MA 2208: PROBABILITY & QUEUING THEORY

Code	Subject Name	L	S/T	AS	IS	P	Credits
EC 2208	PROBABILITY & QUEUING THEORY	60	15	15	30	-	12

STATUS: Core module

PRE-REQUISITE: Mathematics I, Mathematics II& III

SUBJECT AIM

The course aims to provide the students to acquire analytical ability in solving mathematical problems as applied to the respective branches of engineering.

SUBJECT EXPECTED LEARNING OUTCOMES

At the end of the course the learner will be able to

- Solve problems in testing of hypothesis using distributions;
- Develop analytical capability in Statistical methods and Queuing theory;
- Explain and illustrate the concept of a random variable and its probability distributions;
- Demonstrate the concept of joint, marginal and conditional probability distribution involving two random variables;
- Solve problems using discrete time Markov chain;
- Analyze real world problems using the knowledge of Statistical methods and its applications.

Topics of Studey:

Unit I Random Variables:

Review of probability concepts, Types of Events, Axioms, Conditional probability, Multiplication theorem, Applications - Discrete and continuous Random Variables – Discrete case, Probability Mass function, Cumulative distribution function, Applications - Characteristics of random variables – Continuous case, Probability density function, Cumulative distribution function, Applications - Expectation, Variance - Higher Order Moments - Moment Generating Function, Functions of Random Variable (One dimensional only) - Chebychev's Inequality – (Statement only). Applications of Chebychev's Inequality.

Unit IITheoretical Distributions:

Discrete Probability distribution: Binomial distribution – MGF, Mean, Variance, Applications of Binomial distribution, Fitting a Binomial distribution - Poisson distribution – MGF, Mean,

Variance, Applications of Poisson distribution, Fitting a Poisson distribution - Geometric distribution – MGF, Mean, Variance, Memoryless Property , Applications of Geometric distribution - Continuous Probability Distributions: Uniform distribution – MGF, Mean, Variance & Applications - Exponential Distribution - MGF, Mean, Variance, Memoryless Property Applications of Exponential distribution - Normal distribution – Mean, Variance - Standard Normal distribution and Applications of Normal distribution.

Unit III Testing of Hypothesis:

Introduction to Sampling Distributions, Population and Sample, Null Hypothesis and Alternative Hypothesis, Single and Two Tailed Test - Testing of Hypothesis, Level of Significance, Critical Region, Procedure for Testing of Hypothesis - Large Sample Test- Test For Single Proportion, Two Sample Proportions - Large Sample Test- Test For Single Mean, Two Sample Means - Small Sample Tests – 't' Test For a Single Mean - 't' Test For The Difference Of Means, Paired 't' Test - F Test – Test of Significance of The Difference Between Two Population Variances - Chi Square Test For Goodness of Fit, Independence of Attributes.

Unit IV Queueing Theory:

Introduction to Markovian queueing models - Single Server Model with Infinite system capacity, Characteristics of the Model (M/M/1) : (∞/FIFO) - Problems on Model (M/M/1) : (∞/FIFO) - Single Server Model with Finite System Capacity, Characteristics of the Model (M/M/1) : (K/FIFO) - Problems on Model (M/M/1) : (K/FIFO).

Unit V Markov Chains:

Introduction to Stochastic process, Markov process, Markov chain one step & n-step Transition Probability - TPM and Applications - Chapman Kolmogorov theorem (Statement only), Applications on Chapman Kolmogorov theorem - Transition probability - Transition probability - Applications - Classification of states of a Markov chain - Classification of states of a Markov chain – Applications.

ASSESSMENT METHODS:

Assignments	:	20 %
Practical	:	-----
Continuous assessment test 1	:	10 %
Continuous assessment test 2	:	10 %
End of semester examination 1	:	60 %
Total	:	100 %

TOTAL NO OF HOURS: 120

ext Books:

1. Veerarajan T, 2011, Probability, Statistics and Random Processes, 3rd edition, McGraw Hill Publishers, New Delhi.
2. Yates R.D. and Goodman. D. J, 2012, Probability and Stochastic Processes, 2nd Edition, Wiley India Pvt. Ltd., Bangalore.
3. Moorthy M.B.K, Subramani K & Santha A, 2013, Probability and Queueing Theory, 5th edition, Scitech Publications, New Delhi. .
4. Spiegel M.R, Schiller J and Alu Srinivasan R, 2010, Probability and Statistics, Schaum Series, New Delhi.
5. Kandasamy, 2010, Probability and Queuing Theory, S Chand & Co., New Delhi

Reference Books:

1. Hwei Hsu, Schaum's Outline of Theory and Problems of Probability, Random Variable and Random Processesl, Ninth Reprint, Tata McGraw Hill, New Delhi.
2. Chandrasekaran A and Kavitha G, 2014, Probability, Statistics, Random Processes and Queuing Theory, Dhanam Publications, Chennai.
3. Devore J.L, 2012, Probability and Statistics for Engineering and the Sciences, 8th Editio Cengage Learning, New Delhi.
4. Palaniammal S, 2011, Probability and Queueing Theory, Prentice Hall India Learnir Private Limited, New Delhi.
5. Sivaramakrishna Das P, 2014, Probability and Queuing Theory, 7th Edition, pearsc New Delhi.