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B.Tech. (CSE in Big Data Analytics in association with IBM)
Choice Based Credit System (CBCS) 2017-18

SEMESTER-V

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT401	-	Discrete Structure	60	20	20	-	-	3	1	-	4

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES

1. To provide the fundamentals of formal techniques for solve the problems in computational domain and algorithm development

COURSE OUTCOMES

1. Understand the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem solving.
2. Understand the basics of discrete probability and number theory, and be able to apply the methods from these subjects in problem solving.
3. Be able to use effectively algebraic techniques to analyze basic discrete structures and algorithms.
4. Understand asymptotic notation, its significance, and be able to use it to analyze asymptotic performance for some basic algorithmic examples.
5. Understand some basic properties of graphs and related discrete structures, and be able to relate these to practical examples.

SYLLABUS

UNIT–I

Set Theory: Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle. Relation: Definition, types of relation, composition of relations, domain and range of a relation, pictorial representation of relation, properties of relation, partial ordering relation. Function: Definition and types of function, composition of functions, recursively defined functions.

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UNIT–II

Propositional logic: Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradiction , normal forms(conjunctive and disjunctive), modus ponens and modus tollens, validity, predicate logic, universal and existential quantification. Notion of proof: proof by implication, converse, inverse, contrapositive, negation, and contradiction, direct proof, proof by using truth table, proof by counter example

UNIT–III

Graph Theory: Terminology Graph RepresentationGraph isomorphism; Connectedness; Various graph properties; Euler & Hamiltonian graph; Shortest paths algorithms. Trees: Terminology; Tree traversals; prefix codes; Spanning trees; Minimum spanning trees.

UNIT–IV

Algebraic Structure: Binary composition and its properties definition of algebraic structure; Groyas Semi group, Monoid Groups, Abelian Group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).

UNIT–V

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, bounded and complemented lattices. Combinatorics: Introduction, Permutation and combination, Binomial Theorem, Multimonial Coefficients Recurrence Relation and Generating Function: Introduction to Recurrence Relation and Recursive algorithms, Linear recurrence relations with constant coefficients, Homogeneous solutions, Particular solutions, Total solutions, Generating functions , Solution by method of generating functions.

REFERENCES:

1. *C L Liu, Introduction to Discrete Mathematics, McGrawHill, 1986 (Reprint by Tata McGraw Hill, 2007).*
2. *K Rosen, Discrete Mathematics and its Applications, 6/e (Special Indian Edition), Tata McGraw-Hill, 2007.*
3. *B Kilman, R Busby, S Ross, N Rehman, Discrete Mathematical Structures, 5/e, Pearson Education, 2006.*

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS502	-	Operating System	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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COURSE OBJECTIVES

The student will have ability to:

1. To learn the fundamentals of Operating Systems.
2. To study the mechanisms of Operating System to handle processes and threads and their communication.
3. To gain knowledge of process management concepts that includes architecture, Mutual exclusion algorithms, deadlock detection and recovery algorithms.
4. To learn the mechanisms involved in memory management in Operating System.
5. To know the components and management aspects of disc scheduling.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:

1. To describe the detail structure of Operating System.
2. To design and Implement Process management Techniques in Operating System.
3. To calculate CPU Scheduling criteria.
4. To understand The Memory Management of Operating System.
5. To elaborate Disc Scheduling.

SYLLABUS

UNIT–I

Introduction to Operating System

Introduction and need of operating system, layered architecture/logical structure of operating system, Type of OS(Multiprogramming , Time Sharing, Real Time ,Networked, Distributed, Clustered, Hand Held), operating system as resource manager and virtual machine, OS services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader.

Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits, multithreading models.

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UNIT–II

Process Management:- Process model, creation, termination, states & transitions, hierarchy, context switching, process implementation, process control block, Basic System calls- Linux & Windows.
Basic concepts, classification, CPU and I/O bound, CPU scheduler- short, medium, long-term, dispatcher, scheduling:- preemptive and non-preemptive, Static and Dynamic Priority Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, Round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling.

