reduce, Matrix-Vector Multiplication by Map Reduce.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Introduction Hadoop Big Data – Apache Hadoop & Hadoop EcoSystem – Moving Data in and out of Hadoop – Understanding inputs and outputs of MapReduce - Data Serialization.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Hadoop Architecture Hadoop Architecture, Hadoop Storage: HDFS, Common Hadoop Shell commands , Anatomy of File Write and Read., NameNode, Secondary NameNode, and DataNode, Hadoop MapReduce paradigm, Map and Reduce tasks, Job, Task trackers - Cluster Setup – SSH & Hadoop Configuration – HDFS Administering –Monitoring & Maintenance.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Hadoop Ecosystem and Yarn Hadoop ecosystem components - Schedulers - Fair and Capacity, Hadoop 2.0 New FeaturesNameNode High Availability, HDFS Federation, MRv2, YARN, Running MRv1 in YARN.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Hive and Hiveql, Hbase Hive Architecture and Installation, Comparison with Traditional Database, HiveQL - Querying Data - Sorting And Aggregating, Map Reduce Scripts, Joins & Subqueries, HBase conceptsAdvanced Usage, Schema Design, Advance Indexing - PIG, Zookeeper - how it helps in monitoring a cluster, HBase uses Zookeeper and how to Build Applications with Zookeeper.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

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

- apply the basics of information theory to calculate channel capacity and other measures
- design specific data compression techniques and calculate the compression achieved

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- apply and control specific coding methods and be able to calculate the rate and error probabilities achieved
- understand the basic concepts and complexity of cryptographic security methods and their practical applications.

Reference Books:

- Bigdata Analytics Acharya seema Willy Pub
- Big Data Analytics: A Hands-On Approach ArshdeepBahga PH

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Big data engineer, Big data technical lead, Hadoop developer.	Able to understand about big data. Able to understand Hadoop.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: ADVANCED CONCEPT IN DATABASE

Subject Code: 6TMCS 203
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- Learning state-of-art techniques in database systems and information management that students can apply to your future research and/or your practical work.
- Learning how the prepare and present technical papers which is an essential skill for students and researchers.
- Reviewing technical and scientific papers is a skill that you need to develop.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	DBMS Concept Introduction, Data Model, Entity & Attributes, Relationship, E-R Model, Relational Data Model, Domain Tuples, Attributes, Key, Schema, Integrity Constraints, Relational Algebra & Relational Calculus, Normalization & Normal Form.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Query Processing and Optimization Introduction, Query Processing, Syntax Analyzer, Query Decomposition: - Query Analysis, Query Normalization, Semantic Analyzer, Query Simplifier, Query Restructuring. Query Optimization, Cost Estimation in Query Optimization, Structure of Query Evaluation Plans, Pipelining and Materialization.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Distributed Databases Introduction, Architecture of Distributed Databases , Distributed Database System Design, Distributed Query Processing, Concurrency Control in Distributed Databases, Recovery Control in Distributed Databases	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Object-Oriented Databases Introduction, Concept of Object Oriented Database, Object Oriented Data Model(OODM), Object-Oriented DBMS(OODBMS),Object Data Management Group and Object- Oriented Languages. Object-Relational DBMS, ORDBMS Design, ORDBMS Query Language.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Design of Data Warehouse, Dimension and Measures, Data Marts and Distributed Data Marts, Conceptual Modeling of Data Warehouses:-Star Schema, Snowflake Schema, Fact Constellations. Multidimensional Data Model & Aggregates. Data Mining: Data, Information and Knowledge Discovery, Data Mining Functionalities, Data Mining System categorization and its Issues. Data Processing, Data Reduction, Data Mining Statistics. Data Mining Techniques.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

By the end of this module, students should be able to:

- explain and evaluate the fundamental theories and requirements that influence the design of modern database systems
- assess and apply database functions and packages suitable for enterprise database development and database management
- critically evaluate alternative designs and architectures for databases and data warehouses
- discuss and evaluate methods of storing, managing and interrogating complex data
- explain and critically evaluate database solutions for data exchange
- analyse the background processes involved in queries and transactions, and explain how these impact on database operation and design

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Practical

1. To perform basic PL/SQL blocks
   I. Display square of given no from 1 to 10 using loop, for and while.
   II. Write a PL-SQL block for checking weather a given year is a Leap year or not.
   III. Write a PL-SQL block to fine total no of odd and even (from 1 to 20)
   IV. Write a PL-SQL block for reverse the string

2. To perform the concept of cursor
   I. Display all the information of employee using %ROWTYPE
   II. Get Employee Number as input and check whether the employee exists. If it exists display name and department no otherwise print "Employee Not Found"
   III. Create a copy of Emp table. Write a PL/SQL block that will transfer all the records from Emp table to newly created table. If there is any existing record then the new value should be updated in the existing record.
   IV. Write a PL/SQL block that will assign 2 hrs of workload to employee with lowest workload from the employee with highest workload
   V. Display employee-name, dept-name, basic salary, total experience of all the employees whose area of interest is 'C Programming' using record type.

3. To perform the concept of loop
   I. Display Employee Names, Joining Date (Monday 24th of May, 2004 format) of all the employees using a) Loop – End Loop b) While Loop and c) For Loop
   II. The manager has decided to raise the salary for all the employees in the department number 10 by 0.7. Whenever any such raise is given to employees, a record for the same is maintained in the empraise table. Write a PL/SQL block to update the salary of each employee and insert a record in the empraise table. Use for loop.

4. To perform the concept of locking
   I.Write a PL/SQL block that will accept the employee code, department no, amount and operation. Based on specified operation amount is added or deducted from salary of said employee. Use locking concept at appropriate place.

5. To perform the concept of exception handler
   I. Write a PL/SQL block that will increase the salary of the employee by 0.7 who is working as 'manager'. Handle the exception using oracle named exception handler
   II. Write a PL/SQL block that will accept the employee code, amount and operation. Based on specified operation amount is added or deducted from salary of said employee. Use user defined exception handler for handling the exception.

6. To perform the concept of function
   I. Write a PL/SQL block to update the salary of employee specified by emp_code. If record exist then update the salary otherwise display appropriate message. Write a function for updating salary.
   II. List the department names, and, for each department, list the names of the employees in that department.

