K. S. INSTITUTE OF TECHNOLOGY

An Autonomous Institution under VTU, Approved by AICTE

Department of Master of Computer Applications

FIRST SEMESTER SYLLABUS

Course: Mathematical Foundation for Computer Applications		Semester	I
Course Code	**25MMC102**	CIE Marks	50
Teaching Hours/Week (L:P:T)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course Learning objectives:

1. Apply basic concepts of mathematical logic for analyzing propositions and proving theorems.
2. Apply sets and their operations algebraically to solve real-world problems.
3. Examine the basics of graph theory and their various properties.
4. Apply Probability Theory to solve computational problems.
5. Analyze real-world applications using statistical methods.

Module-1

Basic Structures: Sets: Basic definitions, Venn diagrams and set operations, Laws of set theory, Principle of inclusion and exclusion and Pigeonhole principle

Relations: Properties of relations, Matrices of relations, Equivalence relations and partitions

Functions and Matrices: Injective, subjective and bijective, Function compositions and Inverse functions and Eigenvalues and Eigenvectors.

Number of Hours:8

Module-2

Logic: Basic connectivity and Truth table, Logical equivalence, logical implications, Quantifiers – Predicates: Predicative logic, Free and Bound variables, Rules of inference, Consistency. Proofs of theorems-direct, indirect, and proof by contradiction.

. **Number of Hours:8**

Module-3

Statistics and Probability theory:

Curve fitting by method of least squares, fitting of curves – polynomial, (exponential, power function). Correlation and linear regression analysis. Basic concepts of probability, conditional probability, Baye's theorem.

Number of Hours:8

Module-4

Probability Distributions: Random variables- discrete and continuous, probability mass function, probability density function, and cumulative density function. Binomial distribution, Poisson distribution, Exponential distribution, and Normal distribution.

Number of Hours:8

Module-5

Graph Theory: Definition and examples of graphs, properties of a graph, sub graphs, regular graphs, bipartite graphs, paths and cycles, operations on graphs (union, intersection, Cartesian product), isomorphism of graphs. Eulerian graphs, Hamiltonian graphs, directed graphs, in degrees and out degrees in digraphs. Travelling salesman problem.

Number of Hours:8

Course outcome (Course Skill Set):

At the end of the course the student will be able to:

CO1: Make use of sets and its operations for solving real world problems.

CO2: Make use of basic concepts of mathematical logic for solving propositions

CO3: Apply Probability Theory to solve computational problems

CO4: Apply a variety of statistical methods to address real-world problems.

CO5: Apply concepts of graph theory to solve real world problems

Suggested Learning Resources:

Text Books:

1. Kenneth H Rosen, "Discrete Mathematics & its Applications", Mc Graw Hill publications 7th edition.
2. Narsingh Deo, Graph theory with the applications to engineering & Computer Science, Dovers Publications, 2016
3. J.A. Bondy and U.S.R. Murty. Graph theory with Applications, Springer, 1 st edition, 2008

References Books

1. J.K Sharma "Discrete Mathemathics', Mac Millan Publishers India, 3rd edition, 2011.
2. Garry Chartand and Ping Zhang, Introduction to Graph Theory, Tata McGraw-Hill, 2006.
3. Frank Harary, Graph Theory, Narosa Publishing House, Latest edition.
4. Theory and Problems of Probability, Seymour Lipschutz and Marc lars Lipson, 2 nd Edition Schaum's Outline Series, ISBN: 0-07-118356-6.

Web links and Video Lectures (e-Resources):

1. https://archive.nptel.ac.in/courses/111/106/111106086/
2. https://onlinecourses.nptel.ac.in/noc20_cs82/preview

Teaching-Learning Process (Innovative Delivery Methods)

The following are sample strategies that educators may adopt to enhance the effectiveness of the teaching- learning process and facilitate the achievement of course outcomes.

1. Lectures with PowerPoint presentations, Interactive discussions and problem-solving sessions, Assignments and quizzes for assessment.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 50% (50 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

1. Three Unit Tests each of 25 Marks (scale down to 25 Marks)
2. Two assignments each of 25 Marks or one Skill Development Activity of 50 marks to attain the COs and POs which will be scale down to 25 marks.

The sum of **three**-unit tests, two assignments/Skill Development Activities (CIE), will be 50 marks.

Semester-End Examination:

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper consists of Part A and Part B. Part A consists of 10 questions from 5 modules, each carrying 2 marks.

3. Part B consists of 10 questions. Each full question is for 16 marks. There will be two full questions (with a maximum of three sub-questions) from each module.
4. Each full question will have a sub-question covering all the topics under a module.
5. The students will have to answer five full questions, selecting one full question from each module