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SARVAJANIK UNIVERSITY
Sarvajanik College of Engineering and Technology
Bachelor of Technology

Year: B. Tech II (Semester IV)

Subject Name: Discrete Mathematics for Computer Science **Subject Code**: BTCO13405
Type of course: Professional Core Course
Prerequisite: Algebra, Logic

Rationale: This course introduces the basic concepts of discrete mathematics as applicable to the field of computer science. It covers set theory, mathematical logic and reasoning, functions, relations, graph theory and algebraic structures. These topics are very useful in computer science as they help in the development of algorithms as well as the representation and solving of real-world problems.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
3	1	0	4	60	25	15	0	0	100

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests) CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Contents	Total Hours
1.	**Mathematical Logic** Introduction, Statements & Notation, Truth Values, Connectives, Statement Formulas & Truth Tables, Conditional and Biconditional, Well-formed Formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications, Examples, Normal Forms, The theory of Inference for Statement calculus, Rules of Inference, Predicate Calculus: Definition of Predicates; Statement functions, Variables, Quantifiers, Predicate Formulas, Free & Bound Variables; The Universe of Discourse, Examples, Valid Formulas & Equivalences.	10
2.	**Set Theory:** **Basic Concepts of Set Theory**: Definitions, Inclusion, Equality of Sets, Cartesian product, The Power Set, Some operations on Sets, Venn Diagrams, Some Basic Set Identities, Computer Representation of Sets **Relations:** Binary Relation, Properties of Binary Relations in a Set: Reflexive, Symmetric, Transitive, Anti-symmetric Relations, Relation Matrix and Graph of a	15

	Relation; Partition and Covering of a Set, Equivalence Relations, Compatibility Relations, Composition of Binary Relations **Partial Ordering:** Definitions, Representation of Partially Ordered Sets, Hesse Diagrams, Minimal & Maximal, Upper Bound and Lower Bound, Well-ordered Partially Ordered Sets, Lattices as partially ordered sets **Functions:** Introduction & definition, Co-domain, range, image, value of a function; surjective, injective, bijective; Composition of functions, Inverse functions, binary and n-ary operations, characteristic function of a Set. **Recursion :** Recursive Functions, Sets and Predicates, Recursion in Programming Languages, Euclid's algorithm	
3.	**Algebraic Structures:** Definitions and Examples, homomorphism, Congruence relation, Semigroups and Monoids, homomorphism of Semigroups and Monoids, Groups, Subgroups and homomorphisms, Coset, Lagrange's theorem, Normal subgroups	06
4.	**Counting:** The Basics of Counting, The Pigeonhole Principle, Permutations and Combinations, Binomial Coefficients, Generalized Permutations and Combinations, Generating Permutations and Combinations	06
5.	**Graphs Theory:** Basic definitions-graph, directed and undirected graphs, Isomorphic graphs, Degree, Indegree, out-degree, total degree of a node, Paths, Reachability and connectedness, Matrix representation of graph, Adjacency matrix, Determine number of paths of length n through Adjacency matrix, Path (Reachability) matrix of a graph, examples; Warshall's algorithm to produce Path matrix, **Trees**: Definitions, Different representations of a tree, examples; Binary tree, m-ary tree, Full (or complete) binary tree, examples; Tree traversal: Pre-order, in-order, post-order traversal, examples, algorithms; Applications of List structures and graphs	08

Suggested Specification table with Marks (Theory): (For B. Tech only)

Distribution of Theory Marks					
R Level	**U Level**	**A Level**	**N Level**	**E Level**	**C Level**
15	25	20	0	0	0

Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create (Revised Bloom's Taxonomy)

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr No	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1	Discrete Mathematical Structures with Applications to Computer Science	J. P. Tremblay and R. Manohar	Tata McGraw-Hill	1997	Edition 1997
2	Schaum's Outline of Theory and Problems of Discrete Mathematics	S. Lipschutz and M. L. Lipson	Tata McGraw-Hill	1999	
3	Discrete Mathematics and its applications	K. H. Rosen	Tata McGraw-Hill	2007	6th Ed.
4	Discrete Mathematics for Computer Science	David Liben-Nowell	Wiley publication	July 2017	
5	Discrete Mathematics with Proof	Eric Gossett	Wiley publication	July 2009	2nd Edition

Course Outcomes:

Sr. No.	CO statements	Marks % weightage
CO-1	To represent, simplify and evaluate logic statements in terms of predicates, quantifiers, and logical connectives using truth tables and the properties of logic.	20
CO-2	Understand the basic operations in sets, concepts of domain, range of a function, and apply the properties of functions and relations to application problems.	35
CO-3	Use the properties of algebraic structures.	15
CO-4	Apply the concepts and principles in order to compute permutations and combinations.	15
CO-5	Interpret different traversal methods for trees and graphs. Model problems in Computer Science using graphs and trees.	15

List of Open learning website:

1. NPTEL Discrete Mathematics lectures

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Year: B. Tech II (Semester IV)

Subject Name: Entrepreneurship and Start-up **Subject Code:** BTAS10401
Type of course: HSM: Humanities and Social Science including Management
Prerequisite: Zeal to learn the subject.
Rationale: Entrepreneurship and start-up subject is introduced with motive to develop entrepreneurial attitude in today's competitive environment. Further this subject creates awareness about business strategies.