7. To perform the concept of package
   I. Write a PL/SQL block to update the current stock of the item specified by item_id. If specified record not found then insert the new record into table item_record. Use package for function and procedure used
   II. Write a PL/SQL block that will accept the employee code, amount and operation. Based on specified operation amount is added or deducted from salary of said employee. Use package for used procedures.

Text Books:

- Professional ASP. Net 2.0 Databases T. Thangarathinam New Delhi Wiley India Ltd
- Oracle Database 10g. DBA HandbookKevin loney and Bob Bryla and Experts at TUSC Noida Tata Mc Graw Hill Education
- Introduction to Database Management Systems Kahate Atul Noida Pearson
- Teach Yourself Database Programming with JDBC in 21 Days Ashton Hobbs New Delhi: Techmedia ,
- Database Management Systems Alexis Leon & Mathews Leon Chennai : Leon Vikas ,

References Books:

- Database System Concepts Peter Rob and Carlos Coronel Andover: Cengage Learning ,
- Database System Concepts Abraham Silberschatz and Henry F. Korth and S. Sudarshan New York : Mc graw Hill,
- Introduction to Database Management C.J. Date & A. Kanna&Swamynathans New Delhi Pearson Education
- Introduction to Database Systems B.C. Desai New Delhi Galgotia Publishing

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Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Database administrator, Database developer.	Able to understand fundamental of relational systems including data models,database architectures and database manipulations.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: WEB TECHNOLOGY AND COMMERCE

Subject Code: 6TMCS 204
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms
- To prepare graduates who will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise
- To prepare graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, research, design and implementation skills.
- The objective of this subject is to develop an ability to design and implement static and dynamic website

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to building blocks of electronic commerce: Internet and networking. Technologies, IP addressing, ARP, RARP, BOOTP, DHCP, ICMP, DNS, TFTP, TELNET.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Static and dynamic web pages, tiers, plug-ins, frames and forms. Exposure to Markup languages, HTML, DHTML, VRML, SGML, XML etc. CGI, Applets & Serve-lets, JSP & JAVA Beans, active X control, ASP cookies creating and reading cookies, semantic web, semantic web service ontology Comparative case study of Microsoft and JAVA technologies, web server scalability, Distributed objects, object request brokers, component technology, Web services, Web application architectures, Browsers, Search engines.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Electronic Commerce and physical Commerce, Different type of e-commerce, e-commerce scenarios, advantages of e-commerce. Business models: Feature of B2B e-commerce, Business models, Integration. E-Services: category of e-services, Web- enabled services, Matchmaking services, and information- selling on the web.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Internet payment system: Characteristics of payment system, 4C payments methods, SET Protocol for credit card payment, E-cash, E-check, Micro payment system, Overview of smart card, overview of Mondex. E-Governance: E-Governance architecture, Public private partnership, Readiness, Security, Cyber Crime and Law, IT Act	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Advanced technologies for e-commerce: Introduction to mobile agents. WAP: the enabling technology: The WAP model, WAP Architecture, Benefit of WAP to e-commerce.Web Security, Encryption Schemes, Secure Web documents, Digital signatures and firewalls.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

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

- At the end of the course, students should be able to:
- Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.
- Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.
- Get introduced in the area of Online Game programming.

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Text Book:

- Web Technology Tcp / Ip Architecture and Java Programming A.S. Godbole & A. Kahate New Delhi Tata Mc Graw Hill
- WEB Technology : A Developers Perspective Delhi PHI LearningN.P. Gopalan New
- E-Commerce the Cutting Edge of Business Delhi Tata Mc Graw Hill Publishing K.K. Bajaj & D. Nag New

Reference Book:

- Web Technology & Design C. Xavier New Delhi New Age International
- E-Commerce : Fundamentals and Applications Henry Chan & Raymond Lee &Tharam Dillon & Elizabeth Chang New Delhi Wiley India Ltd
- Essentials of E-Commerce Technology V. Rajaraman New Delhi PHI Learning

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Ecommerce developer.	Able to understand internet and networking technologies. Gain knowledge of web page creation. Able to understand web security.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: ELECTIVE-1
(DATA STRUCTURE AND ALGORITHM USING PYTHON)

Subject Code:6TMCS 205(A)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- The course is designed to provide Basic knowledge of Python.
- Python programming is intended for software engineers, system analysts, program managers and user support personnel who wish to learn the Python programming language.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: Basic syntax, Literal Constants, Numbers, Variable and Basic data types, String, Escape Sequences, Operators and Expressions, Evaluation Order, Indentation, Input Output, Functions, Comments.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Data Structure: List, Tuples, Dictionary and Sets. Control Flow: Conditional Statements - If, If-else, Nested If-else.Iterative Statement - For, While, Nested Loops. Control statements - Break, Continue, Pass.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Object oriented programming: Class and Object, Attributes, Methods, Scopes and Namespaces, Inheritance, Overloading, Overriding, Data hiding.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Exception: Exception Handling, Except clause, Try finally clause, User Defined Exceptions.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Modules and Packages Standard Libraries: File I/0, Sys, logging, Regular expression, Date and Time, Network programming, multi-processing and multi-threading.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

- Problem solving and programming capability.
- Master an understanding of scripting and the contributions of scripting languages.
- Master an understanding of Python especially the object-oriented concepts,
- Master an understanding of the built-in objects of Python,

Text Book:

- Data Structures : A Pseudocode Approach with C Richard F. Gilberg& Behrouz A. Forouzan New Delhi Cengage Learning
- Fundamentals of Data Structures Ellis Horowitz & Sartaj Sahni "New Delhi Galgotia Publishing"
- Data Structures Seymour Lipschutz "New Delhi Tata Mc Graw Hill Publishing"

Reference Book:

- The Fundamentals of Python: Kenneth A. Lambert, First Programs, 2011, Cengage Learning,

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Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Python developer.	Able to understand python.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd **Subject Code:** 6TMCS 205(B)
Course: M. Tech (CSE) **Theory Max. Marks:50**
SUBJECT: ELECTIVE-1 **Theory Min. marks:17**

(INFORMATION THEORY CODING AND CRYPTOGRAPHY)

