Shri Vaishnav Vidyapeeth Vishwavidyalaya
B.Tech. (CSE in Cloud & Mobile Computing 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 thesm 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;
*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 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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			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

The student will have ability to:

1. Learn the algorithm analysis techniques.
2. Become familiar with different algorithm design techniques.
3. Understand the limitation of algorithm power.
4. Analyze the asymptotic performance of algorithms.
5. Synthesize efficient algorithms in common engineering design situations.

COURSE OUTCOMES

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

1. Demonstrate a number of standard algorithms for problems in fundamental areas in computer science and engineering such as sorting, searching, and problems involving graphs.
2. Analyze the time and space complexity of algorithm.
3. Critically analyze the different algorithm design technique for a given problem.
4. Analyze worst-case running times of algorithms using asymptotic analysis.
5. Develop the skills of using standard algorithm design techniques to develop efficient algorithms for new problems.

SYLLABUS

UNIT–I

Introduction - Algorithm, Pseudo code for expressing algorithms, Performance Analysis-Space complexity, Time complexity, Asymptotic Notation- Big oh notation, Omega notation, Theta notation and Little oh notation, Probabilistic analysis, Amortized analysis, Mathematical background for algorithm analysis, Randomized and recursive algorithm. Comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, Stassen's matrix multiplication.

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UNIT–II

Greedy Algorithms - Greedy choice, optimal substructure property, minimum spanning trees – Prim's and Kruskal's algorithm, Dijkstra's shortest path using arrays and heaps, fractional knapsack, and Huffman coding.

UNIT–III

Concept of dynamic programming, problems based on this approach such as 0/1 knapsack, multistage graph, reliability design, Floyd-Warshall algorithm, Longest increasing subsequence, matrix chain multiplication.
Introduction to Internet algorithm - Strings and patterns matching algorithm, String Matching: Boyer Moore algorithm.

UNIT–IV

Backtracking - The general method, 8 queen problem, sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem.
Branch and Bound - The method, LC search, 15 puzzle:An example. Bounding and FIFO branch and bound, LC branch and bound,0/1 knapsack problem, TP efficiency considerations.

UNIT–V

NP-completeness - reduction amongst problems, classes NP, P, NP-complete, and polynomial time reductions.
Graph - Graphs, Undirected Graph, Directed Graph, Traversing Graphs, Depth First Search, Breath First Search, special tree like B tree, B+ tree and red black tree.

TEXT BOOKS:

1. Ellis Horowitz,SaratajSahni, S. Rajsekaran, "Fundamentals of computer Algorithms"University press.
2. Anany V. Levitin,"Introduction to the Design and Analysis of Algorithms", Pearson Education publication, Second Edition.
3. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction toAlgorithms", 2nd Edition, MIT Press/McGraw Hill, 2001
4. Michael Goodrich & Roberto Tamassia, "Algorithm design foundation,analysisandinternet examples", Second Edition, Wiley student Edition.
5. Aho, Ullman and Hopcroft, Design and Analysis of algorithms, Pearson education.

REFERENCES:

1. S. Baase, S and A. Van Gelder, "Computer Algorithms: Introduction toDesign and Analysis", 3rd edition. Addison Wesley, 2000
2. Kenneth Berman,Jerome Paul "Algorithm:sequential,parallel and distributed", Cengage Learning
3. Mark Allen Weiss, "Data Structure & Algorithm Analysis in C++", Third Edition,Pearson Education.
4. R.C.T. Lee, S.Tseng, R.C. Chang and T. Tsai,Introduction to Design and Analysis of Algorithms: A strategic approach,McGraw Hill.
5. Allen Weiss, Data structures and Algorithm Analysis in C++ education.
6. Richard Johnson Baugh and Marcus Schaefer, Algorithms, Pearson Education.

LIST OF EXPERIMENTS:

1. Implement Linear Search and determine the time required to search an element. Repeat the experiment for different values of n, the number of elements in the list to be searched.
2. Implement Recursive binary search and determine the time required to search an element. Repeat the experiment for different values of n, the number of elements in the list to be searched.
3. Sort a given set of elements using the Heapsort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted.
4. Sort a given set of elements using Merge sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted
5. Sort a given set of elements using Quick sort method and determine the time required to sort the elements. Repeat the experiment for different values of n, the number of elements in the list to be sorted
6. Write a Program for Strassen's Matrix Multiplication.
7. Write a Program for Minimum Cost Spanning Tree of a given undirected graph using Kruskal's algorithm.
8. Write a Program for Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.
9. Implement Fractional Knapsack problem using greedy method.
10. From a given vertex in a weighted connected graph, find the shortest paths to other vertices using Dijkstra's algorithm.
11. Implement Warshall algorithm.
12. Implement BFS and DFS Algorithm for graph.
13. Write a program for travelling salesman problem.

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

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P - Practical; C - Credit;
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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*				
BTCS511	-	Artificial Intelligence	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. 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.

REFERENCES:

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.

