AWADHESH PRATAP SINGH UNIVERSITY

REWA (M.P.) 486003

CBCS

CURRICULAM & SYLLABUS

MASTER OF TECHNOLOGY IN COMPUTER SCIENCE
(M.Tech.(Computer Science))

(UGC Approved)

Course Code: 222

Approved by Board of studies dated 21-09-2020

Awadhesh Pratap Singh Vishwavidyalaya,Rewa(M.P.)

Scheme of Examination for M.Tech.(Computer Science)

First Semester-M.Tech.(Computer Science)

S. No.	Subject Code	Subject Name	Course Type	Periods Per Week			Credits	Maximum Marks (Theory)	Internal Marks	Practical Marks	Total Marks
				L	T	P		End Sem. Exam	Tests (Two)/ assignment/Quiz/Presentation	End Sem. Practical/ Viva	
1	MTECH CS 101	Advanced Computational Mathematics	CC	3	1	-	4	60	40	-	100
2	MTECH CS 102	Advanced Data Structures and Algorithm	CC	3	1	-	4	60	40	-	100
3	MTECH CS 103	Advanced Computer Architecture	CC	3	1	-	4	60	40	-	100
4	MTECH CS 104	Advanced Compter Networking	CC	3	1	-	4	60	40	-	100
5	MTECH CS 105	Object Oriented Technology *	GE	3	1	-	4	60	40	-	100
6	MTECH CS 106	Lab-I MTECHCS-103,MTECHCS-105	CC	-	-	6	2	-	40	60	100
7	MTECH CS 107	Lab-II MTECHCS-102,MTECHCS-104	CC	-	-	6	2	-	40	60	100
8	MTECH CS 108	Comprehensive Viva	VIVA				4			100	100
		Total		15	5	12	28	300	280	220	800

L:Lecture, T:Tutorial, P:Practical, CC:Core Course, GE:Generic Elective, DCE: Discipline Centric Elective

* Student may choose this course as a Generic Elective or may choose a Generic Elective course offered in other UTDs at the same level or may choose a course offered by MOOCs through SWAYAM.

Instructions:

1. For passing the subject examination minimum 40% marks must be separately scored in Theory Paper, Practical Exams and Internal Evaluation for the subject.

2. For passing the semester, minimum aggregate marks must be 45% in the semester.

Awadhesh Pratap Singh Vishwavidyalaya,Rewa(M.P.)

Scheme of Examination for M.Tech.(Computer Science)

Second semester-M.Tech.(Computer Science)

S. No.	Subject Code	Subject Name	Course Type	Periods Per Week			Credits	Maximum Marks (Theory)	Internal Marks	Practical Marks	Total Marks
				L	T	P		End Sem. Exam	Tests (Two)/ assignment/Quiz/Presentation	End Sem. Practical/ Viva	
1	MTECH CS 201	Knowledge Representation	CC	3	1	-	4	60	40	-	100
2	MTECH CS 202	Advanced Operating Systems	CC	3	1	-	4	60	40	-	100
3	MTECH CS 203	Data Mining and Warehousing	CC	3	1	-	4	60	40	-	100
4	MTECH CS 204	Elective I	DCE	3	1	-	4	60	40	-	100
5	MTECH CS 205	Advanced Database Management Systems *	GE	3	1	-	4	60	40	-	100
6	MTECH CS 206	Lab-I MTECHCS-203,MTECHCS-205	CC	-	-	6	2	-	40	60	100
7	MTECH CS 207	Lab-II MTECHCS-202,MTECHCS-204	CC	-	-	6	2	-	40	60	100
8	MTECH CS 208	Comprehensive Viva	VIVA				4			100	100
		Total		15	5	12	28	300	280	220	800

L:Lecture, T:Tutorial, P:Practical, CC:Core Course, GE:Generic Elective, DCE: Discipline Centric Elective

Elective- I(MTECHCS 204)

       (a) Software Testing & Quality Assurance

       (b)Enterprise Resource Planning

       (c)Web Technology & Java Security

* Student may choose this course as a Generic Elective or may choose a Generic Elective course offered
in other UTDs at the same level or may choose a course offered by MOOCs through SWAYAM.

Instructions:

1. For passing the subject examination minimum 40% marks must be separately scored in Theory Paper,
   Practical Exams and Internal Evaluation for the subject.

2. For passing the semester, minimum aggregate marks must be 45% in the semester.

R.K.ratare

Ahrivastava

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University, Rewa (M.P.) 486003

Awadhesh Pratap Singh Vishwavidyalaya,Rewa(M.P.)

Scheme of Examination for M.Tech.(Computer Science)

Third Semester-M.Tech.(Computer Science)

S. No.	Subject Code	Subject Name	Course Type	Periods Per Week			Credits	Maximum Marks (Theory)	Internal Marks	Practical Marks	Total Marks
				L	T	P		End Sem. Exam	Tests (Two)/ assignment/Quiz/Presentation	End Sem. Practical/ Viva	
1	MTECH CS 301	Elective I	DCE	3	1	-	4	60	40	-	100
2	MTECH CS 302	Elective II	DCE	3	1	-	4	60	40	-	100
3	MTECH CS 303	Dissertation Part-I (Literature Review/Problem Formulation/Synopsis/ Seminar)	CC			8	8		80	120	200
4	MTECH CS 304	Internet of Things (IoT) *	GE	3	1		4	60	40		100
5	MTECH CS 305	Comprensive Viva	VIVA				4			100	100
		Total		9	3	8	24	180	200	220	600

L:Lecture, T:Tutorial, P:Practical, CC:Core Course, GE:Generic Elective, DCE: Discipline Centric Elective

Elective- I(MTECHCS 301)
(a)Cloud Computing
(b)Legal Aspects of Information security

Elective- II(MTECHCS 302)
(a) Network Security
(b)Mobile & Wireless Systems
(c)Software Reuse &Customization

* Student may choose this course as a Generic Elective or may choose a Generic Elective course offered in other UTDs at the same level or may choose a course offered by MOOCs through SWAYAM.

Instructions:

1. For passing the subject examination minimum 40% marks must be separately scored in Theory Paper, Practical Exams and Internal Evaluation for the subject.

2. For passing the semester, minimum aggregate marks must be 45% in the semester.

Awadhesh Pratap Singh Vishwavidyalaya,Rewa(M.P.)