UNIT–III

Interprocess communication- Introduction to message passing, Race condition, critical section problem, Peterson's solution, semaphore, classical problems of synchronization Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem, Sleeping Barber Problem etc... **Deadlock-** System model, resource types, deadlock problem, deadlock characterization, methods for deadlock handling, deadlock prevention, Deadlock Avoidance: Banker's algorithm, deadlock detection, recovery from deadlock.

UNIT–IV

Memory management- concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading- creating a load module, loading, static & dynamic linking, shared libraries, memory allocation schemes- first fit, next fit, best fit, worst fit and quick fit. Free space management- bitmap, link list/free list.
Virtual Memory- concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging ,working set model, page fault frequency, thrashing, page replacement algorithms- optimal, FIFO,LRU; Bleady's anomaly; TLB (translation look aside buffer).

UNIT–V

File Management- concepts, naming, attributes, operations, types, structure, file organization & access (Sequential, Direct ,Index Sequential) methods, memory mapped files, directory structures one level, two level, hierarchical/tree, acyclic graph, general graph, file system mounting, file sharing, path name, directory operations, overview of file system in Linux & windows.
Input/output subsystems- concepts, functions/goals, input/output devices- block and character, spooling, disk structure & operation, disk attachment, disk storage capacity, disk scheduling algorithm- FCFS, SSTF, scan scheduling, C-scan schedule.

TEXT BOOKS:

1. Abraham Silberschatz,"Operating system concepts",7th,John Willey & Sons. INC, 2005
2. Andrew S.Tannanbaum, "Modern operating system", 3rd,Pearson Education, 2009
3. Dhananjay M. Dhamdhere, "Operating Systems:A concept Based Approach", 3rd TMH, 2012,
4. SibsankarHaldar, Alex AlagarsamyAravind,"Operating System", 8th ,Pearson Education India,, 2010,

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REFERENCES:

1. Achyut S Godbole,"Operating System",,3rd TMH,2010.
2. William Stalling, "operating system" 7th,Pearson Education, ,2012.
3. Vijay Shukla, "Operating System", 3rd, Kataria&Sons ,2010.
4. Singhal&Shivratri,"Advanced Concept in Operating Systems", TataMc-Graw Hill Education, edition 2001.

LIST OF EXPERIMENTS:

1. Study of BIOS, Bootstrap Program & System calls.
2. Study of Process Life Cycle.
3. Implement First Come First Serve CPU Scheduling.
4. Implement Non Preemptive Priority CPU Scheduling.
5. Implement Non Preemptive Shortest Job first CPU Scheduling.
6. Implement Preemptive Shortest Job first CPU Scheduling.
7. Implement Preemptive Priority CPU Scheduling.
8. Implement Round-Robin CPU scheduling.
9. Write a program to implement Semaphore.
10. Design and implement Deadlock Avoidance algorithm; Banker's Algorithm.
11. Write a program for Memory Management Algorithms e.g. First Fit, Best Fit, Worst Fit.
12. Demonstrate Virtual memory Techniques like, LRU, FIFO etc.
13. Implement First Come-First Serve Disk Scheduling Algorithm.
14. Implement Shortest Seek Time First Disk Scheduling Algorithm.
15. Implement Scan Scheduling Disk Scheduling Algorithm.
16. Implement Circular Scan Disk Scheduling Algorithm.
17. Implement Look Disk Scheduling Algorithm.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT305	-	Analysis and Design of Algorithms	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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Course Objectives:
At the end of the course
1. Ability to analyze asymptotic runtime complexity of algorithms including formulating recurrence relations. How to develop efficient algorithms for simple computational tasks and reasoning about the correctness of them?
2. The emphasis is on choosing appropriate data structures and designing correct and efficient algorithms to operate on these data structures.

Course Outcomes:
1. Define the basic concepts of algorithms and analyze the performance of algorithms.
2. Discuss various algorithm design techniques for developing algorithms.
3. Discuss various searching, sorting and graph traversal algorithms.
4. Understand NP completeness and identify different NP complete problems.
5. Discuss various advanced topics on algorithms.