COURSE OBJECTIVES:

This course aims to address the efficient error free and secure delivery of information using binary data streams. For efficiency, the information source is coded to reduce redundancy. To minimise the effects of errors, channel coding is employed and, finally, cryptographic techniques are required to make the data secure. The aim is to present the basic theory and objectives of each of these steps, together with the basics of information theory.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Information Theory, Probability and Channel: Introduction, Information Measures, Review probability theory, Random variables, Processes, Mutual Information, Entropy, Uncertainty, Shannon's theorem, redundancy, Huffman Coding, Discrete random Variable. Gaussian random variables, Bounds on tail probabilities.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Stochastic Processes: Statistical independence, Bernoulli Process, Poisson Process, Renewal Process, Random Incidence, Markov Modulated Bernoulli Process, Irreducible Finite Chains with Aperiodic States, Discrete-Time Birth-Death Processes, Markov property, Finite Markov Chains, Continuous time Markov chain, Hidden Markov Model.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Error Control Coding: Channel Coding: Linear Block Codes: Introduction, Matrix description, Decoding, Equivalent codes, Parity check matrix, Syndrome decoding, Perfect codes Hamming Codes .Optimal linear codes. Maximum distance separable (MDS) codes. Cyclic Codes: Introduction, generation, Polynomials, division algorithm, Matrix description of cyclic codes, burst error correction, Fire Codes, Golay Codes, and CRC Codes. BCH Codes: Introduction, Primitive elements, Minimal polynomials, Generator Polynomials in terms of Minimal Polynomials, Decoding of BCH codes.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Coding for Secure Communications: Review of Cryptography, Introduction, Encryption techniques and algorithms, DES, IDEA , RC Ciphers ,RSA Algorithm ,Diffi-Hellman, PGP, Chaos Functions, Cryptanalysis, Perfect security, Unicity distance, Diffusion and confusion, McEliece Cryptosystem	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Advance Coding Techniques: Reed-Solomon codes, space time codes, concatenated codes, turbo coding and LDPC codes (In details), Nested Codes, block (in Details), Convolution channel coding: Introduction, Linear convolution codes, Transfer function representation & distance properties, Decoding convolution codes(Soft-decision MLSE, Hard-decision MLSE),The Viterbi algorithm for MLSE, Performance of convolution code decoders, Soft & Hard decision decoding performance, Viterbi algorithm implementation issues: RSSE, trellis truncation, cost normalization, Sequential decoding: Stack, Fano, feedback decision decoding, Techniques for constructing more complex convolution codes with both soft and hard decoding.	Usage of ICT like PPT, Video Lectures,Black board

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Course outcomes:

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

- Apply the basics of information theory to calculate channel capacity and other measures
- Design specific data compression techniques and calculate the compression achieved
- Apply and control specific coding methods and be able to calculate the rate and error probabilities achieved
- Understand the basic concepts and complexity of cryptographic security methods and their practical applications.

Text Books:

- Cryptography & Network Security Atul Kahate "NoidaTata Mc Graw Hill Education"
- Applied Cryptography B. Schneier "U.K John Wiley & Sons"
- Information Theory Coding and Cryptography, Ranjan Bose "New Delhi Tata Mc Graw Hill "

References Books:

- Cryptography and Network Security : Principles and Practice, William Stallings "New Delhi Pearson Education"
- Cryptography and Network Security, Behrouz A. Forouzan&Deebdeep Mukhopadhyay "New Delhi Tata Mc Graw Hill Publishing"

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Information specialist, Cryptographer.	Able to understand information theory coding techniques. Able to understand coding for secure communication .	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: ELECTIVE-1(DATA ANALYTIC USING R-PROGRAMMING)

Subject Code:6TMCS 205(C)
Theory Max. Marks:50
Theory Min. marks :17

COURSE OBJECTIVES:

- To study the usage and applications of Object Oriented database
- To acquire knowledge on variety of NoSQL databases
- To attain inquisitive attitude towards research topics in NoSQL databases

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Definition of NOSQL, History of NOSQL and Different NOSQL products, Exploring MondoDB Java/Ruby/Python, Interfacing and Interacting with NOSQL.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	NOSQL Basics NOSQL Storage Architecture, CRUD operations with MongoDB,Querying, Modifying and Managing NOSQL Data stores, Indexing and ordering datasets (MongoDB/CouchDB/Cassandra)	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Advanced NOSQL NOSQL in CLOUD, Parallel Processing with Map Reduce, Big Data with Hive Working with NOSQL Surveying Database Internals, Migrating from RDBMS to NOSQL, Web Frameworksand NOSQL, using MySQL as a NOSQL .	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Developing Web Application with NOSQL and NOSQL Administration Php and MongoDB, Python and MongoDB,Creating Blog Application with PHP, NOSQL Database Administration.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Introduction to R: Overview of R programming, Evolution of R, Applications of R programming, Basic syntax Basic Concepts of R: Reserved Words, Variables & Constants Operators, Operator Precedence, Data Types , Input and Output Data structures in R: Vectors, Matrix, List in R programming Data Frame, Factor Control flow: If...else, If else() Function, Programming for loop While Loop, Break & next, Repeat Loop Functions: R Functions, Function Return Value, Environment & Scope, R Re Unit IV cursive Function, R Infix Operator, R Switch Function. Strings: String construction rules, String Manipulation functions R packages: Study of different packages in R R Data Reshaping: Joining Columns and Rows in a Data Frame Merging Data Frames, Melting and Casting Working with files: Read and writing into different types of files R object and Class Object and Class: R S3 Class, R S4 Class R Reference Class, R Inheritance Data visualization in R and Data Management: Bar Chart, Dot Plot, Scatter Plot (3D), Spinning Scatter Plots, Pie Chart Histogram (3D). [including colorful ones], Overlapping Histograms, Boxplot, Plotting with Base and Lattice Graphics Missing Value Treatment, Outlier Treatment, Sorting Datasets Merging Datasets, Binning variables Statistical modelling and Databases in R: Mean, mode, median Linear regression, Decision tree, K-means Clustering, RODBC and DBI Package, Performing queries	Usage of ICT like PPT, Video Lectures,Black board

Course outcomes:

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

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- Recognize and make appropriate use of different types of data structures
- Use R to create sophisticated figures and graphs
- Identify and implement appropriate control structures to solve a particular programming problem 4. Design and write functions in R and implement simple iterative algorithms.