Scheme of Examination for M.Tech.(Computer Science)

Fourth Semester-M.Tech.(Computer Science)
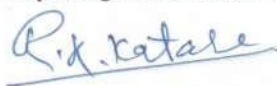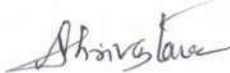
S. No.	Subject Code	Subject Name	Course Type	Periods Per Week			Credits	Maximum Marks (Theory)	Internal Marks	Practical Marks	Total Marks
				L	T	P		End Sem. Exam	Practical Records/ assignment/Quiz/Presentation	End Sem. Practical/ Viva	
1	MTECH CS 401	Dissertation Part-II	CC	-	-	20	20	-	200	300	500
2	MTECH CS 402	Data Science *	GE	3	1		4	60	40		100
		Total		3	1	20	24	60	240	300	600

L:Lecture, T:Tutorial, P:Practical, CC:Core Course, GE:Generic Elective, DCE: Discipline Centric Elective

* Student may choose this course as a Generic Elective or may choose a Generic Elective course offered in other UTDs at the same level or may choose a course offered by MOOCs through SWAYAM.

Instructions:

1. For passing the subject examination minimum 40% marks must be separately scored in Theory Paper, Practical Exams and Internal Evaluation for the subject.

2. For passing the semester, minimum aggregate marks must be 45% in the semester.

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A.P.S. University, Rewa (M.P.) 486003

Programme Outcomes

POs.1 An ability to independently carry out research/investigation and development work to solve practical problems.

POs.2 An ability to write and present a substantial technical report/document.

POs.3 Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program.

POs.4 The mastery should be at a level higher than the requirements in the appropriate bachelor program.

POs.5 Conduct Investigations of Complex Problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

Programme Specific Outcomes

PSOs.1 The ability to understand, analyze, and develop computer programs in the areas related to algorithms, system software, web design and networking for efficient design of computer based systems.

PSOs.2 Students will be able to analyze system by sampling and investigating hard data. Also students will be able to identifying, forecasting/comparing cost and or benefits for system under study.

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science- First Semester
(Session 2020-21)
Paper (MTECHCS- 101): Advanced Computational Mathematics

Course Outcome

COs.1   The idea of partial differentiation and types of partial differential equations and vector operations.

COs.2   The idea of classification of second partial differential equations, wave, heat equation and transmission lines.

COs.3   The basic ideas of statistics including measures of central tendency, correlation, regression and their properties.

COs.4   The ideas of probability and random variables and various discrete and continuous probability distributions and their properties.

COs.5   The statistical methods of studying data samples, hypothesis testing and statistical quality control, control charts and their properties.

Unit wise Syllabus :

Time: 3 hours   **Max. Marks: 60**
                                                         Min. Marks: 24

UNIT I

Linear Algebra: Linear transformation, vector spaces, Hermite polynomial, Elementary concepts of Modular mathematics.

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.

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.

UNIT V

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/ FCFS), (M/M/1: N/ Infinity/ FC FS), (M/M/S: Infinity/ Infinity/ FC FS)

UNIT IV

Operations of fuzzy sets, fuzzy arithmetic & relations, fuzzy relation equations, fuzzy logics. MATLAB introduction, programming in MATLAB scripts, functions and their application.

Text Books:

1. Advance Engineering Mathematics by Ervin Kreszig, Wiley Easten Edd.
2. Fuzzy Logic in Engineering by T. J. Ross

Reference Books:

1. Higher Engineering Mathematics by B.V. Ramana, Tata Mc Hill.
2. Applied Numerical Methods with MATLAB by Steven C Chapra, TMH.
3. Advance Engg Mathematics, O' Neil, Cengage (Thomson)
4. Introduction of Numerical Analysis by Forberg
5. Numerical Solution of Differential Equation by M. K. Jain
6. Numerical Mathematical Analysis By James B. Scarborogh
7. Fourier Transforms by J. N. Sheddon

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Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science- First Semester
(Session 2020-21)
Paper (MTECHCS- 102): Advanced Data Structures and Algorithm

Course Outcome

COs.1   Choose appropriate data structure as applied to specified problem definition.

COs.2   Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures

COs.3   Handle operations on tree, graph and various running time complexity of algorithms

Unit wise Syllabus :

Time: 3 hours   **Max. Marks: 60**
                                                                                  Min. Marks: 24

UNIT I

Introduction: Asymptotic Notation, Recurrences, Algorithm Analysis – ADT -List (Singly, Doubly and Circular), Design Techniques - Divide and Conquer– Merge Sort, Quick Sort, Searching, Heap Sort. Sorting in Linear time- counting sort, Radix sort.

UNIT II

Basic Data Structures: Stacks and Queues, ADT, Implementation and Applications, Trees – General, Binary, Binary Search tree, Red-Black tree, B-Trees – Implementations - Tree Traversals.

UNIT III

Advanced Data Structures: Data structure for disjoint Set, Implementation, Basic operations on disjoint set Priority Queue, Implementation, Graphs, Directed Graphs, Shortest Path Problem, Undirected Graph, Spanning Trees and Graph Traversals. All pair shortest path problem.

UNIT IV

Searching, Bubble Sort, Insertion Sort, Dynamic Programming – Matrix Chain multiplication, Longest Common Subsequence, Greedy Algorithm- Huffman Code, Knapsack Problem, Backtracking.

UNIT V

Polynomials and the FFT: Representing polynomials, The DFT and FFT, Efficient FFT implementations, RSA cryptosystem NP-Completeness: Polynomial time, Polynomial-time verification, NP-completeness and reducibility, NP-completeness proofs, NP-complete problems

Text Books:
1. Thomas H. Coremen, Rivest , Stein ,"Introduction to Algorithms", PHI
2. . Horowitz, Sahni, Rajasekaran, "Computer Algorithms", Galgotia,

Reference Books :
1. Thomas H. Coremen, Rivest , Stein ,"Introduction to Algorithms", PHI
2. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Pearson Education P
3. Drozdek, Data Structures and algorithm in Jawa, Cengage (Thomson)
4. Gilberg, Data structures Using C++, Cengage

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science- First Semester
(Session 2020-21)
Paper (MTECHCS- 103): Advanced Computer Architecture

Course Outcome

COs.1   Study of the basic structure and operation of a digital computer system.

COs.2   Implementation of control unit techniques and the concept of Pipelining.

COs.3   Understanding the parallel algorithms, hierarchical memory system, cache memories and virtual memory.