Syllabus

Unit-I
Algorithms, Designing Algorithms, Analyzing Algorithms, Asymptotic Notations, Heap and Heap Sort,Brief Review of Graphs, Sets and Disjoint Set Union, Sorting and Searching Algorithms and their Analysis in terms of Space and Time Complexity.Divide and Conquer: General Method, Binary Search, Merge Sort, Quick Sort, Selection Sort, Strassen's Matrix Multiplication Algorithms.

Unit-II
Greedy Method: General Method, Knapsack Problem, Job Sequencing with Deadlines, Minimum-Cost Spanning Trees, Single Source Shortest Paths.

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Unit-III

Dynamic Programming: General Method, Optimal Binary Search Trees, O/1 Knapsack, The Traveling Salesperson Problem, All Pairs Shortest Paths.

Unit-IV

Backtracking: General Method, 8-Queens Problem, Graph Coloring, Hamiltonian Cycles, Sum of Subsets.Branch And Bound: Method, O/1 Knapsack Problem, Traveling Salesperson Problem, Efficiency Considerations, Techniques for Algebraic Problems, Some Lower Bounds Oon Parallel Computations.

Unit-V

NP Hard and NP Complete Problems: Basic Concepts, Cook's Theorem, NP Hard Graph and NP Scheduling Problems, Some Simplified NP Hard Problems.

References:

1. *Fundamental of Computer Algorithms, Ellis Horowitz and SartajSahni, Galgotia Publication.*
2. *Introduction to Algorithms, Thomas H Cormen, Charles E Leiserson and Ronald L Rivest, TMH.*
3. *Fundamentals of Algorithms: The Art of Computer Programming Voll, Knuth, Naresh Publications.*
4. *Introduction to Design and Analysis of Algorithm, Goodman, S.E. &Hedetnieni, MGH.*
5. *Algorithms, Dasgupta, TMH.*
6. *Analysis & Design of Algorithm, Ullmann.*
7. *Algorithm Design, Michael T Goodrich and RobartoTamassia, Wiely India.*

List of experiments:

1. Write a program for Iterative and Recursive Binary Search.
2. Write a program for Merge Sort.
3. Write a program for Quick Sort.
4. Write a program for Strassen's Matrix Multiplication.
5. Write a program for minimum spanning trees using Kruskal's algorithm.
6. Write a program for minimum spanning trees using Prim's algorithm.
7. Write a program for single sources shortest path algorithm.
8. Write a program for Floyd-Warshal algorithm.
9. Write a program for traveling salesman problem.
10. Write a program for Hamiltonian cycle problem.

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS508		Essentials of Software Engineering (OOAD & SW Lifecycle)	60	20	20	0	50	3	1	2	5

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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS502	-	Computer Networks	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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COURSE OBJECTIVES
The student should be made to:
1. Build an understanding of the fundamental concepts of computer networking.
2. Familiarize the student with the basic taxonomy and terminology of the computer networking area.
3. Introduce the student to advanced networking concepts, preparing the student for entry Advanced courses in computer networking.

COURSE OUTCOMES
Upon completion of the subject, students will be able to:
1. Independently understand basic computer network technology.
2. Understand and explain Data Communications System and its components.
3. Identify the different types of network topologies and protocols.
4. 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
6. Understand and building the skills of sub netting and routing mechanisms.

SYLLABUS
UNIT–I
Computer Network: Definitions, goals, components, Architecture, Classifications & Types. Layered Architecture: Protocol hierarchy, Design Issues, Interfaces and Services, Connection Oriented & Connectionless Services, Service primitives, Design issues & its functionality. ISO- OSI Reference Model: Principle, Model, Descriptions of various layers and its comparison with TCP/IP. Network standardization.

UNIT–II
Data Link Layer: Need, Services Provided, Framing, Flow Control, Error control. Data Link Layer Protocol: Elementary & Sliding Window protocol: 1-bit, Go-Back-N, Selective Repeat, Hybrid ARQ. Bit oriented protocols: SDLC, HDLC, BISYNC, LAP and LAPB.