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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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		THEORY			PRACTICAL					
		END SEM UNIVERSITY EXAM	TWO TERM EXAM	TEACHERS ASSESSMENT*	END SEM UNIVERSITY EXAM	TEACHERS ASSESSMENTS*	Th	T	P	CREDITS
BTIT511	**Wireless Communication Networks**	**60**	**20**	**20**	**30**	**20**	**3**	**1**	**2**	**5**

Legends: L-Lecture; T-Tutorial/Teacher Guided Student Activity; P–Practical; C-Credit; Q/A–Quiz/Assignment/Attendance, MST Mid Semester Test.

***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. The course will provide fundamental about many theoretical & practical concepts that form the basis for wireless communication systems and Networks.
2. To provide an overview of foundation of cellular concepts which will be useful for understanding the fundamentals of cellular mobile communication systems design
3. To study the Working Principle of Multiple Access techniques like TDMA, CDMA and FDMA etc.
4. To understand the various terminology, principles, devices, schemes, concepts, algorithms and different methodologies used in Wireless Communication Networks like Wi-Fi, Wi-MAX, Zig-bee, UWB Radio and Wireless Ad-hoc Networks.

COURSE OUTCOMES:

After learning the course the students should be able to:

1. To Understand the basic concepts of basic Cellular System and the design requirement,principle of propagation of radio signals.
2. Will be able to evaluate the basic principles behind radio resource management techniques such as power control, channel allocation and hand-off.
3. To remember and apply the gain insights into various LAN Protocols and how the diversity Mobile transport layer can be exploited to improve performance.
4. Analyze and evaluate the technologies for how to effectively share spectrum through multiple access techniques i.e. TDMA, CDMA, FDMA etc.
5. Plan and analyze the design consideration and architecture for different Wireless Systems like GSM, CDMA, and GPRS etc.

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SYLLABUS

UNIT-I:

Introduction to Wireless Communication System: Evolution of mobile communications, MobileRadio System around the world, Types of Wireless communication System, Comparison of Common wireless system, Trend in Cellular radio and personal communication. Second generation Cellular Networks, Third Generation (3G) Wireless Networks ,Wireless Local Loop(WLL),Wireless Local Area network(WLAN),

UNIT-II:

The Cellular Concept- System Design Fundamentals: Cellular system, Hexagonal geometry cell andconcept of frequency reuse, Channel Assignment Strategies Distance to frequency reuse ratio, Channel &co-channel interference reduction factor, S/I ratio consideration and calculation for Minimum Co-channel and adjacent interference, Hand off Strategies, Umbrella Cell Concept, Trunking and Grade of Service, Improving Coverage & Capacity in Cellular System-cell splitting, Cell sectorization, Repeaters, Micro cell zone concept, Channel antenna system design considerations.

UNIT-III:

IEEE 802.11: LAN-architecture, 802.11 a, b and g, protocol architecture, physical layer, MAC layer, HIPERLAN-protocol architecture, Bluetooth-user scenarios- physical layer. Mobile IP, DHCP, Ad hoc networks: Characteristics, performance issue, routing in mobile host. Wireless sensor network, Mobile transport layer: Indirect TCP, Snooping TCP, Mobile TCP, Time out freezing, Selective retransmission and transaction oriented TCP.

UNIT-IV:

Multiple Access Techniques: Introduction, Comparisons of multiple Access StrategiesTDMA,CDMA, FDMA, OFDM , CSMA Protocols.

Wireless Systems:

GSM system architecture, Radio interface, Protocols, Localization and calling, Handover, Authentication and security in GSM, GSM speech coding, Concept of spread spectrum, CDMA System Air Interface, RAKE Receiver, GPRS system architecture.

UNIT-V:

Recent Trends: Introduction to Wi-Fi, WiMAX, Zig-Bee Networks, Software Defined Radio, UWBRadio, Wireless Adhoc Network and Mobile Portability, Security issues and challenges in a Wireless network.

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TEXT BOOKS:

1. WirelessCommunications and Networking, William Stalling, Pearson Education.
2. Mobile Communications Engineering, William C.Y. Lee, McGraw Hill Publications
3. Wireless Communication, Theodore S. Rappaport, Prentice hall

REFERENCES:

1. WirelessCommunications and Networking,VijayGarg, Elsevier
2. Mobile and personal Communication system and services by Rajpandya, IEEE press (PHI).
3. WirelessCommunications-T.L.Singh-TMH.
4. Adhoc Mobile Wireless network, C.K.Toh Pearson.

LIST OF EXPERIMENTS:

1. Write a MAT LAB/SCI LAB Program/s based on
    a. Ground Reflection (Two-ray) Model
    b. Diffraction (Knife-Edge) Model
2. Performance evaluation of GSM & CDMA.
3. Design Small LAN Network using DHCP Protocol.
4. Case Study of blue-tooth enabling services.
5. Survey and performance evaluation of radio station using channel access.
6. Field study of cellular and tower management.

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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*				
BTIT512	-	Information theory and coding	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
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 theory, Random variables, Processes, Mutual Information, Entropy, Uncertainty, Shannon's theorem,

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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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B.Tech. (CSE in Cloud & Mobile Computing in association with IBM)
Choice Based Credit System (CBCS) 2017-18

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL					
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*	Th	T	P	CREDITS
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

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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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			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTCS714	-	Enterprise Mobile Application Development	0	0	0	30	20	0	0	2	1

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