Teaching and Examination Scheme:

Teaching Scheme				Theory Marks			Practical Marks		Total
L	T	P	C	TEE	CA1	CA2	TEP	CA3	
2	0	0	2	60	25	15	0	0	100

CA1: Continuous Assessment (assignments/projects/open book tests/closed book tests) CA2: Sincerity in attending classes/class tests/ timely submissions of assignments/self-learning attitude/solving advanced problems TEE: Term End Examination TEP: Term End Practical Exam (Performance and viva on practical skills learned in course) CA3: Regular submission of Lab work/Quality of work submitted/Active participation in lab sessions/viva on practical skills learned in course

Content:

Sr. No.	Contents	Total Hours
1.	**Entrepreneur:** Concept, functions, types, characteristics, qualities and role, entrepreneur vis-à-vis professional manager, intrapreneur, entrepreneurial competencies; entrepreneur and entrepreneurship – factors, barriers &problems and process of entrepreneurship, growth of entrepreneurship in India.	06
2.	**Starting the venture:** Generating business idea–sources of new ideas, methods of generating ideas, creative problem solving, opportunity recognition; environmental scanning, competitor and industry analysis.	06
3.	**Functions of Marketing:** Marketing vs sales, marketing philosophies, 7 P's of marketing.	03
4.	**Financial Management:** Concept, scope, objective and significance of financial management, profit maximization vs. wealth maximization, functions of finance manager in modern age, key financial decision areas, risk and return analysis-PBP, NPV ,IRR Methods	06
5.	**Production Management**: Objective, scope, project management- CPM & PERT Technique	05

Sr. No.	Contents	Total Hours
6.	**Feasibility study:** Market feasibility, Technical / operational feasibility, Financial feasibility; drawing business plan; preparing project report; presenting business plan to investors.	04

Suggested Specification Table of Marks as per Bloom's Taxonomy (Theory/Practical):

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
06	30	06	18	0	0

Legends: R: Remembrance, U: Understanding; A: Application, N: Analyze, E: Evaluate C: Create

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Reference Books:

Sr. No.	Title of book /article	Author(s)	Publisher and details like ISBN	Year of publication	Publication Edition
1.	Financial Management	Prasanna Chandra,	Tata McGraw-Hill, 978-0-07-065665-9	2007	10th
2.	Financial Management	I M Pandey,	Vikas Publishing House, 978-9-32-598229-1	2018	11th
3.	Dynamics Of Entrepreneurial Development And Management	Vasant Desai	HPH, 817-0-4-0289-1	2007	1st
4.	Essentials of Human Resource Management	C. B. Gupta	Sultan Chand & Sons, 978-9-35-161123-3	2018	6th
5.	Marketing Management	Philip Kotler,	Pearson Publication,978-9332557185	2015	15th
6.	New Venture Creation: Entrepreneurship for the 21st Century	Timmons, Jeffry A. and Spinelli, Stephen Jr	McGraw-Hill, 978-0-07- 802910-3	2015	10th

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Course Outcome:

Sr. No.	CO Statements	Marks % weightage
CO-1	Identify the pros and cons of developing a business plan	20%
CO-2	Analyse management issues for solving decision making problems.	20%
CO-3	Evaluate different strategic business plans.	15%
CO-4	Sketch the financial concepts & techniques to solve the problems in an industry	15%
CO-5	Communicate business plan effectively to financiers & other stake holders.	30%

Mapping with POs:

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO-1	0	2	0	0	0	2	2	3	2	2	3	3			
CO-2	0	1	0	0	0	2	1	2	1	1	2	2			
CO-3	0	0	0	0	0	3	1	2	1	3	3	1			
CO-4	0	1	0	0	0	2	1	1	2	2	2	2			
CO-5	0	1	0	0	0	2	2	3	3	2	3	3			
Rationale*	0	5	0	0	0	11	6	11	9	10	13	11			

***Rationale:** Students increase their awareness and deliberately practice the skills and disciplines necessary to increase confidence and agency; foster self-efficacy and self-advocacy; improve communication and problem-solving skills, manage strong impulses and feelings; and identify personal purpose and social purpose.