COs.4   Understanding the different ways of communicating with I/O devices and standard I/O interfaces.

Unit wise Syllabus :

Time: 3 hours   Max. Marks: 60
                                                                                 Min. Marks: 24

UNIT I

Processors Arrays, Multiprocessors and Multicomputer, Processor Organization: Mess Network, Binary Tree Network, Hypercube Network, Flynn's Taxonomy.

UNIT II

Pipelining, Vector Processors, Data and control hazards and method to resolve them, SIMD multiprocessor structures.

UNIT III

Interconnection networks, Parallel Algorithms for array processors, Search algorithms, MIMD multiprocessor systems, PRAM Model, PRAM algorithm-Prefix Sums, List Banking, Preorder Tree Traversal, Merging two shortest lists, Graph Colouring, Reducing the number of processors

UNIT IV

Mapping and Scheduling, Mapping data to processors on processor arrays and multi computer: Ring into 2-D Mesh,2-D Mesh into 2-D Mesh, Complete Binary Tree into 2-D Mesh,

UNIT V

Dynamic load balancing in multicomputer systems, Static Scheduling on UMA multiprocessors: Deterministic Models, Graham's List scheduling Algorithms, Nondeterministic models, Deadlock.

Text Books:

1.Parallel Computing Theory and Practice, Michael J. Quinn
2.Computer Architecture and Parallel Processing- Hwang And Briggs, TMH

Reference Books:

1. Advance Computer Architecture, parthsarthy, Cengage (Thomson)
2. Computer Architecture and Organization- John Hays, Mc.Graw-Hill.
3. Advanced Computer Architecture – Kai Hwang , TMH.
4. Efficient Parallel Algorithms- Alan Gibbons, Cambridge University Press.

Paper (MTECHCS- 104): Advanced Computer Networking

Course Outcome

COs.1   To apply the concepts of layered architecture in assessing the placement of network devices, protocols and services.

COs.2   To compare the services provided by the UDP/TCP transport layer protocols and explain the mechanisms used to provide a reliable data transport service on an unreliable IP network.

Unit wise Syllabus :

Time: 3 hours   Max. Marks: 60
                                                                                                   Min. Marks: 24

UNIT I

Review of Networking and O.S. Fundamentals, ISO-OSI Model, different layers and their functions, LAN, MAN, WAN, Communication media & principles IEEE standards etc.

UNIT II

Internetworking with TCP/IP, Basic concepts, Principles, Protocols and Architecture, Address handling Internet protocols and protocol layering. DNS, Applications: TELNET, RLOIGN, FTP, TFTP, NFS, SMTP, POPL, IMAP, MIME, HTTP, STTP, DHCP, VOIP, SNMP.

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.

UNIT IV

VPN addressing and routing, VPN Host management, ATM Concepts, Services Architecture, Equipment's and Implementation

UNIT V

Introduction to wireless transmission and medium access control, wireless LAN: IEEE 802.11, Hiper LAN, Bluetooth Mobile Network and Transport layer, WAP, GSM and CDMA: Network architecture and management.

Text Books:
1. Internetworking with TCP/IP: Comer.
2. Data communication and Networking: Forouzan McGraw-Hill Publications

Reference Books:
1. Computer Networks: Tanenbaum.
2. Data Communications, Computer Networks and Open Systems: Hallsall.
3. Data Communications, Stalling.
4. Mobile Communication: Schiller, Pearson Education
5. Computer Communications and network Technology, Gallo, Cengage (Thomson)
6. Wireless and Mobile Network Architecture: Yi Bing Lin, Wiley

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science- First Semester
(Session 2020-21)
Paper (MTECHCS- 105): Object Oriented Technology

Course Outcome

COs.1   Implementing Object Oriented programming concepts using basic syntax of control structures, strings and functions for developing skills of logic building activity.

COs.2   Identifying classes, objects, members of a class and the relationships among them needed for finding the solution to specific problems.

Unit wise Syllabus :

Time: 3 hours   Max. Marks: 60
                                                                       Min. Marks: 24

UNIT I

0verview of object oriented concepts: Need for object oriented programming, modelling, class modelling-object and class concept, link, association, generalization and inheritance, aggregation, abstract classes.

UNIT II

State modelling-Events, states, transitions and conditions state diagram, Advance state modelling, nested state diagrams, concurrency A sample state model.

UNIT III

Interaction modelling-Use case model, sequence model, activity models, advance interaction modelling

UNIT IV

Object oriented programming: An overview of C++ programming, loops and decisions, structures and functions, objects and classes, constructor and destructor, operator overloading, Inheritance, virtual function, files and stream.

UNIT V

Object oriented Databases: Relational v/s object oriented databases, the architecture of OO databases, Query languages for OO databases.

Text Books:
1. Object Oriented Modeling and Design with UML, Michael R Blaha , James R Rumbaugh
2. OOP in C++ by Lafore, Galgotia Pub.

Reference Books :
1. Object Oriented Analysis and Design, Satzinger, Cengage (Thomson)
2. Object Oriented S/W Development by Mc. Gregor & Sykes DA, Van Nostrand.
3. The C++ Programming Language by Stroustrup B, Addison Wesely
4. Introduction to OOP by Witt KV, Galgotia Pub.
5. Object Data Management by Cattel R., Addison Wesely
6. Modern Data Base System by Kim W, ACM Press, Addison Wesely
7. OOP by Blaschek G, Springer Verlag

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Second Semester
(Session 2020-21)
Paper (MTECHCS- 201): Knowledge Representation

Course Outcome

COs.1   Demonstrate fundamental understanding of the knowledge representation and its foundations.

COs.2   Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.

Unit wise Syllabus :

Time: 3 hours   Max. Marks: 60
                                                                                 Min. Marks: 24

UNIT-I

Introduction toLogic, Representing knowledge in Logic, Ontology: sets,collection,types and categoriesSpace and Time.

Unit-II

Knowledge Engineering: Representing structure in frame, Rules and Data, Natural Language Semantics Level of Representation,Processes:Time, Events and situation, concurrent Processes, computations.

Unit-III

Purposes, contexts, and Agents:purpose, syntax of contexts, semantics of contexts, First order reasoning in context, Agents, First Order Logic.

Unit-IV

Knowledge Soup:Limitation of Logic, Fuzzy Logic, Nonmonotonic Logic,Theories models and the world semiotics.

