

Roll No.

Total Pages : 03

BT-7/M-20

37003

STATISTICAL MODELS FOR
COMPUTER SCIENCE
CSE-405

Time : Three Hours]

[Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. Each question carries equal marks.

Unit I

1. (a) A certain firm has plants A, B and C producing, respectively, 35 percent, 15 percent and 50 percent of the total output. The probabilities of a non-defective product are, respectively, 0.75, 0.95 and 0.85. A customer receives a defective product. What is the probability that it came from plant C ? **10**
(b) State and prove Bayes' theorem. **10**
2. (a) Out of every 100 jobs received at a computing center, 50 are of class 1, 30 of class 2, and 20 of class 3. A sample of 30 jobs is taken with replacement. Find the probability that the sample will contain ten jobs of each class. **10**

- (b) State and prove addition theorem of probability. **10**

Unit II

3. (a) Let y_1, y_2, \dots, y_r be mutually independent discrete random variables. If y_i has Poisson distribution with parameter α_i , then $\sum_{i=1}^r y_i$ has a Poisson distribution

with parameter $\sum_{i=1}^r \alpha_i$. Prove. **10**

- (b) The time (measured in years), X required to complete a software project has a p.d.f. of the form :

$$f(x) = \begin{cases} Kx(1-x), & 0 \leq x \leq 1 \\ 0 & , \text{ otherwise} \end{cases}$$

Find the value of K. **10**

4. (a) Explain Markov property of exponential distribution. **10**
- (b) State and prove the linearity property of Expectation i.e.

$$E[Z] = E[X + Y] = E[X] + E[Y] \text{ where } Z = x + y.$$

10

Unit III

5. Define the term stochastic process. Explain the classification of stochastic processes. **20**
6. Explain the concept of the following :
- (a) Superposition of Independent Poisson process
 - (b) Decomposition of Independent Poisson process. **20**

Unit IV

7. Explain M/G/1 queuing system. **20**
8. Explain the following :
- (a) The Pure death process
 - (b) Machine repairman model. **20**