References Books:

- Data Analytics Using R Seema Acharya "McGraw Hill Education"
- Beginning R: The Statistical Programming Language Mark Gardener "Wiley"
- Data Analytics with R, Bharti Motwani"Wiley"

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Senior NoSQL database engineer.	Gain knowledge on variety of NoSQL databases Developing Web Application with NOSQL and NOSQL Able to understand different packages in R R Data Reshapin Able to understand R programming.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: ELECTIVE-1(AD-HOC NETWORK)

Subject Code:6TMCS 205(D)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- Explains the constraints of physical layer that affect the design and performance of ad hoc network.
- The Concept of protocols required for wired network may not work for wired network at MAC, Network and Transport Layer.
- Explains the operations and performance of various MAC layer protocols, unicast routing protocols and transport layer protocols proposed for ad hoc networks.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Ad Hoc Networking: An introduction, Model of operation, symmetric Links, Layer-2 Ad Hoc solutions, Proactive versus reactive protocols, multicast, commercial replications of Ad Hoc networking, conferencing, Home Networking, Emergency services, personal Area Networks and Bluetooth, Embedded Computing Applications, Sensor Dust, Automotive/PC Interaction. Factors Affecting Ad Hoc Networks, Scalability, Wireless Data Rates, DARPA packet Radio network, Survivable Radio Networks.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Ad Hoc Wireless Media Access Protocols: Issues in Designing a MAC protocol for Ad Hoc Wireless networks. Design Goals of a MAC Protocol for Ad Hoc Wireless Networks.Classifications of MAC Protocols. Contention-Based Protocols, Contention- Based Protocols with reservation Mechanisms. Contention –Based MAC Protocols with Scheduling Mechanisms. MAC protocols that use Directional Antennas. Other MAC Protocols.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Overview of Ad Hoc Routing Protocols: Table-Driven Approaches, Destination Sequenced Distance Vector (DSDV), Wireless Routing Protocol (WRP), Cluster Switch Gateway Routing (CSGR) , Source-Initiated On –Demand Approaches .Ad Hoc On-Demand Distance Vector Routing (AODV) , Dynamic Source Routing (DSR), Temporally Ordered Routing Algorithm (TORA), Signal Stability Routing (SSR) , Location-Aided Routing (LAR) , Power – Aware Routing (PAR), Zone Routing Protocol (ZRP), Source Tree Adaptive Routing (STAR) , Relative Distance Microdiversity Routing (RDMAR) , Multicast Routing in Mobile Ad Hoc Networks, Existing Ad Hoc Multicast Routing Protocols, ABAM : Associativity-Based Ad Hoc Multicast.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Transport Layer for Ad Hoc Wireless Network: Introduction , Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions, TCP Over Ad Hoc Wireless Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Sensor Network: Sensor Network Architecture, Network Protocols, Data Storage and Manipulation, Localization and Management,Data Dissemination, Data Gathering, MAC protocols for Sensor Networks, Location Discovery, Quality of	Usage of ICT like PPT, Video Lectures,Black board

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	a Sensor Network, Evolving Standards. Security issues in Ad Hoc Network: Security in Ad Hoc Wireless Network, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, and Secure Routing in Ad HocWireless Networks.	

Course outcomes:

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

- Understand the challenges in design of wireless ad hoc networks.
- Understand and analyze proposed protocols at MAC and routing layers of ad hoc networks.
- Understand and analyze attacks pertaining to network layer.

Text Book:

- Data Communication and computer Networks, Prakash Gupta .C "New Delhi: PHI Learning"
- Introduction to data Communication & Networking Wayne Tomasi "Noida: Pearson"
- Cryptography & Network Security Atul Kahate "Noida Tata Mc Graw Hill Education"
- Telecommunication Switching Systems and Networks, Thiagarajan Viswanathan"New Delhi : Phi Learning"
- Data Communications and Networks Behrouz A Forouzan "Noida Tata Mc Graw Hill Education"

References Book:

- Troubleshooting, Maintaining &Repairing:Windows, Netware & Linux Networks, Stephen J. Bigelow New Delhi: Dreamtech .,
- Computer Networks Andrew S. Tanenbaum "Delhi: Pearson Education"
- Network ANalysis an Synthesis B.R. Gupta"New Delhi S. Chand Group"

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Network engineer.	Able to understand Ad Hoc networking. Able to understand Ad Hoc Wireless Media Access Protocols. Able to understand Ad Hoc Routing Protocols	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: ELECTIVE-1(IMAGE PROCESSING)

Subject Code: 6TMCS 205(E)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- To prepare graduates who will be successful professionals in industry, government, academia, research, entrepreneurial pursuit and consulting firms
- To prepare graduates who will contribute to society as broadly educated, expressive, ethical and responsible citizens with proven expertise
- To prepare graduates who will achieve peer-recognition; as an individual or in a team; through demonstration of good analytical, research, design and implementation skills
- To prepare graduates who will thrive to pursue life-long reflective learning to fulfil their goals