Unit-V

Knowledge Acquisition and Sharing : Sharing Ontologies ,Conceptual Schema, Accomodating multiple Paradigms , Language Pattern. Tools for Knowledge Acquisition.

Text Books:

1. Knowledge Representation,John F. Sowa,Vikash Publishing House.

References:

1. Handbook of Knowledge Representation, Frank van Harmelen , Vladimir , B. Porter Elsevier Science

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Second Semester
(Session 2020-21)
Paper (MTECHCS- 202): Advanced Operating Systems

Course Outcome

COs.1 The structure of OS and basic architectural components involved in OS design.

COs.2 The various device and resource management techniques for timesharing and distributed systems.

COs.3 Ability to analyse various scheduling and synchronisation techniques.

Unit wise Syllabus :

Time: 3 hours   **Max. Marks: 60**
                                                                         Min. Marks: 24

Unit I

Overview, Functions of an Operating System, Design Approaches, Types of Advanced Operating Systems. Synchronization Mechanisms, Concept of a Process, Concurrent Processes, Critical Section Problem, Other Critical Section Problems, Language Mechanisms for Synchronization

Unit II

Process Deadlocks, Models of Deadlock, Models of Resources ,A graph theoretic model of a System State, Necessary and Sufficient conditions for a Deadlock, Systems with Single unit requests, Systems with only consumable resources, Systems with reusable resources.

Unit III

Distributed Operating Systems, Introduction, System Architecture Types, Issues in Distributed Operating Systems, Communication Networks, Communication Primitives,

Unit IV

Limitations of a distributed system, Lamport's logical clocks, Vector Clocks, Causal ordering of messages, Global state, Cuts of a distributed Computation, Termination detection.

Unit V

Distributed Mutual Exclusion, Classification of Mutual ExclusionAlgorithms, Preliminaries, Non token based algorithms, Lamport's algorithm, Token based algorithms, Suzuki Kasami's Broadcast algorithm, Singhal's heuristic algorithm, Raymond's tree based algorithm, Comparative performance analysis.

Text Books:

1.M. Singhal, N. Shivaratri, Advanced Concepts in Operating Systems, Tata McGraw- Hill, 2008.
Refernce Books
1. W. Stallings, Operating Systems - Internals and Design Principles, Prentice Hall, 2008.
2. W. Stallings, Operating Systems, Macmillian Publishing, 2008.

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Second Semester
(Session 2020-21)
Paper (MTECHCS- 203): Data mining and Warehousing

Course Outcome

COs.1 Use of appropriate data mining tools like classification, clustering or Frequent Pattern mining on large data sets.

COs.2 Understand warehousing architectures and tools for systematically organizing large database and use their data to make strategic decisions.

COs.3 Understand KDD process for finding interesting pattern from warehouse.

Unit wise Syllabus :

Time: 3 hours   Max. Marks: 60
                                                                       Min. Marks: 24

Unit I

Data Mining : Introduction, Relational Databases, Data Warehouses, Transactional databases, Advanced database Systems and Application, Data Mining Functionalities, Classification of Data Mining Systems, Major Issues in Data Mining.

Unit II

Data Warehouse : Introduction, A Multidimensional data Model, Data Warehouse Architecture, Data Warehouse Implementation, Data Cube Technology, From Data warehousing to Data Mining.

Unit III

Data Processing : Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and concept Hierarchy Generation.

Data Mining Primitives, Languages and System Architecture: Data Mining Primitives, DMQL, Architectures of Data Mining Systems.

Unit IV

Concept Description : Data Generalization & Summarization – Based Characterization, Analytical Characterization, Mining class Comparisons, Mining Descriptive Statistical Measures in Large Databases.

Unit V

Mining Association Rules in Large Databases : Association Rule Mining, Single – Dimensional Boolean Association Rules, Multilevel Association Rules from Transaction Databases, Multi-Dimensional Association Rules from Relational Databases, From Association Mining to Correlation Analysis, Constraint – Based Association Mining, Classification & Prediction, Issues Regarding Classification & Prediction, Cluster Analysis, Mining Complex Types of Data.

Text Books :
1. Jiawei Han & Micheline Kamber - Data Mining Concepts & Techniques
   Publisher Harcout India. Private Linited.

Reference Books:
1) G.K. Gupta – Introduction to Data Mining with case Studies, PHI, New Delhi – 2006.
2) A. Berson & S.J. Smith – Data Warehousing Data Mining, COLAP, TMH, New Delhi – 2004
3) H.M. Dunham & S. Sridhar – Data Mining, Pearson Education, New Delhi, 2006.

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Second Semester
(Session 2020-21)
Paper (MTECHCS- 204(A)): Software Testing & Quality Assurance

Course Outcome
COs.1 Various software application domains and different process models.

COs.2 To handle various software testing tools with quality management.

COs.3 Converting requirements model into the design model and using software and interface design and engineering principles.

Unit wise Syllabus :
Time: 3 hours   Max. Marks: 60
                                                                             Min. Marks: 24

Unit I
Need of testing, Basic concepts – errors, faults, defects, failures, test bed, unit testing, integration testing system, system testing, regression testing, alpha, beta and acceptance testing, functional testing, performance testing, recovery testing, white box testing, black box testing, verification and validation.

Unit II
Test Management
Testing Life Cycle – Roles and activities, Test Planning – forming a test team, develop test plan review, Test Cases design strategies black box approach: random testing, equivalence class partitioning andboundary value analysis. white box approach: test adequacy criteria, coverage and control flow graphs,paths, loop testing, mutation testing. Test execution: build test data, life cycle of defect, defect tracking, defect detection stages, defect detection stages, defect types, defect severity, defect analysis and prevention.

Unit III
Software Metrics
Scope of software metrics, Classifying software measures, Measurement basics – representational theory, scales, meaningfulness, What to measure – GOM technique, Control flow structure, product quality metrics – MTTF, defect density, customer problems, customer satisfaction, function point, Metrics for software maintenance, In-process quality metrics.

