UJ – 167

VI Semester B.E. (CSE/ISE) Degree Examination, June/July 2016
(2K11 Scheme)
CI 6.2 : PROBABILITY AND STOCHASTIC PROCESSES

Time : 3 Hours | Max. Marks : 100

***Instruction** : Answer **any five** questions choosing atleast **two** from **each** Part.*

PART – A

1. a) With an example, explain the following :

    i) Independent events

    ii) Conditional probability **6**

   b) Explain with examples. **9**

    i) Mutually exclusive events.

    ii) Exhaustive events.

    iii) Sample space and sample outcome.

   c) State and prove Baye's theorem, using total probability theorem. **5**

2. a) In a large consignment of electric bulbs, 10% are defective. A random sample of 20 is taken for inspection. Find the probability that

    i) All are good bulbs

    ii) At most there are 2 defective bulbs.

    iii) Exactly there are 4 defective bulbs. **10**

   b) If the probability that an applicant for a drivers license will pass the road test on any given trial is 0.8. What is the probability that he will finally pass the test ?

    i) on the 4^{th} trial

    ii) in fewer than 6 trials. **10**

P.T.O.

3. a) A CPU burst of a task is exponentially distributed with mean $1/\mu$. At the end of a burst the task requires another burst with probability 'P' and finishes execution with probability 1–P. Thus the number of CPU bursts required for task completion is a random variable with the image {1, 2, ...}. Find the distribution function of the total service time of a task. Also, compute its mean and variance. **10**

b) Let X and Y be two random variables. Then the expectation of their sum is the sum of their expectations i.e. if Z = X + Y, then prove that

$E[Z] = E[X + Y] = E[X] + E[Y]$. **10**

4. a) The failure rate of a certain type of component is $\lambda(t) = at (t \geq 0)$ where $a > 0$ and is constant. Find the components reliability and its expected life (or MTTF). **10**

b) A group of telephone subscriber is observed continuously during a 80- minute busy hour period. During this period they make 30 calls, with the total conversation time being 1,200 seconds. Compute the call arrival rate and the traffic intensity. **10**

PART – B

5. a) In a hypothetical market, there are only two brands A and B. A customer buys brand 'A' with probability 0.7 if his last purchase was 'A' and buys brand B with probability 0.4 if his last purchase was 'B'. Assuming Markov Chian model, explain.

i) One-step tpm p

ii) n-step tpm p^n and

iii) the stationary distribution. **10**

b) Suppose that the probability of a dry day following a rainy day is $1/2$ and the probability of a rainy day following a dry day is $1/4$. Given that June 1 is a dry day. Find the probability that June 3 is a dry day and June 6 is a dry day. **10**

6. a) Consider the Markov Chain with tpm

$$\begin{bmatrix} 0.4 & 0.6 & 0 & 0 \\ 0.3 & 0.7 & 0 & 0 \\ 0.2 & 0.4 & 0.1 & 0.3 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

Is it irreducible ? If not, find the classes. Also find nature of the states. **10**

b) Consider a computer system with Poisson Job arrival stream at an average rate of 60 per hour. Determine the probability that the time interval between successive job arrival is

i) Between 4 and 8 minutes

ii) Shorter than 12 minutes

iii) Longer than 8 minutes. **10**

7. a) Consider M|M|1 queuing system in which the total number of jobs is limited to 'n' owing to a limitation on queue size.

i) Find the steady-state probability that an arriving request is rejected because the queue is full.

ii) Find the steady-state probability that the processor is idle.

iii) Given that a request has to be accepted, find its average response time. **10**

b) Discuss the differences between open queuing networks and closed queuing networks. **10**

8. Write short note on : **(4×5=20)**

a) Non- exponential time distribution.

b) Properties of expectations.

c) Difference between discrete random variable and continuous random variable.

d) Birth and death process.