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UNIT–III

MAC Sublayer: MAC Addressing, Binary Exponential Back-off (BEB) Algorithm, Distributed Random Access Schemes/Contention Schemes: for Data Services (ALOHA and Slotted- ALOHA), CSMA/CA, CSMA/CD Ethernet, token bus, token ring, (IEEE 802.3, IEEE 802.4, IEEE 802.5)

UNIT–IV

Network Layer: Need, Services Provided , Design issues, Routing and congestion in network layer, Routing algorithms: Least Cost Routing algorithm, Dijkstra's algorithm, Bellman-ford algorithm, Hierarchical Routing, Broadcast Routing, Multi cast Routing. IP protocol, IP Addresses, Subneeting, Comparative study of IPv4 & IPv6, Mobile IP.

UNIT–V

Transport Layer: Design Issues, UDP: Header Format, Per-Segment Checksum, CarryingUnicast/Multicast Real-Time Traffic, TCP: Connection Management, Reliability of Data Transfers, TCP Flow Control, TCP Congestion Control, TCP Header Format, TCP Timer Management.Session layer: Authentication, Authorisation, Session layer protocol. Presentation layer: Data conversion, Encryption and Decryption, Presentation layer protocol (LPP, Telnet, X.25 packet Assembler/Disassembler).Application Layer: WWW and HTTP, FTP, SSH, Email (SMTP, MIME, IMAP), DNS, Network Management (SNMP).

TEXT BOOKS:

1. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

REFERENCES:

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. “Networking Fundamentals”, KavehPahlavan, PrashantKrishnamurthy,Wiley Publication.
3. “Computer Communications & Networking Technologies” Michael A. Gallo & William M. Hancock Cengagepearsen publications.

LIST OF EXPERIMENTS:

1. Study of Different Types of Network Equipment’s.
2. Color coding standard of CAT 5, 6, 7 and crimping of cable in RJ-45.
3. LAN installations and Configurations.
4. Study of basic network command and Network configuration commands.
5. Study of network IP.
6. Write a program to implement various types of error correcting techniques.
7. Write a program to implement various types of farming methods.
8. Study of Tool Command Language (TCL).
9. Study and Installation of Standard Network Simulator: N.S-2.

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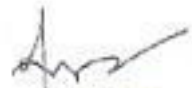

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10. Implement & simulate various types of routing algorithm.
11. Study & Installation of ONE (Opportunistic Network Environment) Simulator for High MobilityNetworks.
12. Simulate STOP AND WAIT Protocols on NS-2.
13. Simulate various Routing Protocol on NS-2.
14. Simulate various Network Topologies on NS-2.
15. Configuring routers, bridges and switches and gateway on NS-2.

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BTCS511	-	Artificial Intelligence	60	20	20	30	20	3	1	2	5

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COURSE OBJECTIVES

The student will have ability to:

1. Know how to build simple knowledge-based systems.
2. Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction, genetic algorithms).
3. Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems.
4. An ability to use current techniques, skills, and tools necessary for computing practice

COURSE OUTCOMES

Upon completion of the subject, students will be able to:

1. Describe the key components of the artificial intelligence (AI) field and its relation and role in Computer Science;
2. Identify and describe artificial intelligence techniques, including search heuristics, knowledge representation, automated planning and agent systems, machine learning, and probabilistic reasoning;
3. Identify and apply AI techniques to a wide range of problems, including complex problem solving via search, knowledge-base systems, machine learning, probabilistic models, agent decision making, etc.;
4. Design and implement appropriate AI solution techniques for such problems;
5. Analyze and understand the computational trade-offs involved in applying different AI techniques and models.
6. Communicate clearly and effectively using the technical language of the field correctly.

