4E2918

Roll No. : ______________ Total Printed Pages : 4

4E2918

B. Tech. (Sem. IV) (Main / Back) Examination, June/July - 2013
Computer Science & Information Tech.
4CS4 Statistics & Probability Theory

Time : 3 Hours] [Total Marks : 80
[Min. Passing Marks : 24

*Attempt any **five questions**, selecting **one question** from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*
Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)

1. Nil 2. Nil

UNIT - I

1 (a) A random variable x has the probability density

$$f(x)=\begin{cases} 0, & x<0 \\ 2e^{-2x} & x>0 \end{cases}$$

Find the probability for

(i) $1<x<3$

(ii) $x>5$

(iii) The distribution function $F(x)$.

A B $\frac{1}{6}$ $\frac{5}{6}$ $\frac{5}{6}\times\frac{1}{6}$ $\frac{5}{6}\times\frac{5}{6}$

8

(b) A and B throw an ordinary die alternately for a stake of Rs. 11, which is to be won by one who first 6. Find their expectations, if A has the first chance.

8

OR

2 (a) A publisher earns a profit of Rs. 20 on a book, if it is published at the right time, but the profit earned is Rs. 18.00 if the publication is delayed. The profit is further reduced to Rs. 10.00 on each book, if though published in time or not

published in time, if they are defective. If 20% of the books be defective and they are only 70% chances of publishing the book at the right time and in perfect conditions without any defect and 10% chances for not publishing in it right time and 20% chances are there for a book not to be in the perfect condition. What is the publishers expected profit ? 8

(b) A person draws cards one by one from a pack until he draws all the aces. How many cards he may be expected to draw ? 8

UNIT - II

3 (a) Find the distribution function of the random variable X where probability density is given by

$$f(x)=\begin{cases} x & for\, 0<x<1 \\ 2-x & for\, 1\le x<2 \\ o & elsewere \end{cases}$$

8

(b) For the binomial variate prove the recurrence formula is $\mu_{k+1}=pq\left[\frac{d\mu_k}{dp}+nk\mu_{k-1}\right]$ where μ_k is Kth order central moment. 8

OR

4 (a) The joint probability mass function of (x,y) is given by $P(X=x,Y=y)=k(2x+3y)$, $X=0,1,2$: $Y=1,2,3$. Find k, marginal probability distribution of X and Y. Also find conditional probability distribution of X for $Y=1$. i.e. $P\left[\frac{X=x}{Y=1}\right]$.

8

(b) If X and Y are independent poisson Random variates, show that the conditional distribution of X given the values of $X+Y=n$ is a binomial distribution. 8

UNIT - III

5 (a) Calculate the coefficient of correlation between x and y from the following data :

x	-10	-5	0	5	10
y	5	9	7	11	13

8

(b) Find the two lines of regression and coefficient of correlation for the data given below.

$n=18$, $\sum x=12$, $\sum y=18$, $\sum x^2=60$, $\sum y^2=96$, $\sum xy=48$.

8

OR

6 (a) Fit a second degree parabola to the following data taking x as the indendement varible.

x	1	2	3	4	5	6	7	8	9
y	2	6	7	8	10	11	11	10	9

8

(b) Obtain regression line of x on y for the given data :

x	1	2	3	4	5	6
y	5.0	8.1	10.6	13.1	16.2	20.0

8

UNIT - IV

7 (a) A repairman is to be hired to repair machines which break down at an average rate of 3/h. The break down following the Poissonian Law. Non productive time of a machine is considered to cost Rs. 10/h. Two repairmen have been contacted. One A, charge Rs. 5 per hour and repairs 4 breakdowns machines/hr. while B charges Rs. 7 per hour and repairs 6 such faults/hr. Find which repairman should be hired. (1 day = 8 hour working)

8

(b) A tailor takes 1 day to stich a suit. Customer arrival follow Poission distribution with mean rate of 1 in every two hours. How long a customer will have to wait ?

8

OR

8 (a) Prove that the probability distribution in Poisson queues is given by $P_n(t) = e^{-\lambda t} \dfrac{(\lambda t)^n}{\lfloor n}$ where t denotes number of arrivals n in a time interval t and λ denotes average rate of arrivals. 8

(b) A supermarket has two girls running up sales at the counters. If the service time for each customer is exponentially distributed with mean of 4 minutes and if the arrival be poissonian with mean rate of 10/hr, then find (i) the probability of having to wait for service, (ii) the expected idle time for each girl. 8

UNIT – V

9 (a) Describe the M/G/1 queueing system analysing the steady state solution. 8

(b) Two brands A and B of a product have probabiliteis 30% and 70% respectively at time $t = 0$, if their transition matrix be $\begin{bmatrix} .7 & .3 \\ .2 & .8 \end{bmatrix}$, find their probabilities.

(i) after $t = 1$

(ii) after $t = 2$

(iii) their steady state probabilities. 8

OR

10 (a) Find the nature of the states of the Markox chain with t.p.m.

$$\begin{array}{c c} & \begin{array}{ccc} 0 & 1 & 2 \end{array} \\ \begin{array}{c} 0 \\ 1 \\ 2 \end{array} & \begin{pmatrix} 0 & 1 & 0 \\ \frac{1}{2} & 0 & \frac{1}{2} \\ 0 & 1 & 0 \end{pmatrix} \end{array}$$

8

(b) On a telephone booth, arrivals of customers follow the Poisson process with an average time of 10 minutes between one arrival and next arrival. The length of a phone call is assumed to be distributed exponentially with mean 3 minutes. Find (i) the average number of persons waiting in the system. (ii) the probability that a customer spends more than 10 minutes in the both. 8