SEMESTER - I

Course No: 09CS 6111 Course Title: Stochastic Process and Queuing Theory
Credits: 4-0-0: 4 Year :2015

Pre-requisites: Nil

Course Objectives:
To familiarize the students with the advanced concepts in mathematical structures like Markov models, Queuing Networks etc. These concepts will help the students in their Master research project work.

Syllabus

Theoretical distributions-Discrete, Continuous; Stochastic processes and classifications; Renewal theorems; Markov chains-Discrete and continuous ; Chapman Kolmogorov Theorem; Queuing theory; Markovian single server and multiserver queuing models**;** Time delays and blocking in queuing Networks.

Course Outcome:

Students who successfully complete this course will get an idea of the power of stochastic processes and its range of applications. They will master essential stochastic modeling tools including Markov chains and queuing theory are able to formulate and solve problems which involve setting up stochastic models.

Text Books:

1. *Richard A Johnson, C B Gupta, Miller& Freund's Probability And Statistics For Engineers, Pearson Education, Seventh Edition*
2. *Veerajan T, "Probability, Statistics and Random Processes", 3rd Edition Tata McGraw Hill, New Delhi, 2008.*

References:

1. *Kishore.S. Trivedi, "Probability & Statistics with Reliability, Queuing and Computer Science Applications", PHI, New Delhi, 2011*
2. *Gupta S.C and Kapoor V.K, "Fundamentals of Mathematical Statistics", 9th revised edition, Sultan Chand & Co., New Delhi 2003.*
3. J. Medhi, "Stochastic Process *Stochastic Processes"*, *3rd Edition*, 2009 (2010).

COURSE PLAN		
COURSE NO: 09CS 6111 COURSE TITLE: Stochastic Process and Queuing Theory (L-T-P : 4-0-0) CREDITS: 4		
MODULES	**Contact hours**	**Sem. Exam Marks%**
MODULE : 1 **THEORETICAL DISTRIBUTIONS**-Discrete: Binomial, Poisson, Negative Binomial, Geometric, Uniform Distributions. Continuous: Uniform, Exponential, Erlang and Gamma, Weibull Distributions.	12	25

MODULE : 2 **STOCHASTIC PROCESSES**- Classification of Stochastic Processes – Bernoulli process – Poisson process – Pure birth process – Birth and Death process- **FIRST INTERNAL EXAMINATION**	7	13
Reward and Cost Models -Point Process Regenerative Processes, Renewal Theorems	6	12
MODULE : 3 **MARKOV CHAINS-**Discrete-Parameter Markov Chains – Irreducible Chains-Pure Jump Continuous- Time Chains -Transition Probability Matrix – Chapman Kolmogorov Theorem – State classification and limiting distributions. **SECOND INTERNAL EXAMINATION**	13	25
MODULE : 4 **QUEUING THEORY** -Introduction – Characteristics of Markovian Single server and Multi server queuing models *(M/M/1) : (∞ / FIFO), (M/M/1) : (N / FIFO), (M/M/s) : (∞ /FIFO)+ – M/G/1 Queuing System – Pollaczek Khinchin formula- Time delays and blocking in queuing Networks- Time delays in single server queue- time delays in networks of queues	14	25
END SEMESTER EXAMINATION		

Internal Continuous Assessment: 40 marks

Internal continuous assessment is in the form of periodical tests, assignments, seminars or a combination of all whichever suits best. There will be two tests per subject. The assessment details are to be announced to the students, right at the beginning of the semester by the teacher.

End Semester Examination: 60 marks