SYLLABUS

UNIT–I

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Introduction To Al And Production Systems:
Introduction to AI-Problem formulation, Problem Definition Production systems, Control strategies, Search strategies. Problem characteristics, Production system characteristics –Specialized productionsystem- Problem solving methods - Problem graphs, Matching, Indexing and Heuristic functions -Hill Climbing-Depth first and Breath first, Constraints satisfaction - Related algorithms, Measure of performance and analysis of search algorithms.

UNIT–II
REPRESENTATION OF KNOWLEDGE
Knowledge Representation Issues: Representations and Mappings, Approaches to Knowledge Representation.Knowledge representation using Predicate logic, Introduction to predicate calculus, Resolution, Use of predicate calculus, Knowledge representation using other logic-Structured representation ofknowledge.

UNIT–III
KNOWLEDGE INFERENCE
Knowledge Inference -Production based system, Frame based system. Inference - Backward chaining, Forward chaining, Rule value approach, Fuzzy reasoning - Certainty factors, Bayesian Theory-Bayesian Network-Dempster - Shafer theory.

UNIT IV
PLANNING AND MACHINE LEARNING
Basic plan generation systems - Strips -Advanced plan generation systems – K strips -Strategic explanations -Why, Why not and how explanations. Learning- Machine learning, adaptive Learning.
Game Playing: Overview, And Example Domain : Overview, Mini-Max, Alpha-Beta Cut-off, Refinements, Iterative deepening, The Blocks World, Components Of A Planning System, Goal Stack Planning, Nonlinear Planning Using Constraint Posting, Hierarchical Planning, Reactive Systems, Other Planning Techniques.

UNIT–V
EXPERT SYSTEMS
Expert Systems - Architecture of expert systems, Roles of expert systems - Knowledge Acquisition – Meta knowledge, Heuristics. Typical expert systems - MYCIN, DART, XOON, Expert systems shells.

TEXT BOOKS:
1. Rich E and Knight K, Artificial Intelligence, TMH New Delhi.
2. Nelsson N.J., Principles of Artificial Intelligence, Springer Verlag, Berlin.
3. Kos Ko B, Neural Networks and Fuzzy system –PHI.

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1. Neural Network, Fuzzy Logic, and Genetic Algorithms - Synthesis and Applications", by S. Rajasekaran and G.A. VijayalaksmiPai, (2005), Prentice Hall, Chapter 1-15, page 1-435.
2. "Artificial Intelligence: A Modern Approach" by Stuart Russell and Peter Norvig, (2002), Prentice Hall, Chapter 1-27, page 1-1057.
3. Waterman D.A., A guide to Expertsystem, Adision - Wesley, Reading
4. Artificial Intelligence Hand book, Vol. 1-2, ISA, Research Triangle Park.
5. Haykin S, Artificial Neural Networks-Comprehensive Foundation, Asea, Pearson.
6. Barr A, Fergenbaub E.A. and Cohen PR. Artificial Intelligence, Addison Wesley, Reading.

LIST OF EXPERIMENTS:

1. Write a program to implement Tic-Tac-Toe game problem.
2. Write a program to implement BFS (for 8 puzzle problem or Water Jug problem or any AI search problem).
3. Write a program to implement DFS (for 8 puzzle problem or Water Jug problem or any AI search problem)
4. Write a program to implement Single Player Game (Using Heuristic Function)
5. Write a program to Implement A* Algorithm.
6. Write a program to solve N-Queens problem.
7. Write a program to solve 8 puzzle problems.
8. Write a program to solve travelling salesman problem.