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Light, Brightness adaption and discrimination, Pixels, coordinate conventions, Imaging Geometry, Perspective Projection, Spatial Domain Filtering, sampling and quantization. Spatial Domain Filtering Intensity transformations, contrast stretching, histogram equalization, Correlation and convolution, Smoothing filters, sharpening filters, gradient and Laplacian.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Filtering in the Frequency domain Hotelling Transform, Fourier Transforms and properties, FFT (Decimation in Frequency and Decimation in Time Techniques), Convolution, Correlation, 2-D sampling, Discrete Cosine Transform, Frequency domain filtering. Basic Framework, Interactive Restoration, Image deformation and geometric transformations, image morphing, Restoration techniques, Noise characterization, Noise restoration filters, Adaptive filters, Linear, Position invariant degradations, Estimation of Degradation functions, Restoration from projections.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Image Compression Encoder-Decoder model, Types of redundancies, Lossy and Lossless compression. Entropy of an information source, Shannon's 1st Theorem, Huffman Coding, Arithmetic Coding, Golomb Coding, LZW coding, Transform Coding, Sub-image size selection, blocking artifacts, DCT implementation using FFT, Run length coding, FAX compression(CCITT Group-3 and Group-4), Symbol-based coding, JBIG-2, Bit-plane encoding, Bit-allocation, Zonal Coding, Threshold Coding, JPEG,Lossless predictive coding, Lossy predictive coding, Motion Compensation .Wavelet based Image Compression Expansion of functions, Multi-resolution analysis, Scaling functions, MRA refinement equation, Wavelet series expansion, Discrete Wavelet Transform (DWT), Continuous Wavelet Transform, Fast Wavelet Transform, 2-D wavelet Transform, JPEG-2000 encoding, Digital Image Watermarking.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Morphological Image Processing:Basics, SE, Erosion, Dilation, Opening, Closing, Hit-or-Miss Transform, Boundary Detection, Hole filling, Connected components, convex hull, thinning, thickening, skeletons, pruning, Geodesic Dilation, Erosion, Reconstruction by dilation and erosion.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Image Segmentation, Boundary detection based techniques, Point, line detection, Edge detection, Edge linking, local processing, regional processing, Hough transform, Thresholding, Iterative thresholding, Otsu's method, Moving averages, Multivariable thresholding, Region-based segmentation, Watershed algorithm, Use of motion in segmentation	Usage of ICT like PPT, Video Lectures,Black board

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Course outcomes:

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

- An understanding of the theoretical foundations and the limits of computing.
- An ability to adapt existing models, techniques, algorithms, data structures, etc. for efficiently solving problems.
- An ability to design, develop and evaluate new computer based systems for novel applications which meet the desired needs of industry and society.
- The course will cover techniques and tools for digital image processing, and finally also introduce image analysis techniques in the form of image segmentation.
- The course is primarily meant to develop on-hand experience in applying these tools to process these images. Hence the programming assignments form a key component of this course.
- The students would be encouraged to develop the image processing tools from scratch, rather than using any image processing library functions.

Text Books:

- Introduction To Digital Image Processing Alasdair Mcandrew "New Delhi: Cengage Learning"
- Digital Image Processing Rafael C. Gonzalez & Richard E. Woods "New Delhi Pearson Education"
- Fundamentlas of Digital Image Processing Anil Kumar Jain "New Delhi Prentice Hall of India"
- Digital Image Processing S Jayaraman & S Esakkirajan& T Veerakumar "New york. MC Graw Hill Co."

References Books:

- Digital Image Processing : PIKS Scientific Inside (With CD), William K. Pratt "New Delhi Wiley India Ltd"
- Fundamentals of Digital Image Processing S. Annadurai &R.Shanmugalakshmi "New Delhi Pearson Education"
- MATLAB: with Control System, Signals Processing & Image Processing Toolboxes with CD S.N. Sivanandam& S.N. Deepa "New Delhi Wiley India Ltd"

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Image processing engineer.	Able to understand wavelet based image compression. Able to understand image compression encode decode model. Able to understand fourier transform. Able to understand sampling and quantization.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: AUDIT COURSE-II DISASTER MANAGEMENT

Subject Code:
Theory Max. Marks:
Theory Min. marks

COURSE OBJECTIVES:

Students will be able to:

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
4. Critically understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude. Repercussions Of Disasters And Hazards: Economic Damage, Loss Of Human And Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Disaster Prone Areas In India: Study Of Seismic Zones; Areas Prone To Floods And Droughts, Landslides And Avalanches; Areas Prone To Cyclonic And Coastal Hazards With Special Reference To Tsunami; Post-Disaster Diseases And Epidemics	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Disaster Preparedness And Management Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard; Evaluation Of Risk: Application Of Remote Sensing, Data From Meteorological And Other Agencies, Media Reports: Governmental And Community Preparedness.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Risk Assessment Disaster Risk: Concept And Elements, Disaster Risk Reduction, Global And National Disaster Risk Situation. Techniques Of Risk Assessment, Global Co-Operation In Risk Assessment And Warning, People's Participation In Risk Assessment. Strategies for Survival.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Disaster Mitigation Meaning, Concept And Strategies Of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs Of Disaster Mitigation In India.	Usage of ICT like PPT, Video Lectures,Black board

Course Objectives

1. To get a working knowledge in illustrious Sanskrit, the scientific language in the world
2. Learning of Sanskrit to improve brain functioning
3. Learning of Sanskrit to develop the logic in mathematics, science & other subjects

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4. Enhancing the memory power
5. The engineering scholars equipped with Sanskrit will be able to explore the huge knowledge from ancient literature

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor,	•	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS

Subject Code:
Theory Max. Marks:
Theory Min. marks

COURSE OBJECTIVES:

1. To learn to achieve the highest goal happily
2. To become a person with stable mind, pleasing personality and determination
3. To awaken wisdom in students

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Neetisatakam-Holistic development of personality, Verses- 19,20,21,22 (wisdom), Verses- 29,31,32 (pride & heroism), Verses- 26,28,63,65 (virtue), Verses- 52,53,59 (dont's), Verses- 71,73,75,78 (do's)	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Approach to day to day work and duties. Shrimad BhagwadGeeta : Chapter 2-Verses 41, 47,48, Chapter 3-Verses 13, 21, 27, 35, Chapter 6-Verses 5,13,17, 23, 35, Chapter 18-Verses 45, 46, 48. Statements of basic knowledge: Shrimad BhagwadGeeta: Chapter2-Verses 56, 62, 68, Chapter 12 -Verses 13, 14, 15, 16,17, 18	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Personality of Role model. Shrimad BhagwadGeeta: Chapter2-Verses 17, Chapter 3-Verses 36,37,42, Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63	Usage of ICT like PPT, Video Lectures,Black board

Students will be able to

1. Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
2. The person who has studied Geeta will lead the nation and mankind to peace and prosperity
3. Study of Neetishatakam will help in developing versatile personality of students

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor,	•	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 2nd
Course: M. Tech (CSE)
SUBJECT: VALUE EDUCATION

Subject Code:
Theory Max. Marks:
Theory Min. marks

COURSE OBJECTIVES:

Students will be able to:
1. Understand value of education and self- development
2. Imbibe good values in students
3. Let the should know about the importance of character