Unit IV
Quality Assurance
Quality concepts – quality, quality control, quality assurance, cost of quality Software quality assurance – SQA activities, software reviews, inspections, audits, Software reviews, inspections, audits, Software reliability Quality Attributes: correctness, reliability, usability, integrity, portability, maintainability, interoperability. Ishikawa's Seven Basic Tools

Unit V
Quality Standards
Basic concept of – ISO 9000 & 9001, CMM, six sigma.
CMM – Following KPAs : requirements management (RM), software project tracking and oversight (SPTO), software configuration management (SCM), organization process definition (OPD), software product engineering (SPE), peer reviews (PR), quantitative process management (QPM), defect prevention(DP), process change management

Text Books :
1.Software Testing and Quality Assurance Kshiras agarnaik,Priyadarshi Tripathi,john wiley &sons

References:
1. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3/e Narosa Publishing House

References:
1. Pankaj Jalote, "An Integrated Approach to Software Engineering", 3/e Narosa Publishing House

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Second Semester
(Session 2020-21)
Paper (MTECHCS- 204(B)): Enterprise Resource Planning

Course Outcome
COs.1 Managing of ERP projects.

COs.2 Demonstrate an understanding of the importance of data mining and the principles of business intelligence.

Unit wise Syllabus :

Time: 3 hours   **Max. Marks: 60**
                                                                                     Min. Marks: 24

UNIT I

Enterprise Resources Planning: Evolution of ERP-MRP and MRP II - problems of system islands need for system integration and interface-early ERP Packages-ERP products and Markets - opportunities and problems in ERP selection and implementation; ERP implementation identifying RP benefits team formation-Consultant intervention-Selection ERP-Process of ERP implementation.

UNIT II

Managing changes in IT organisation -Preparing IT infrastructure-Measuring benefits of ERP-Integrating with other systems: The emergence of reengineering concept- concept of business process rethinking of processes identification of re-engineering need-preparing for re-engineering -implementing change-change management-BPR & ERP;

UNIT III

Supply Chain Management: The concept of value chain differentiation between ERP and SCM- SCM for customer focus-nee and specificity of SCM. SCM scenario in India-products and markets of Sehl-issue in selection and implementation of SCM solution -CRM solutions;

UNIT IV

E- Business: Introduction to 1-Net technologies-Evolution of E-Commerce, EDI and E-Business - business opportunities basic and advanced business models on internet- internet banking and related technologies- security and privacy issues- technologies for E-Business. Future and Growth of E-Business's.

UNIT V

ERP & E-Commerce, Future Directives- in ERP, ERP and Internet, Critical success and failure factors, Integrating ERP into organizational culture.

Text Books:
1.Langenalter, A. Gary, *Enterprise Resources Planning and Beyond.* St. Lucie Press, USA.
2. Mahadeo Jaiswal and Ganesh Vanapalli, *Textbook of Enterprise Resource Planning*.

References:
1. Alexis Leon, "ERP Demystified", Tata McGraw Hill
2. Rahul V. Altekar "Enterprisewide Resource Planning", Tata McGraw Hill,
3. Vinod Kumar Garg and Venkitakrishnan N K, "Enterprise Resource Planning – Concepts and Practice", PHI

4. Joseph A Brady, Ellen F Monk, Bret Wagner, "Concepts in Enterprise Resource Planning", Thompson Course Technology

5. Mary Summer, "Enterprise Resource Planning"- Pearson Education

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Second Semester
(Session 2020-21)
Paper (MTECHCS- 204(C)): Web Technology & Java Security

Course Outcome

COs.1 To understand the security issues associated with various applications and associated data, various threats and be able to identify the key components of cyber security network architecture, apply cyber security architecture principles.

COs.2 Design and development of .Net and java applications using JSP.

COs.3 Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database.

Unit wise Syllabus :

Time: 3 hours   **Max. Marks: 60**
Min. Marks: 24

Unit I

Internet & Web: Introduction of Internet and Web, Internet protocols and applications,Web Design &Development: Key issues and challenges. HTML : Building web pages with HTML tags , Frames, DHTML. Hosting Website & Security: Hosting a Website and it's Security issues, cyber laws.

Unit II

HTML Editors & Tools: Use of different HTML editors and tools like Microsoft Front Page , Dreamweaver etc. Graphical and Animation Tools: Use of Different graphical and animation tools like Abode Photoshop ,Gif Animator, Macromedia flash etc .

Unit III

Interactivity: Forms, Creating interactive & dynamic web pages . Comparison of ASP, PHP and JSP technologies. Active Server Pages : Interactivity with database using ASP, ASP request & response objects, ASP Server Objects.

Unit IV

Web Technologies: Latest trends & technologies in Web industry. Java for web : Overview of Java beans , Java Servlets , Java applets , Java Script . ASP.NET , E-Commerce, Web engineering , Semantic web .VB Script, Microsoft Visual Interdev IDE , Overview of Visual Basic & VB.NET.

Unit V

Introduction to active server pages (ASP),ASP.NET, java server pages (JSP), JSP application design, tomcat server, JSP objects, declaring variables, and methods, debugging, sharing data between JSP pages, Session, Application: data base action , development of java beans in JSP, introduction to COM/DCOM.

Text Book:

1. Achyut S Godbole and Atul Kahate, "Web Technologies", Tata McGraw Hill
2. C. Xavier, "Web Technology & Design ", Tata McGraw Hill.
3. Ann Navarro, " Effective Web Design", BPB publications.
4. Raj Kamal, "Internet & Web Design", Tata McGraw Hill
5. Raj Kamal, "Internet and Web Technologies", TMH
6. E Stephen,Will Train, "HTML 4.0", BPB publication
7. ASP 3 Programming , Eric A. Smith , IDG Books India. Active Server Pages by Heith Morneau, Vikas Publishing House
8. Active Server Pages by Heith Morneau, Vikas Publishing House
9. B. Reselman et al, "Using Visual Basic 6", PHI

10. E. Petroutsos, "Mastering Visual Basic 6.0", BPB.

Reference Books:
1. VK Jain, "Advanced programming in web design",Cyber tech publications
2. Rick Dranell, "HTML4 unleashed", Techmedia Publication.
3. TM Ramachandran , "Internet & Web development", Dhruv publications
4. James L Mohler and Jon Duff, "Designing interactive web sites",Delmar Thomson learning .
5. Ivan Bay Ross, "HTML,DHTML,Java script,Perl CGI" , BPB
6. Java-2 The complete Reference by Patrick Naughton and Herbertz Schildt, TMH.

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Second Semester
(Session 2020-21)
Paper (MTECHCS- 205): Advanced Database Management Systems

Course Outcome

COs.1 Understand the database concepts, technology and practice ER diagrams for real time applications using DBMS.

COs.2 Analyze and apply the different normalization Techniques.

COs.3 Access the basic issues of transaction processing and concurrency control.

COs.4 Understand the basics of query processing, object-oriented, distributed databases.