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BTIT512	-	Information theory and coding	60	20	20	30	20	3	1	2	5

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COURSE OBJECTIVES

1. Students will be introduced to calculate entropy, channel capacity, bit error rate, code rate, and steady-state probability.
2. Students will be introduced to convolutional and block codes, decoding techniques.
3. Students will understand how error control coding techniques are applied in communication systems.
4. Students will be able to describe the real life applications based on fundamental theory.
5. Students will implement the encoder and decoder of one block code using any programming language.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:

1. Derive equations for entropy mutual information and channel capacity for all typesofchannels.
2. Distinguish between different types error correcting codes based on probability of error and bit Energy to noise ratio.
3. Design a digital communication system by selecting an appropriate error correcting codesfor a particular application.
4. Explain various methods of generating and detecting different types of error correcting codes.
5. Formulate the basic equations of linear block codes.
6. Compare the performance of digital communication system by evaluating the probability of error for different error correcting codes

SYLLABUS

UNIT-I

Information Theory, Probability and Channel: Introduction, Information Measures, Review probability

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theory, Random variables, Processes, Mutual Information, Entropy, Uncertainty, Shannon's theorem, redundancy, Huffman Coding, Discrete random Variable. Gaussian random variables, Bounds on tail probabilities.

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.

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..

UNIT-IV

BCH Codes: Introduction, Primitive elements, Minimal polynomials, Generator Polynomials in terms of Minimal Polynomials, Decoding of BCH codes. Advance Coding Techniques: Reed-Solomon codes, space time codes, concatenated codes, turbo coding and LDPC codes, Nested Codes, block.Techniques for constructing more complex convolution codes with both soft and hard decoding

UNIT-V

Convolutional channel coding: Introduction, Linear convolutional codes, Transfer function representation & distance properties, Decoding convolutional codes(Soft-decision MLSE, Hard-decision MLSE),The Viterbi algorithm for MLSE, Performance of convolutional code decoders, Soft & Hard decision decoding performance, Viterbi algorithm implementation issues: RSSE, trellis truncation, cost normalization, Sequential decoding: Stack, Fano, feedback decision decoding, .

TEXT BOOKS:

1. Rajan Bose “Information Theory, Coding and Cryptography”, TMH, 2002.
2. Kishor S. Trivedi “Probability and Statistics with Reliability, Queuing and Computer Science Applications”, Wiley India, Second Edition.
3. J.C.Moreira, P.G. Farrell “Essentials of Error-Control Coding”, Willey Student Edition
4. San Ling and Chaoping “Coding Theory: A first Course”, Cambridge University Press, 2004.
5. G A Jones J M Jones, “Information and Coding Theory”, Springer Verlag, 2004.

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REFERENCES:

1. Cole, "Network Security", Bible, Wiley INDIA, Second Addition
2. Proakis and Masoud, "Digital Communication" ,McGraw-Hill ,2008.
3. Principles of Digital Communications, Signal representation, Detection , Estimation &Information
4. Coding by J Das, S.K. Mullick, P.K.Chatterjee, New Age Int. Ltd.
5. Principles of Communication Systems, Taub&Schilling, 2/e, TMH Publishers

LIST OF EXPERIMENTS:

1. Write a program for determination of various entropies and mutual information of a given chann Test various types of channel such as a) Noise free channel. b) Error free channel c) Binary symmetric channel d) Noisy channel Compare channel capacity of above channels.
2. Write a program for generation and evaluation of variable length source coding using C/MATLAB
   a) Shannon – Fano coding and decoding
   b) Huffman Coding and decoding
   c) Lempel Ziv Coding and decoding
3. Write a Program for coding & decoding of Linear block codes.
4. Write a Program for coding & decoding of Cyclic codes.
5. Write a program for coding and decoding of convolution codes.
6. Write a program for coding and decoding of BCH and RS codes.
7. Write a program to study performance of a coded and uncoded communication system (Calculate the error probability).
8. Write a simulation program to implement source coding and channel coding for transmitting a text file.
9. Encoding the data bits using a Binary Cyclic block encoder in Simulink.
10. Decoding the code words using a Binary Cyclic block decoder in Simulink.
11. Encoding the data bits using a Binary Linear block encoder in Simulink.
12. Decoding the code words using Binary Linear block decoder in Simulink.