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
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	Usage of ICT like PPT, Video Lectures,Black board
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	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	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. 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	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	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	Usage of ICT like PPT, Video Lectures,Black board
Unit - V		Usage of ICT like PPT, Video Lectures,Black board

Course outcomes
Students will be able to
1. .Knowledge of self-development
2. Learn the importance of Human values
3. Developing the overall personality

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor,	•	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd
Course: M. Tech (CSE)
SUBJECT: DATA SCIENCE

Subject Code: 6TMCS 301(A)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

Aim to provide general overview of the principles, concepts, techniques, tools and services for managing, harmonizing, aggregating, preprocessing, modeling, analyzing and interpreting large, multi-source, incomplete, incongruent, and heterogeneous data (Big Data). The focus will be to expose students to common challenges related to handling Big Data and present the enormous opportunities and power associated with our ability to interrogate

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Understanding Data: Data Wrangling and Exploratory Analysis, Data Transformation & Cleaning, Feature Extraction, Data Visualization. Introduction to contemporary tools and programming languages for data analysis like R and Python.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Introduction to machine learning: Supervised & unsupervised learning, classification & clustering Algorithms, Dimensionality reduction: PCA & SVD, Correlation & Regression analysis, Training & testing data: Overfitting & Under fitting.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Introduction to machine learning: Supervised & unsupervised learning, classification & clustering Algorithms, Dimensionality reduction: PCA & SVD, Correlation & Regression analysis, Training & testing data: Overfitting & Under fitting.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Introduction to Information Retrieval:Boolean Model, Vector model, Probabilistic Model, Text based search: Tokenization,TF-IDF, stop words and n-grams, synonyms and parts of speech tagging.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Introduction to Web Search& Big data: Crawling and Indexes, Search Engine architectures,Link Analysis and ranking algorithms such as HITS and PageRank, Hadoop File system & MapReduce Paradigm.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

After competition of upon course students will be able:

- To understand the concept of data mining and data science.
- To implement methods to retrieve information from different different web sources.
- To understand the architecture of various search engine.

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- To analytics big data using Phython and Hadoop.

Text Books:

- Artificial Intelligence and machine Learning S.S.Vinod Chandra PHI learning

Reference Books:

- Artificial Intelligence: A Modern Approach Stuart Russell & New Delhi Pearson Education PeterNorvig

Job opportunety	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Data scientist.	Able to understand machine learning. Able to understand information retrieval. Able to understand web search and big data.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd
Course: M. Tech (CSE)
SUBJECT: MACHINE LEARNING

Subject Code: 6TMCS 301(B)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- Understand the concepts of machine learning.
- Understand the clustering techniques and their utilization in machine learning.
- Study the neural network systems for machine learning.
- Learn and understand the linear learning models in machine learning.
- Study the tree based machine learning techniques and to appreciate their capability.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction Machine learning: What and why?, Types of Machine Learning - Supervised Learning - Unsupervised Learning – reinforcement, The Curse of dimensionality , Over fitting and linear regression, Bias and Variance, Learning Curve, Classification, Error and noise, Parametric vs. non-parametric models-Linear models	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Clustering Approaches Measuring dis-similarity - Evaluating the output of clustering method, Spectral clustering - Graph Laplacian - Normalized graph Laplacian, Hierarchical clustering -Agglomerative clustering – Divisive clustering - Choosing the number of clusters,Bayesian hierarchical clustering, Clustering datapoints and features, Bi-clustering, Multi-view clustering, K-Means clustering, K-meloids clustering	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Neural Networks Biological motivation for Neural Network : Neural network Representation, Perceptrons, Feed forward networks, Multilayer Networks and Back Propagation Algorithms, 2onvergence and local minima and Hidden layer representation in back propagation, Recurrent networks, Application of neural network- Face recognition using neural network, Biological motivation for Neural Network : Neural network Representation, Perceptrons	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Linear Models Linear Regression,Logistic Regression, Maximum Likelihood estimation (least squares), Robust linear regression, Ridge Regression, Principal Component Analysis, Bayesian Classifier, Support Vector Machines	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Tree Learning Directed and Undirected trees, Decision tree representation, Basic decision tree learning algorithm, Inductive bias in decision tree, Issues in decision tree, classification and regression trees(CART), Random forest, Multivariate adaptive regression trees(MART), Junction tree algorithm	Usage of ICT like PPT, Video Lectures,Black board

Course Outcome:

On completion of the course students will be expected to:

- Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model

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complexity, etc.

- Have an understanding of the strengths and weaknesses of many popular machine learning approaches.

Text Books:

- Genetic Algorithms : In Search Optimization and Machine Learning Goldberg David E., New Delhi Pearson Education

Reference Books:

- Artificial Intelligence and machine Learning S.S.Vinod Chandra PHI learning
- Artificial Intelligence: A Modern Approach Stuart Russell & Peter Norvig New Delhi Pearson Education

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Machine learning engineer.	Able to understand machine learning. Able to understand neural network. Able to understand linear models.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd
Course: M. Tech (CSE)
SUBJECT: REAL TIME OPERATION SYSTEM

Subject Code: 6TMCS301(C)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- To learn the fundamentals of Operating Systems.
- To learn the mechanisms of OS to handle processes and threads and their communication
- To learn the mechanisms involved in memory management in contemporary OS
- To gain knowledge on distributed operating system concepts that includes architecture, Mutual exclusion algorithms, deadlock detection algorithms and agreement protocols
- To know the components and management aspects of concurrency management
- To learn programmatically to implement simple OS mechanisms

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction: Introduction to Operating System: Computer Hardware Organization, BIOS and Boot Process, Multi- threading concepts, Processes, Threads, Scheduling	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Basics of Real-Time Concepts: Terminology: RTOS concepts and definitions, real-time design issues, examples, HardwareConsiderations: logic states, CPU, memory, I/O, Architectures, RTOS building blocks, Real-Time Kernel	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Process Management: Concepts, scheduling, IPC, RPC, CPU Scheduling, scheduling criteria,scheduling algorithms Threads: Multi-threading models, threading issues, thread libraries, synchronization Mutex: creating, deleting, prioritizing mutex, mutex internals	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Inter-Process Communication: Messages, Buffers, mailboxes, queues, semaphores, deadlock, priority inversion, PIPES MEMORY MANAGEMENT:- Process stack management, run-time buffer size, swapping, overlays, block/page management, replacement algorithms, real-time garbage collection	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Case Studies: Case study Linux POSIX system, RTLinux / RTAI, Windows system, Vxworks, uItron Kernel Design Issues: structure, process states, data structures, inter-task communication mechanism, Linux Scheduling	Usage of ICT like PPT, Video Lectures,Black board

Course Outcome:

At the end of this course attendees will be able to:

- Student will be able to summarize the issues in real time computing
- Student will be able to explain and give examples of real time operating systems.