COs.5 Understand the fundamentals of relational database systems including: data model and database architectures.

Unit wise Syllabus :

Time: 3 hours   Max. Marks: 60
                                                                                  Min. Marks: 24

Unit I

Introduction, Client Server Architecture, E-R Diagram and Keys

Overview of database Management System; Various views of data, data Models, Introduction to Database Languages. Advantages of DBMS over file processing systems, Responsibility of Database Administrator, Introduction to Client/Server architecture, three levels architecture of Database Systems, ER Diagram (Entity Relationship), mapping Constraints, Keys, Reduction of E-R diagram into tables.

Unit II

File Organization and Relational Model and Calculus:

Sequential Files, index sequential files, direct files, Hashing, B-trees Index files.Relational Model, Relational Algebra & various operations, Relational and Tuple calculus.

Unit III

Introduction to Query Languages:

QLB, QBE, Structured query language – with special reference of (SQL of ORACLE), integrity constraints, functional dependencies & Normalization – (up to 4th Normal forms), BCNF (Boyce – code normal forms)

Unit IV

Object Oriented Database:

Concept of the object, Names and Identity, Implementation of object identifiers, object class and instantiation, inheritance, object database**.**

Unit V

Introduction to Distributed Data processing, parallel Databases, data mining & data warehousing, network model & hierarchical model, Introduction to transaction, properties of transaction and life cycle of transaction, Introduction to Concurrency control and Recovery systems., need of concurrency control and recovery system, problems in concurrent transactions.

Text Books:

1. Database System Concepts by A. Silberschatz, H.F. Korth and S. Sudarshan, 3rd edition, 1997, McGraw-Hill, International Edition.
2. Introduction to Database Management system by Bipin Desai, 1991, Galgotia Pub.

Reference Books:

1. .Fundamentals of Database Systems by R. Elmasri and S.B. Navathe, 3rd edition, 2000,

2. Addision-Wesley, Low Priced Edition.
3. 2. An Introduction to Database Systems by C.J. Date, 7th edition, Addison-Wesley, Low
4. Priced Edition, 2000.
5. 3. Database Management and Design by G.W. Hansen and J.V. Hansen, 2nd edition,
6. 1999, Prentice-Hall of India, Eastern Economy Edition.
7. 4. Database Management Systems by A.K. Majumdar and P. Bhattacharyya, 5th edition,
8. 1999, Tata McGraw-Hill Publishing.
9. 5. A Guide to the SQL Standard, Date, C. and Darwen,H. 3rd edition, Reading, MA:

Course Outcome

COs.1 Enable students to appreciate the importance of Cloud Computing and assess the need of resources for a given scenario

COs.2 The program prepares the young professional for Understand how the different IT services can be provided with the help of Windows Azure, AWS, Google Cloud.

COs.3 To develop skills on Cloud Computing.

Unit wise Syllabus :

Time: 3 hours   Max. Marks: 60
                                                                                               Min. Marks: 24

Unit I

Cloud Computing Fundamental: Cloud Computing definition, private, public and hybrid cloud. Cloud types; IaaS, PaaS, SaaS. Benefits and challenges of cloud computing, public vs private clouds, role of virtualization in enabling the cloud; Business Agility: Benefits and challenges to Cloud architecture. Application availability, performance, security and disaster recovery; next generation Cloud Applications.

Unit II

Cloud Applications: Technologies and the processes required when deploying web services; Deploying a web service from inside and outside a cloud architecture, advantages and disadvantages

Unit III

Cloud Services Management: Reliability, availability and security of services deployed from the cloud. Performance and scalability of services, tools and technologies used to manage cloud services deployment; Cloud Economics: Cloud Computing infrastructures available for implementing cloud based services. Economics of choosing a Cloud platform for an organization, based on application requirements, economic constraints and business needs (e.g Amazon, Microsoft and Google, Salesforce.com, Ubuntu and Red hat)

Unit IV

Application Development: Service creation environments to develop cloud based applications. Development environments for service development; Amazon, Azure, Google App.

Unit V

Best Practice Cloud IT Model : Analysis of Case Studies when deciding to adopt cloud computing architecture. How to decide if the cloud is right for your requirements. Cloud based service, applications and development platform deployment so as to improve the total cost of ownership (TCO)

Text Books:

1.Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications
 [ISBN: 978-0521137355]

References:
1. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach
[ISBN:0071626948]
2. Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Third Semester
(Session 2020-21)
Paper (MTECHCS- 301(B)): Legal Aspects of Information Security

Course Outcome

COs.1 To have the awareness about information security standards, cyber crimes, Cyber Laws, Intellectual Property rights and various laws related to software's and semiconductors.

Time: 3 hours

Max. Marks: 60
Min. Marks: 24

UNIT I

Information Security Overview

Information Security, Confidentiality, Integrity, Availability, Common Information Security Concepts: Vulnerability, Threats, Risks, Safeguards, Common Information Security Concerns, Mechanisms that ensure Information Security.

Privacy Overview

Privacy, How Privacy Different from Information Security, Sources of Privacy Law, Threats to Personal Data Privacy in Information Security, Workplace Privacy, General Principals for Privacy Protection in Information Security, The American Legal System.

UNIT II

Security and Privacy of Consumer Financial Information: Different types of Financial Institutions, Consumer Financial Information, Who regulates financial Institutions, Federal Financial Institutions Examination Council (FFIEC), The Gramm- Leach- Bliley Act, Payment card Industry Standards.

UNIT III

Security and Privacy of Information Belonging to Children and Educational Records: Challenges in protecting children on the Internet, Children's Online Privacy Protection Act, Children's Internet Protection Act (CIPA), Family Educational Rights and Privacy.

UNIT IV

Intellectual Property Law: Patent, Difference between Patents and Trade Secrets, Trade Marks, Copyright, Protecting Copyrights Online- The Digital Millennium Copyright Act (DMCA)

UNIT V

Computer Forensics and Investigations: Computer Forensic and role of a Computer Forensic Examiner, Collecting, Handling and using digital Evidence, Legal Issues involving Digital Evidence.

Text Books:

1. Legal Issues in Information Security, by Joanna Lyn Grama Jones & Bartlett Learning

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Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Third Semester
(Session 2020-21)
Paper (MTECHCS- 302(A)): Network Security

Course Outcome
COs.1 Understand the concepts of Network security and cryptography protocols.

