VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Fourth Semester B.E
B.E MATHS SYLLABUS for Computer Science Stream - 21MATCS41
Mathematical Foundations for Computing, Probability and Statistics
(Effective from the academic year 2022-23)

Topics	Topics to be covered	Hours
MODULE- 1 (Fundamentals of Logics)		
Basic Connectives and Truth Tables, Logical equivalences: The laws of Logic, Logical Implication: Rules of Inference,	Discussion restricted to problems in Articles No. 2.1, 2.2, 2.3 of Textbook 1	**2L**
The use of Quantifiers, Quantifiers, Definitions and the proofs of Theorems	Discussion restricted to problems in Articles No. 2.4, 2.5 of Textbook 1	**2L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module** iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-Study: Problems on Logical Equivalence	1. **No Question is to be set for SEE.** 2. **20% weightage shall be given to CIE from self-study topics.**	
RBT Levels : L1, L2 & L3	**Total**	**8 hours**
MODULE-2 (Relations, functions and Graph Theory)		
Cartesian products and Relations, Functions: Plain and One-to-One, Onto functions, Function Composition and Inverse Functions	Discussion restricted to problems in Articles No. 5.1, 5.2,5.3 and 5.6 of Textbook 1	**1L**
Properties of relations, Computer recognition: Zero-One Matrices and Directed Graphs, Partial Orders, Hasse Diagrams, Equivalence Relations and Partitions	Discussion of Problems in Articles No. 7.1, 7.2, 7.3 and 7.4 of Text book1	**2L**
Introduction to Graph Theory: Definitions and examples, Subgraphs, Compliments and Graph Isomorphism, Vertex Degree, Euler trails and Circuits.	Discussion of Problems in Articles No. 11.1, 11.2, and 11.3 of Text book1	**1L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module-.** iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-Study: The pigeonhole principle, problems and its applications.	**Article No. 5.5 of Textbook 1.** 1. **No Question is to be set for SEE** 2. **20% weightage shall be given to CIE from self-study topics**	
RBTLevels:L1, L2 & L3	**Total**	**8hours**
MODULE-3 (Statistical Methods)		

Correlation and regression-Karl Pearson's coefficient of correlation and rank correlation, problems. Regression analysis, lines of regression, problems.	Discussion restricted to problems in Articles No. 25.12, 25.13, 25.14, 25.16 of Textbook 2	**2L**
Curve Fitting: Curve fitting by the method of least squares, fitting the curves of the forms $y = ax + b,\ y = ax^b$ and $y = ax^2 + bx + c$	Discussion restricted to problems in Articles No. 24.4, 24.5 and 24.6(1) of Textbook 2	**2L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module** iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-Study: Angle between two regression lines, problems. Fitting of the curve $y = ab^x$	**Article No. 25.14, 24.6(2) of Textbook 2.** 1. **No Question is to be set for SEE** 2. **20% weightage shall be given to CIE from self-study topics**	
RBT Levels: L1, L2 and L3	**Total**	**8hours**
MODULE-4: Probability Distributions		
Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance.	Discussion of Problems in Articles No 26.7, 26.8, 26.9, 26.10 (1)(2) of Textbook 2	**2L**
Binomial, Poisson and normal distributions- problems (derivations for mean and standard deviation for Binomial and Poisson distributions only)- Illustrative example	Discussion of Problems in Articles No 26.14, 26.15 and 26.16 of Textbook 2	**2L**
Tutorials	i) Involvement of faculty and students in identifying the problems & solutions. ii) **PPT presentations by the faculty about the applications of the module.** iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-Study: Exponential distribution.	**Article No. 26.19(6) of Textbook 2.** 1. **No Question is to be set for SEE** 2. **20% weightage shall be given to CIE from self-study topics.**	
RBT Levels:L1, L2 and L3	**Total**	**8hours**
MODULE-5: Joint probability distribution:		
Joint Probability distribution for two discrete random variables, expectation, covariance and correlation	Discussion and problems restricted to Article No. 20.1 of Reference Book 7	**3L**
Sampling Theory: Introduction to sampling distributions, standard error, Type-I and Type-II errors. Test of hypothesis for means, student's t-distribution, Chi-square distribution as a test of goodness of fit.	Discussion and problems restricted to Articles No. 27.1 to 27.5, 27.14, 27.17, 27.18 Textbook 2	**1L**

Tutorials	i) Involvementoffacultyandstudentsinidentifyingtheproblems&solutions. ii) **PPT presentations by the faculty about the applications of the module** iii) Guidance to the students for self-study topics through illustrative examples.	**4T**
Self-Study: Point estimation and interval estimation.	1. **No Question is to be set for SEE** 2. **20% weightage shall be given to CIE from self-study topics**	
RBT Levels: L1, L2 andL3	**Total**	**8 hours**

Textbooks:
1. Ralph P. Grimaldi and B V Ramana, Discrete and Combinatorial Mathematics- An Applied Introduction, Pearson Education, Asia, Fifth edition – 2007. ISBN 978-81-7758-424-0.
2. Higher Engineering Mathematics B. S. Grewal Khanna Publishers 44th Edition, 2017

References:
3. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata – McGraw Hill, Sixth Edition, Sixth reprint 2008. ISBN-(13):978-0-07-064824-1.
4. C. L. Liu and D P Mohapatra, Elementary Discrete Mathematics, Tata- McGraw Hill, Sixth Edition, ISBN:10:0-07-066913-9.
5. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata – McGraw Hill, 35TH reprint 2008. ISBN 13:978-0-07-463113-3.
6. Advanced Engineering Mathematics C. Ray Wylie, Louis C. Barrett McGraw-Hill 6th Edition 1995
7. Higher Engineering Mathematics B. V. Ramana McGraw-Hill 11th Edition,2010
8. A Text-Book of Engineering Mathematics N. P. Bali and Manish Goyal Laxmi Publications 2014
9. Advanced Engineering Mathematics Chandrika Prasad and Reena Garg Khanna Publishing, 2018.