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- Student will be able to solve scheduling problems and can apply them in real time applications in industry.

Text Books:

- Linux Programming Tools Unveiled N.B. Venkateswarlu Hyderabad BSP Books

Reference Books:

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Chief operating officer, Software system designer.	Able to understand RTOS building blocks. Able to understand scheduling algorithm threads. Able to understand deadlock.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd
Course: M. Tech (CSE)
SUBJECT: PARALLEL ALGORITHMS

Subject Code: 6TMCS301(D)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- To understand different parallel architectures and models of computation.
- To introduce the various classes of parallel algorithms.
- To study parallel algorithms for basic problems.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Sequential model, need of alternative model, parallel computational 8 models such as PRAM, LMCC, Hypercube, Cube Connected Cycle, Butterfly, Perfect Shuffle Computers, Tree model, Pyramid model, Fully Connected model, PRAM-CREW, EREW models, simulation of one model from another one.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Performance Measures of Parallel Algorithms, speed-up and 8 efficiency of PA, Cost- optimality, An example of illustrate Cost- optimal algorithms- such as summation, Min/Max on various models.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Parallel Sorting Networks, Parallel Merging Algorithms on on 8 CREW/EREW/MCC, Parallel Sorting Networks CREW/EREW/MCC/, linear array.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Parallel Searching Algorithm, Kth element, Kth element in X+Y on 8 PRAM, Parallel Matrix Transportation and Multiplication Algorithm on PRAM, MCC, Vector-Matrix Multiplication, Solution of Linear Equation, Root finding.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Graph Algorithms - Connected Graphs, search and traversal, 8 Combinatorial Algorithms-Permutation, Combinations, Derrangements.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

Upon completion of this course, the students should be able to

- Develop parallel algorithms for standard problems and applications.
- Analyse efficiency of different parallel algorithms.

Text Books:

References Books:

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Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Software engineer.	Able to understand parallel merging algorithm. Gain knowledge of graph Algorithms	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd
Course: M. Tech (CSE)
SUBJECT: DEEP LEARNING

Subject Code: 6TMCS302(A)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

This course covers the basics of machine learning, neural networks and deep learning. Model for deep learning technique and the various optimization and generalization mechanisms are included. Major topics in deep learning and dimensionality reduction techniques are covered. The objective oft his course is:

- To present the mathematical, statistical and computational challenges of building neural Networks.
- To study the concepts of deep learning
- To introduce dimensionality reduction techniques
- To enable the students to know deep learning techniques to support real-time applications
- To examine the case studies of deep learning techniques

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction Introduction to machine learning- Linear models (SVMs and Perceptions, logistic regression)- Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximates	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Deep Networks History of Deep Learning- A Probabilistic Theory of Deep Learning- Back propagation and regularization, batch normalization- VC Dimension and Neural Nets-Deep Vs Shallow Networks Convolution Networks- Generative Adversarial Networks (GAN), Semi-supervised Learning .	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Dimentionality Reduction Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convent -Architectures – Alex Net, VGG, Inception, Res Net - Training a Convent: weights initialization, batch normalization, hyper parameter optimization.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Optimization and Generalization Optimization in deep learning– Non-convex optimization for deep networks- Stochastic Optimization Generalization in neural networks- Spatial Transformer Networks- Recurrent networks, LSTM - Recurrent Neural Network Language Models- Word-Level RNNs & Deep Reinforcement Learning - Computational & Artificial Neuroscience	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Case Study and Applications Image net- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint Detection Bio Informatics- Face Recognition- Scene Understanding- Gathering Image Captions.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

Upon completion of the course, the students will be able:-

- To Understand basics of deep learning
- Implement various deep learning models

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- Realign high dimensional data using reduction techniques
- Analyze optimization and generalization in deep learning
- Explore the deep learning applications

Text Books:

- Neural Networks:Algorithms, Applications, and Programming Freeman A. James [s.l]: Pearson Education
- Neural Network:A Comprehensive Foundation Haykin Simon ., Delhi: Pearson Education,
- Neural Networks and Fuzzy Systems Kosko Bart , Delhi: Pearson Education.,

Reference Books:

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Researcher, Machine learning engineer.	Able to understand dimentionality reduction. Able to understand machine learning.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd **Subject Code:** 6TMCS302(B)
Course: M. Tech (CSE) **Theory Max. Marks:50**
SUBJECT: PRIVACY & SECURITY IN ONLINE SOCIAL MEDIA **Theory Min. marks:17**

COURSE OBJECTIVES:

Privacy and security in online social media are one of the hottest and most serious issues these days. This course will cover a wide range of topics to prepare you for the privacy and security issues and concerns you will face in social professional environments. The goal of this course is not to teach you how to encrypt a message using any particular encryption method, but to teach you to think analytically when you make privacy and security when you are working on social media.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Understanding Privacy and security: Public-key and symmetric-key cryptography, Secure hash function,Public-key infrastructure,Digitalsignature,Webauthentication,Wirelesssecurity,Spam filtering.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	What is Online Social Networks, data collection from social networks, challenges,opportunities, and pitfalls in online social networks, APIs .	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Collecting data from Online Social Media. Trust, credibility, and reputations in social systems,Online social Media and Policing.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Information privacy disclosure, revelation and its effects in OSM and online social networks,Phishing in OSM & Identifying fraudulent entities in online social networks.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Case study of privacy & security in social media.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

After completion of this course students are able:

- To understand how to achieve privacy in online social media.
- To prevent forgery in social media.
- To implement various technique to secure data on social media.