COs.2 Slightly mapped as students will be able to understand the Network attacks and Cryptographic algorithms.

COs.3 Students will get to know about the maths behind the cryptographic algorithm which can contribute to the basic engineering knowledge

Unit wise Syllabus :

Time: 3 hours   **Max. Marks: 60**
                                                                       Min. Marks: 24

UNIT 1
Conventional Encryption: Conventional Encryption Model, Steganography, Classical Encryption Techniques, Simplified DES, Block Cipher Principles, The Data Encryption Standard, The Strength of DES , Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of operation, Conventional Encryption algorithms

UNIT II
Public Key Encryption And Hash Functions ,Public Key Cryptography , Principles of Public Key Cryptosystems , The RSA Algorithm , Key Management, Diffie Hellman Key Exchange , Elliptic Curve Cryptography.

UNIT III
Message Authentication and Hash Functions, Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Security of Hash Functions, Hash And Mac Algorithms.

UNIT IV
MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA-I) , RIPEMD , HMAC Digital Signatures and Authentication Protocols Digital Signatures , Authentication Protocols -Digital Signature Standard

UNIT V
Authentication Applications, IP Security, Web Security Intruders, Viruses and Worms, Intruders, Viruses and Related Threats, Firewalls, Firewall Design Principles, Trusted Systems.

Text Books:
1.William Stallings, "Cryptography and Network Security",Third Edition, Pearson Ed

Reference Books:
1. Atul Kahate, " Cryptography and Network Security," TMH
2. Introduction to network security, Krawetz, Cengage.

Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Third Semester
(Session 2020-21)
Paper (MTECHCS- 302(B)): Mobile and Wireless Systems

Course Outcome

COs.1 Understand the concepts of mobile communication, signal propogation, modulation, medium access control.

COs.2 Learn concepts of telecommunication systems, satellite systems, broadcast systems.

COs.3 Understand wireless LAN, mobile network layer, adhoc networks, mobile transport layer.

COs.4 Understand and analyse various supports for mobility such as file systems, www, WAP, i-mode, SyncML.

Time: 3 hours

Max. Marks: 60
Min. Marks: 24

UNIT I

Wireless Communication System
Wireless network generations, Mobile Radio standards- AMPS, IS- 95, GSM, UMTS, CDMA 2000, Mobile Wireless Systems: Cordless Telephone system and Cellular telephone system, Fixed Wireless Networks: Wireless Local Loop (WLL) & Local Multipoint Distribution System (LMDS) .

Mobile Phone Unit: Block diagram, working, features of transmitter and receiver section, Frequency Synthesizer, Control unit and Logic Unit of Mobile phone, sensors, speakers, camera, touch screen, motion sensors and other common sensors.

UNIT II

Fundamentals of Cellular System
Cellular concept Fundamentals: Cell, cell structure, Cluster, Reuse factor, minimum reuse distance, basic cellular system: mobile station, base station, Traffic channel (Forward and Reverse), Control channel (Forward and Reverse), Frequency reuse, channel assignment strategies.

Handoff Strategies: Concept of handoff, Types of Handoffs: Hard, Soft, Queued, Delayed, MAHO (Mobile Assisted Handoff), Proper and Improper Handoff, Umbrella cell approach.

UNIT III

Interference and System Capacity: Co-Channel interference, Adjacent Channel Interference, Channel Planning for wireless systems.

Improving Coverage and Capacity in Cellular Systems: Cell splitting, Sectoring, Microcell Zone concept, Repeaters for range extension.

Digital Cellular Mobile Standards: Global System for Mobile Communication (GSM): Features and services, GSM radio aspects, GSM architecture, GSM channel types, Security aspects. Signalling System No. 7 (SS7): Network Services Part (NSP), Message Transfer Part (MTP).

UNIT V

Advance Wireless Standards

Need for 3G and 4G technology, IMT-2000 global standards: Vision, Compatibility, service and spectrum requirements.

UMTS/W- CDMA standards: Features, architecture, UMTS Air-interface specification, security procedure. Next generation Mobile Standards: Features of 4G &4G LTE, VoLTE, 4.5G, 5G.

UNIT IV

Bluetooth Technology: Features, Architecture, frequency band, IEEE 802.15.1 and Other Protocol, Applications.

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Mobile Ad-Hoc Networks

Ad-Hoc Basic Concepts, Characteristics, Applications, Design Issues , Routing , Essential of Traditional Routing Protocols , Popular Routing Protocols, Vehicular Ad Hoc networks (VANET) , MANET Vs VANET , Security.

Text Books:

1. Wireless Communications, Principles, Practice – Theodore, S. Rappaport, PHI, 2nd Edn., 2002
2. Wireless Communication and Networking – William Stallings, PHI, 2003.

Reference Books:

1. Wireless Digital Communications – Kamilo Feher, PHI, 1999

2. Principles of Wireless Networks – Kaveh Pah Laven and P. Krishna Murthy, Pearson Education, 2002 3.Introduction to Wireless and Mobile Systems – Dharma Prakash Agarwal, Qing-An Zeng, Thomson 2nd Edition, 2006.

4. Wireless Communications – Andreaws F. Molisch, Wiley India, 2006.

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Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Third Semester
(Session 2020-21)
Paper (MTECHCS- 302(C)): Software Reuse & Customization

Course Outcome

COs.1 Apply schedule and cost control techniques for project monitoring including contract management.

COs.2 Apply quality models in software projects for maintaining software quality and reliability.

COs.3 Use suitable project organization structure, leadership, decision and motivation styles, proper safety and ethical practices and be responsible to the society

Time: 3 hours

Max. Marks: 60
Min. Marks: 24

UNIT I

Introducing to Software Reuse: What is Software Reuse?, Reuse types, Reuse Approaches, Reuse Technology, Reuse benefits & barriers, Reuse success & failure Factors, Reuse Driven Software Engineering is a business

UNIT II

Architectural Style: Application and component systems- Application Developers can reuse OOSE model components; Application families allow significant reuse, Application Systems Are Built from Reusable Components, Group Components into Component Systems, Facades Control Access to Component System Internals, Component Systems Export Components Via Facades. Use Case Components, Object Components, Layered Architecture

UNIT III

Process- Object Oriented Business Engineering, Applying Business Engineering to Define Process and Organization, Application Family engineering, Component System Engineering, Application System Engineering.

UNIT IV

Organizing a Reuse Business: Transition to a Reuse Business, Reengineering and Reuse, Managing the Reuse Business.

