4E 4162

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B.Tech. IV Semester (Main/Back) Examination, June/July - 2015

Computer Science and Engineering

4CS3A Statistics and Probability Theory

(Common with IT)

Time : 3 Hours **Maximum Marks : 80**

Min. Passing Marks : 26

Instructions to Candidates:

1. Normal distribution table.

Unit - I

1. a) Two computers A and B are to be marketed. A salesman who is assigned the job of finding customers for them has 60% and 40% chances respectively of succeeding in case of computers A and B. The two computers can be sold independently. Given that he was able to sell at least one computer, what is the probability that computer, A has been sold. **(8)**

   b) There are three boxes containing respectively 1 white, 2 red and 3 black balls, 2 white, 3 red and 1 black ball, 3 white, 1 red and 2 black balls. A box is chosen and from it two balls are drawn at random. They happen to be one red and one white. find the probabilities that these come from

   i) The first box

   ii) The second box and

   iii) The third box **(8)**

OR

1. a) The joint probability mass function of (X,Y) is given by $f_{XY}(x, y) = k(2x+3y)$; $x=0,1,2$; $y=1,2,3$ find:

i) The value of constant K,

ii) Marginal probability distribution of X and Y

iii) $P\left(\frac{Y=y}{X=2}\right)$ **(6)**

b) If f(t) be the pdf of a system and h(t) be the hazard rate function of the same system, then using $f(t)=\lambda^2 te^{-\lambda t}$, find h(t) and MTTF. **(6)**

c) The first four moments of a distribution about the value '5' of the variable are 2,20,40 and 50. Find the mean, variance, β_1 *and* β_2 **(4)**

Unit - II

2. a) The probability of a man hitting a target is 1/4. Then find:

i) If he fires 7 times, what is the probability of his hitting the target atleast twice

ii) How many times must he fire so that the probability of his hitting the target at least once is greater than 2/3 **(4+4=8)**

b) For Poisson distribution find first four moments about origin and hence find first four central moments **(8)**

OR

2. a) The average monthly sales of 5000 firms are normally distributed. Its mean and standard deviation are Rs 36000 and Rs 10,000 respectively then find:

i) The number of firms the sales of which are over Rs. 40,000

ii) The number of firms the sales of which are between Rs. 38,500 and Rs.41000 **(4+4=8)**

b) Subway trains from karolbagh to chandani chowk run every half an hour between midnight and six in the morning what is the probability that a man entering the station at a random time during this period will have to wait at least twenty minutes. **(4)**

c) State and derive memory less property of exponential distribution **(4)**

Unit - III

3. a) Calculate the karl person's coefficient of correlation between x and y from the following data:

x :	25	27	30	35	33	28	36
y :	19	22	27	28	30	23	28

(8)

b) In a partially destroyed laboratory, record of an analysis of correlation data, the following results only are legible: variance of x = 9.

Regression equations: 8x-10y+66=0,

40x-18y=214 then find

i) The mean values of x and y

ii) Coefficient of correlation between x and y

iii) The standard deviation of y **(8)**

OR

3. a) Use method of least squares to fit a straight line to the following data treating y as the dependent variable **(8)**

x :	1	2	3	4	5
y :	5	7	9	10	11

b) Ten competitors in a beauty contest are ranked by three judges in the following order: **(8)**

I judge :	1	6	5	10	3	2	4	9	7	8
II judge :	3	5	8	4	7	10	2	1	6	9
III judge :	6	4	9	8	1	2	3	10	5	7

Then find that which two judges have better correlation.

Unit - IV

4. a) If for a period of 2 hours in a day(7 A.M to 9 A.M) customers arrive in a barber's shop that has space to accommodate only 4 customers. Arrival rate of customers is 3 per hour and service time is 36 minutes per customer. Then, find:

i) The probability that there is no customer in the shop and

ii) Average number of customers in the shop **(8)**

b) In a shop there are two computers for carrying out the job work. the average time per job on each computer is 20 minutes per job and the average arrival rate is 2 jobs per hour. Assume the job times to bedistributed exponentially. If the maximum number of jobs accepted on a day be 6, then find:

i) The expected number of jobs waiting for computer

ii) The total time lost per day consists of 8 working hours **(8)**

OR

4. a) 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. Then find: **(8)**

i) Average number of customers present in the system

ii) The probability that a customer spends more than 10 minutes in the booth.

iii) The fraction of a day that the phone will be in use

b) A supermarket has two girls serving at the counters. The customers arrive in a Poisson fashion at the rate of 12 per hour. The service time for each customer is exponential with mean 6 minutes. Then find:

i) The probability that an arriving customer has to wait for service

ii) The average number of customers in the system

iii) The average time spent by a customer in the supermarket **(8)**

Unit - V

5. a) A housewife buys three kinds of food A,B and C. She never buy the same food on successive weeks. If she buys food A, then the next week she buys food B. However if she buys B or C. Then the next week she is three times as likely to buy A as to the other brand. Find the transition probability matrix **(8)**

b) An automata car station has one bay where service is done. The arrival pattern is Poisson with 4 cars per hour and may wait in the parking lot in the street if the bay is busy then find the time spent in the station by a car if service time distribution is normal with mean 12 minutes and $\sigma = 3$ minutes. Also, find the average number of cars in the station, if service time distribution is uniform between 8 and 20 minutes **(8)**

OR

5. a) Write a short note on 'discrete parameter birth - death process' **(8)**

b) In a heavy machine shop the overhead crane is utilized 75%. Time study observations gave the average slinging time as 10.5 minutes with a standard deviation of 8.8 minutes. What is the average calling time for the services of the crane and what is the average delay in getting service? If the average service time is cut to 8 minutes with standard deviation of 6 minutes, how much reduction will occur on average in the delay of getting served? **(8)**