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Text Books:

- Cryptography & Network Security Kahate Atul., Noida Tata Mc Graw Hill Education

Reference Books:

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Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Social media executive, Network/Security technician.	Able to understand privacy security. Able to understand collecting data from online social media.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd
Course: M. Tech (CSE)
SUBJECT: GRID COMPUTING

Subject Code:6TMCS302(C)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

The course will provide an insight for achieving cost efficient high performance system. The course will deal with design and architecture of grid and cluster computing.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	The Grid - The Evolution of the Grid - Grids and Grid Technologies, Overview of Grid systems, Grid activities, Grid Business Areas, Applications, Programming models -A Look at a Grid Enabled Server and Parallelization Techniques – Grid applications.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	The concept of virtual organizations – Grid architecture – Grid architecture and relationship to other Distributed Technologies – computational and data Grids, semantic grids.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Grid Management systems, Grid security, Grid-Enabling software and Grid enabling network services, Data Grid - Virtualization Services for Data Grids, Peer-to-Peer Grids - Peer-to-Peer Grid Databases for Web Service Discovery, Merging the Grid service Architecture with Web service Architecture, Relationship between Web services & Grid services.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Open Grid Services Infrastructure (OGSI):Introduction-Grid services- High-level introduction to OGSI- Technical details- Introduction to service data components- Grid service: Naming & change management recommendations, Open Grid Service Architecture (OGSA):OGSA Basic Services: Common Management model (CMM)-service domains- policy architecture- security architecture- Mastering & Accounting- common distributed Logging.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Grid Middleware, Resource management and scheduling, setting up Grid, deployment of Grid software and tools, and application execution, Compilers, Languages and Libraries for the Grid, Grid Application Description Languages, Application Partitioning, Grid Portals.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcome:

AT the end of the course student will have knowledge of Grid Computing, Web Services, and Service-oriented architecture, Architecture for grid computing, Cluster Computing, process scheduling and load balancing

Text Books:

- Grid Computing : A Research Monograph Janakiram D , New Delhi Tata Mc Graw Hill Publishing

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Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Researcher, Team Leader.	Able to understand grid management system. Able to understand open grid service infrastructure.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd
Course: M. Tech (CSE)
SUBJECT: SOFTWARE TESTING & QUALITY ASSURANCE

Subject Code:6TMCS302(D)
Theory Max. Marks:50
Theory Min. marks:17

COURSE OBJECTIVES:

- To study fundamental concepts in software testing, including software testing objectives, process, criteria, strategies, and methods.
- To discuss various software testing issues and solutions in software unit test; integration, regression, and system testing.
- To learn how to planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generate a testing report.
- To expose the advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
- To gain software testing experience by applying software testing knowledge and methods to practice-oriented software testing projects.
- To understand software test automation problems and solutions.
- To learn how to write software testing documents, and communicate with engineers in various forms.
- To gain the techniques and skills on how to use modern software testing tools to support software testing projects.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Introduction to software testing, concepts, issues and techniques, test activities, management and automation, Coverage and usage testing based on checklist, input domain portioning and boundary testing.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Object oriented testing: testing OOA and OOD models, object oriented testing strategies, test case design for OO software, testing methods applicable at the class level, interclass test case design, Web application testing, debugging, security & reliability.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Programming style and program quality: simple style rules, comment statements, program quality, quantifying program quality.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Software quality and quality Assurance: Principle of Software Quality Assurance (SQA), Applying SQA to software project, proven factors for SQA success, SQA during software requirements, SQA during software design phase, SQA during software code and test, Advance quality engineering topics.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Human factors in software engineering: Human factors history, HCL requirements and design process, HCL testing.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

At the end of this course attendees will be able to:

- Understand quality management processes
- Distinguish between the various activities of quality assurance, quality planning and quality control.
- Understand the importance of standards in the quality management process and their impact on the final product.

Text Books:

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- Software Engineering BanzalSashi , Bhopal Ram Prasad .,
- Software:Made Simple Madhulika , New Delhi: BPB Publication.,
- Software Engineering MathewSajan, New Delhi S. Chand Group
- An Integrated Approach to Software Engineering Jalote Pankaj, New Delhi: Narosa Publishing.,

Reference Books:

- PC Software and IT Tools Roy Gautam , New Delhi S. Chand Group
- Software Engineering Aggarawal K.K., New Delhi New Age International
- Software Engineering Fundamentals Frederick J. Hudson Behforooz Ali, New Delhi: Oxford University Press .,

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor, Testing and quality assurance engineer, Quality assurance specialist.	Able to understand concepts of software testing. \ Able to understand object oriented testing.	Goal 04(Quality Education)	Start business unit Service consultancy

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SEMESTER- 3rd **Subject Code:**
Course: M. Tech (CSE) **Theory Max. Marks:**
SUBJECT: RESEARCH METHODOLOGY AND IPR **Theory Min. marks**

COURSE OBJECTIVES:

The course has been developed with orientation towards research related activities and recognizing the ensuing knowledge as property. It will create consciousness for Intellectual Property Rights and its constituents. Learners will be able to perform documentation and administrative procedures relating to IPR in India as well as abroad.

Syllabus:

Unit	Unit wise course contents	Methodology Adopted
Unit – I	Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.	Usage of ICT like PPT, Video Lectures,Black board
Unit – II	Effective literature studies approaches, analysis Plagiarism, Research ethics. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge, Case Studies.	Usage of ICT like PPT, Video Lectures,Black board
Unit – III	Effective technical writing, how to write report, Developing a Research Proposal, Format of research proposal, presentation and assessment by a review committee.	Usage of ICT like PPT, Video Lectures,Black board
Unit – IV	Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	Usage of ICT like PPT, Video Lectures,Black board
Unit - V	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.	Usage of ICT like PPT, Video Lectures,Black board

Course Outcomes:

At the end of the course, students will demonstrate their ability to:

1. Understanding and formulation of research problem.
2. Analyze research related information.
3. Understand plagiarism and follow research ethics
4. Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.

Reference Books:

Job opportunity	Employability skill developed	Local/National/UNDP Goal Achieved	Entrepreneurship Opportunity
Assistant Professor,		Goal 04(Quality Education)	Start business unit Service consultancy

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