UNIT V

Design Patterns: Object Oriented Principles, Importance of Design Patterns in Reuse, Introduction to Creational Patterns, Structural Patterns, Behavioural Patterns, Miscellaneous Patterns, Implementation of Design Patterns.

Text Book:
1. Ivar Jacobson, Martin Griss, Patrick Johnson, "*Software Reuse Architecture, Process and Organization for Business Success*", First Edition, Pearson Education, 2000.
2. Erich Gamma at al., "*Design Patterns: Elements of Reusable Object-Oriented Software*", Addison Wesley, 1999.

Reference Books:
1. Eric Braude, "*Software Design: From Programming to Architecture*", John Wiley & Sons, 2003.
2. Bernd Bruegge & A. Dutoit, "*Object Oriented Software Engineering using UML, Design Patterns, and Java*", Pearson Education, 2004.
3. Ugrasen Suman, "*Software Engineering: Concepts & Practices*", Cengage Learning publications, 2013.
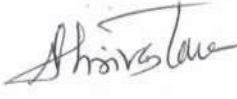
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- Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", 1st Edition, Apress Publications, 2013
- Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014

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Department of Computer Science, A.P.S. University, Rewa (M.P.)
Syllabus for M.Tech. Computer Science-Third Semester
(Session 2020-21)
Paper (MTECHCS- 304): Internet of Things

Course Outcome

COs.1 To understand with the concepts of internet of things

COs.2 To be familiar with the big data and cloud in the IoT basis

COs.3 Students will know different IoT devices and working process

Time: 3 hours

Max. Marks: 60
Min. Marks: 24

UNIT-I

INTRODUCTION TO IoT

Internet of Things- What Is IoT? IoT Devices, IoT Design- Physical Design, Logical Design, IoT Enabling Technologies, IoT Levels & Deployment Templates, Domain Specific IoTs, IoT and M2M, IoT System Management with NETCONF-YANG, IoT Platforms, Design Methodology

Unit-II

IoT ARCHITECTURE

M2M high-level ETSI Architecture, IETF Architecture for IoT, OGC Architecture- IoT Reference model, Domain model, Information model, Functional model, Communication model, IoT Reference Architecture

Unit-III

IoT PROTOCOLS

Protocols Concepts, Protocol standardization for IoT- Efforts- M2M and WSN Protocols-SCADA and RFID Protocols, Issues with IoT Standardization, Unified Data Standards, Protocols- IEEE 802.15.4, BACNet Protocol, Modbus, Zigbee Architecture, Network layer – 6LowPAN CoAP-Security

Unit-IV

BUILDING IoT WITH RASPBERRY PI & ARDUINO

Building IOT with RASPERRY PI, IoT Systems, Logical Design using Python, IoT Physical Devices & Endpoints, IoT Device-Building blocks –Raspberry Pi- Board - Linux on Raspberry Pi - Raspberry Pi Interfaces -Programming Raspberry Pi with Python - Other IoT Platforms

Unit-V

REAL WORLD IoT APPLICATIONS

Real world design constraints- Applications, Asset management, Industrial Internet of Things, Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT, Software & Management Tools for IoT, Cloud Storage Models & Communication APIs, Cloud for IoT, Amazon Web Services for IoT.

Text & References:

Text:

- Honbo Zhou, "The Internet of Things in the Cloud: A Middleware Perspective", CRC Press, 2012.
- Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet Of Things", Springer, 2011
- Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key applicationsand Protocols", Wiley, 2012

Reference Books:

- CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493-9357-1

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Syllabus for M.Tech. Computer Science-Third Semester
(Session 2020-21)
Paper (MTECHCS- 402): Data Science

Course Outcome

COs.1 To learn a powerful, flexible, and scalable general-purpose database to handle big data.

COs.2 Deploy the Data Analytics Lifecycle to address big data analytics projects.

COs.3 Apply appropriate analytic techniques and tools to analyze big data, create statistical models, and identify insights that can lead to actionable results.

COs.4 To select appropriate data visualizations to communicate analytic insights to business sponsors and analytic audiences.

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Syllabus for M.Tech. Computer Science-Fourth Semester
(Session 2020-21)
Paper (MTECHCS- 402): Data Science

Time: 3 hours

Max. Marks: 60
Min. Marks: 24

UNIT-I

INTRODUCTION TO DATA SCIENCE

Definition – Data Science in a Big Data world, Why data science? Benefits and uses of Data Science and big data, Facts of Data, Who is Data Scientist? Data Science Process, The big data ecosystem and data science, Defining goals, Retrieving data – Data Preparation, Data exploration, Data Modelling – Presentation

Unit-II

BIG DATA

Problems when handling large data, General techniques for handling large data, Case study – Steps in big data, Distributing data storage and processing with Frameworks – Case study, Join the NoSQL movement- Introduction to NoSQL, ACID: the principle of relational databases, CAP Theorem, The rise of graph databases

Unit-III

MACHINE LEARNING

Machine learning, Modeling Process – Training model, Validating model, and Predicting new observations, Supervised learning algorithms – Unsupervised learning algorithms. Tools used in machine learning, The Perception algorithm, Kernel Functions

DEEP LEARNING

Introduction, Deep Feedforward Networks, Regularization, Optimization of Deep Learning, Convolutional Networks, Recurrent and Recursive Nets – Applications of Deep Learning, Generative Adversarial Networks (GANs)

Unit-IV

DATA VISUALIZATION

Introduction to data visualization – Data visualization options – Filters, MapReduce, Dashboard development tools – Creating an interactive dashboard with dc.js-summary.

Unit-V

ETHICS AND RECENT TRENDS

Data Science Ethics – Doing good data science, Owners of the data, Valuing different aspects of privacy, Getting informed consent, The Five Cs, Diversity, Inclusion – Future Trends.

Text Books and Reference Books:

[1]. Introducing Data Science, Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Manning Publications Co., 1st edition, 2016

[2]. An Introduction to Statistical Learning: with Applications in R, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, 1st edition, 2013

[3]. Deep Learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, MIT Press, 1st edition, 2016

[4]. Ethics and Data Science, D J Patil, Hilary Mason, Mike Loukides, O' Reilly, 1st edition, 2018

Essential Reading / Recommended Reading

[1]. Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly, 1st edition, 2015

[2]. Doing Data Science, Straight Talk from the Frontline, Cathy O'Neil, Rachel Schutt, O' Reilly, 1st edition, 2013

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