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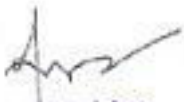

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B.Tech. (CSE in Big Data Analytics in association with IBM)
Choice Based Credit System (CBCS) 2017-18

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS514		Data Warehouse and Mining	60	20	20	30	20	3	1	2	5

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

COURSE OBJECTIVES

The student will have ability to:

1. To understand the basic principles, concepts and applications of data mining.
2. To identify and implement several methods to enhance and develop information systems and to manage the information system resources.
3. To develop skills of using recent data mining software for solving practical problems.
4. To gain experience of doing independent study and research.

COURSE OUTCOMES

Upon completion of the subject, students will be able to:

1. Show how to plan, acquire, and maintain information systems using data mining techniques.
2. Identify components in typical data mining architecture.
3. Understand typical knowledge discovery process and the different algorithms available by popular commercial data mining software.
4. Obtain hands-on experience with some popular data mining software.

SYLLABUS

UNIT–I

Data warehousing Components –Building a Data warehouse –- Mapping the Data Warehouse to a Multiprocessor Architecture – DBMS Schemas for Decision Support – Data Extraction, Cleanup, and Transformation Tools –Metadata.

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UNIT–II

Reporting and Query tools and Applications – Tool Categories – The Need for Applications – Cognos Impromptu – Online Analytical Processing (OLAP) – Need – Multidimensional Data Model – OLAP Guidelines – Multidimensional versus Multirelational OLAP – Categories of Tools– OLAP Tools and the Internet.

UNIT–III

Introduction – Data – Types of Data – Data Mining Functionalities – Interestingness of Patterns, Classification of Data Mining Systems – Data Mining Task Primitives – Integration of a Data Mining System with a Data Warehouse Issues Data Preprocessing.

UNIT–IV

Mining Frequent Patterns, Associations and Correlations Mining Methods Mining Various Kinds of Association Rules Correlation Analysis Constraint Based Association Mining Classification and Prediction - Basic Concepts - Decision Tree Induction Bayesian Classification Rule Based Classification – Classification by Back propagation, Support Vector Machines Associative Classification – Lazy Learners – Other Classification Methods - Prediction

UNIT–V

Cluster Analysis - Types of Data Categorization of Major Clustering Methods, K-meansPartitioningMethods, HierarchicalMethods-Density-BasedMethods–Grid Based Methods, Model-Based Clustering Methods – Clustering High Dimensional Data- Constraint – Based Cluster Analysis – Outlier Analysis – Data Mining Applications.

TEXT BOOKS:

1. Alex Berson and Stephen J. Smith, " Data Warehousing, Data Mining & OLAP", TataMcGraw Hill Edition, Tenth Reprint 2007.
2. Jiawei Han and MichelineKamber,"Data Mining Concepts and Techniques", SecondEdition, Elsevier, 2007.

REFERENCES:

1. Pang-Ning Tan, Michael Steinbach and Vipin Kumar, "Introduction to Data Mining", Person Education, 2007.
2. K.P.Soman,ShyamDiwakarandV.Ajay"InsightintoDataminingTheoryandPractice", Easter Economy

Edition, Prentice Hall of India, 2006.
3. G.K.Gupta,"IntroductiontoDataMiningwithCaseStudies", EasterEconomyEdition, Prentice Hall of India, 2006.
4. Daniel T.Larose, "Data Mining Methods and Models", Wile-Interscience, 2006.

LIST OF EXPERIMENTS:

1. Installation of any data mining tool.
2. Demonstration of preprocessing on dataset.
3. Demonstration of association rule mining process on dataset.
4. Demonstration of classification rule process on dataset
5. Demonstration of clustering rule process on dataset.
6. Evaluate attribute relevance analysis on a weather data warehouse
7. Evaluate Information Gain of an attribute in the student database
8. Experiment to predict the class using the Bayesian classification

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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS506	-	Foundation Course in Enterprise Application Development using IBM Rational Tools	0	0	0	0	50	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTIT406	-	Unix & Shell Programming	0	0	0	50	0	0	0	2	1

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;

*Teacher Assessment shall be based following components: Quiz/Assignment/ Project/Participation in Class, given that no component shall exceed more than 10 marks.

