Roll No. .....

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MT/D11 : 8908

M.TEC-1.4 : Stochastic Methods

Time : Three Hours

Maximum Marks : 60

Note:- Attempt five questions in all, selecting at least one questions from each of the four units.

UNIT - I

Q.1. a) A pair of dice is rolled 10 times. Find the probability that "Seven" will show at least once. 4

b) For any two random variables x and y Assume $\sigma_x^2 = \text{Var}\{x\}$, $\sigma_y^2 = \text{Var}\{y\}$ and $\sigma^2_{x+y} = \text{Var}\{x+y\}$, show that 8

$$\frac{\sigma_{xy}}{\sigma_{x+y}} \leq 1$$

Q.2 a) State and explain Bay's Rule. 4

b) Show that the convolution of two normal densities is a normal density. 4

c) Define system reliability. How will you compute it? Also discuss conditional failure rate. 4

UNIT - II

Q.3 a) What is stochastic process ? Explain with an example. 4

b) Discuss the classification of stochastic processes. 4

c) Show that the time a discrete - time homogeneous markov chain spends in a given state has a geometric distribution. 4

Q.4 a) Define Renewal Process. Derive the funtamental Renewal equation. 6

b) Discuss the following: 6

i) Random Incidence ii) Bernoulli's Process

UNIT - III

Q.5 a) Explain Transition Probability function of marker chain. How will you computer n-step Transition Probabilities ? 6

b) For the M/G/1 queue, plot the average queue length E[N] as a function of server utilization P for exponential service time distribution. 6

Q.6 a) Discuss Markov chains with absorbing states. 6

b) A group of telephone subscribers is observed continuously during a 30-minutes busy hour period. During this time, they make 30 calls and the total conversation time is 4200s. Estimate the call arrival rate and traffic intensity. 6

UNIT - IV

Q.7 a) What are open and close queuing networks? Illustrate. 4

b) Derive a closed form expression for average system throughout for a closed queuing network under mono programming. 8

Q.8 Write short note on the following. 4x3

a) Correlation

b) Regression

c) Least squares curve fitting.