2/4 B.Tech SECOND SEMESTER

IT4T4   **PROBABILITY STATISTICS & QUEUEING THEORY**   **Credits: 4**

Lecture: 4 periods/week   **Internal assessment: 30 marks**
Tutorial: 1 period /week   **Semester end examination: 70 marks**

Objectives:

- This course is designed to equip the students with a working knowledge of probability, statistics.
- The objective of this course is to help students to develop an intuition and interest for random phenomenon and to introduce theoretical issues and applications that may be useful in real life.
- The fundamental goal of queuing theory is to derive an analytical or mathematical model of customers needing service and use that model to predict queue lengths and waiting times.

Outcomes:

- Understand the basic principles of probability, conditional probability, Baye's rule.
- Know the concepts of discrete, continuous random variables and able to solve problems of probability using Binomial, Poison, Normal distributions.
- Understand the significance of statistical parameters like mean, variance, mode, standard deviation.
- Get the knowledge of   concept of sampling and basic methods of estimation.
- Able to perform test of hypothesis in the context of single mean, two means, single proportion, several proportions.
- Understand the queue system, queuing problem and able to do simple queuing problems.

Syllabus:

UNIT-I
Probability Sample space and events – Probability – The axioms of probability – Some elementary theorems - Conditional probability – Baye's theorem. Random variables – Discrete and continuous distributions - Distribution function.

UNIT-II
Discrete distributions Binomial, Poisson distribution – related properties. Fitting these distributions to the given data. Computing probabilities using Binomial, Poisson.

UNIT-III
Continuous distributions Uniform, normal, exponential distributions and their properties.

UNIT-IV
Population and samples. Sampling distribution of mean (with known and unknown variance),proportions, variances. - Sampling distribution of sums and differences. Point and interval estimators for means, variances, proportions.

UNIT-V
Statistical Hypothesis – Errors of Type I and Type II errors and calculation. One tail, two-tail tests. Testing hypothesis concerning means, proportions and their differences using Z-test,t-test.

UNIT-VI
Test of significance – F-test, χ²-test, , χ²-test as a test of goodness of fit.
Analysis of variance (ANOVA) – ANOVA for one –way.

UNIT-VII
QUEUEING THEORY
Queues-Characteristics of Queues-Kendal's notation-Random arrivals-Arrival and Departure Distributions-Types of Queues- Basic Queuing models- M/M/1∞/FIFO – $P_n = \rho^n P_0$ (no proof)-Derivation of the following Characteristics (a) Probability that there are n or more customers in the system (b) Average number of customers in the system

UNIT-VIII
(a)Average queue length(b) Average length of nonempty queue .Waiting time distribution (no proof) – Waiting time in the system –Waiting time in the queue - Little's Formulae – Problems based on the above results.

Text books:
1. Probability and statistics by Dr.T.K.V.Iyengar, Dr.B.Krishna Gandhi, S.Ranganatham Dr,M.V.S.S.N.Prasad,S.Chand.

Reference books:

1. Probability, Statistics and Queuing theory applications for Computer Sciences 2 edition, Trivedi, john Wiley and sons.
2. Probability & Statistics, D. K. Murugeson & P. Guru Swamy, Anuradha Publishers.
   A text book of Probability and statistics Unitech series by Dr.Shahnaz Bathul
3. Fundamentals of Mathematical Statistics – S.C. Gupta & V.K.Kapoor S.Chand Publications.