Course Objectives:

The course content should be taught and implemented with the aim to develop required skills so that students are able to acquire following competency:

7. Know the basics of UNIX operating system and shell programming.

Course Outcomes:

6. Work on any Unix platform with confidence
7. Write the code in C language on UNIX platform.
8. Write effective scripts for their day to day jobs
9. Understand and use most of the Unix features and commands

Syllabus:

Unit-I: Introduction to UNIX

The UNIX Operating System, The UNIX Architecture, Features of UNIX, Internal And External Commands, Command Structure.GENERAL-PURPOSE UTILITIES: cal, date, echo, printf, bc, script, passwd, PATH, who, uname, tty, stty, pwd, cd, mkdir, rmdir, od.

Unit-II:

Handling Files and C Environment The File System, cat, cp, rm, mv, more, file, ls, wc, pg, cmp, comm, diff, gzip, tar, zip, df, du, mount, umount, chmod, The vi editor ,security by file Permissions. NETWORKING COMMANDS: ping, telnet, ftp, finger, arp, rlogin. The C compiler, vi editor, compiler options, and run the programs.

Unit-III: Shell Basics

Types of shells , Shell functionality, Work Environment, Writing script & executing basic script, Debugging script, Making interactive scripts, Variables (default variables), Mathematical expressions. Conditional statements: If-else-elif, Test command, Logical operators-AND, OR, NOT, Case –esac. Loops: While, For, Until, Break & continue.

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Unit- IV:
Command Line Arguments and Regular Expression Command line arguments: Positional parameters, Set & shift, IFS. Functions & file manipulations: Processing file line by line, Functions. Regular Expression & Filters: What is regular expression, Grep, cut, sort commands, Grep patterns.

Unit –V:SED and AWK
SED: Scripts, Operation, Addresses, commands, Applications, grep and sed.
AWK: Execution, Fields and Records, Scripts, Operations, Patterns, Actions, Associative Arrays, String Functions, String Functions, Mathematical Functions, User – Defined Functions, Using System commands in awk, Applications, awk and grep, sed and awk.

REFERENCES:
1. Graham Glass, King Ables, "Unix for programmers and users", 3rd Edition, Pearson Education, 2009.
2. N.B Venkateswarlu, "Advanced Unix programming", 2ndEdition, BS Publications, 2010.
3. YashwanthKanitkar,"Unix Shell programming", 1stEdition, BPB Publisher, 2010.
4. Sumitabha Das, "Unix Concepts and Applications", 4thEdition. TMH, 2006.
5. Behrouz A. Forouzan, Richard F. Gilbery, "Unix and shell Programming", 1stEdition, Cengage Learning India, 2003.

LIST OF EXPERIMENTS:
1. Installation of Unix/Linux operating system.
2. Study of Unix general purpose utility command list obtained from (man, who, cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands.
3. Study of vi editor.
4. Study of Bash shell, Bourne shell and C shell in Unix/Linux operating system.
5. Write a C program to check whether the given string is palindrome or not using Command line substitution.
6. Write a C program to check the given integer is prime or not.
7. Write a C program to check whether the given number is Avogadro number or not.
8. Write a C program that accept two integers as its arguments and computes the value of first number raised to the power of second number.
9. Write a shell script program to display list of user currently logged in.
10. Write a shell script program to display "HELLO WORLD".
11. Write a shell script program to develop a scientific calculator.
12. Write a shell Script program to check whether the given number is even or odd.
13. Shell script Program to search whether element is present is in the list or not.
14. Shell script program to check whether given file is a directory or not.
15. Shell script program to count number of files in a Directory.
16. Shell script program to copy contents of one file to another.
17. Create directory, write contents on that and Copy to a suitable location in your home directory.

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18. Use a pipeline and command substitution to set the length of a line in file to a variable.
19. Write a program using sed command to print duplicated lines of Input.
20. Write a grep/egrep script to find the number of words character, words and lines in a file.
21. Write an awk script to develop a Fibonacci series.
22. Write an awk script to display the pattern of given string or number.
23. Write an egrep script to display list of files in the directory.