Roll No.

4E4162

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B.Tech. IV-Sem (Main & Back) Exam; June-July 2016
Computer Science & Engineering
4CS3A Statistics & Probability Theory
Common with CS, IT

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks (Main & Back): 26
Min. Passing Marks (Old Back): 24

Instructions to Candidates:-

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. Normal distribution Table

2. Scientific calculator

UNIT-I

Q.1 (a) A bag has 4 white and 3 black balls while another bag has 3 white and 5 black balls. A ball is drawn from the first bag and without noting its colour, is put into the second bag. Then a ball is drawn from the second bag. Find the probability that it is white. [8]

(b) The chance that a doctor will diagnose a disease correctly is 70%. The chances of death of patient after correct diagnosis is 35% while after wrong diagnosis it 80%. If a patient dies after taking his treatment, find the probability that he was diagnosed. [8]

(i) Wrongly

(ii) Correctly

Q.1 (a) Find the moment generating function of the random variable X whose p.m.f. is given by:-

$$P(X = x) = \frac{1}{8}\,^3Cx; \quad x = 0, 1, 2, 3 \text{ and then find } \mu_1' \text{ and } \mu_2'$$ [8]

(b) Thirteen cards are drawn simultaneously from a pack of 52. If are count 1. face cards 10 each and other according to their denominations, find the expectation of the total score of the 13 cards. [8]

UNIT-II

Q.2 (a) Find mean & variance of Poisson distribution. [8]

(b) Define normal distribution. The distribution of weekly wages of 500 workers in a factory is approx. normal with the mean and s.d. of ₹ 75 and ₹ 15. Find the number of workers who receive weekly wages. [8]

   (i) More than ₹ 90

   (ii) Less than ₹ 45

OR

Q.2 (a) Find the mean and variance of normal distribution. [8]

(b) The following data shows the number of seeds germinating out of 10 on damp filter for 80 set of seeds. Fit a binomial dist ^{n} to this data. [8]

x:	0	1	2	3	4	5	6	7	8	9	10
f:	6	20	28	12	8	6	0	0	0	0	0

UNIT-III

Q.3 (a) Find the correlation coefficient between x & y when it is given:

that: $n = 15$, $\Sigma x = 50$, $\Sigma y = -30$, $\Sigma x^2 = 290$, $\Sigma y^2 = 300$, $\Sigma xy = -115$. [8]

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

Judge 1	1	6	5	10	3	2	4	9	7	8
Judge 2	3	5	8	4	7	10	2	1	6	9
Judge 3	6	4	9	8	1	2	3	10	5	7

Use the rank correlation coefficient to discuss which pair of judges have the nearest approach to common taste in beauty. [8]

Q.3 (a) Fit a parabola of second degree taking x as an independent variable to the following data

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

(b) Find the two lines of regression and coefficient of correlation from the data given below [8]

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

UNIT-IV

Q.4 (a) Customers arrive at a box office with one ticket window according to a poisson input process with mean rate of 30 per hour. The time required to serve a customer has an exponential dist^n with mean 90 seconds. Find [8]

   (i) Average line length

   (ii) Average queue length

   (iii) Average waiting time in queue

   (iv) Average time spent by a customer in the system

(b) If for a period of 2 hours in a day, customers arrive in a barber's shop and there is space to accommodate only 4 customers. Arrival rate of customers is 3 per hour and service time is 36 minutes per customer. Find for the above period [8]

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

   (ii) Average number of customers in the shop.

OR

Q.4 (a) A petrol pump has 2 pumps. The service time follows the exponential distribution with a mean of 4 minutes and vehicles arrive for service in Poisson fashion at the rate of 10 per hour. Find [8]

   (i) The probability that an arrival of a vehicle would have to wait.

   (ii) The expected percentage of idle time for each pump.

(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 be distributed exponentially. If the maximum number of jobs accepted on a day be 6, then find [8]

(i) The expected number of jobs waiting for computer.

(ii) The total time lost per day.

UNIT-V

Q.5 (a) Write a short note on discrete parameter birth death process. [8]

(b) Three advocates A, B, C have at t = 0; 450, 500, 600 clients respectively. During one year though no new client has been added, migrations from one to the other have taken place as follows: [8]

From A   50 have gone to B   and 25 to C

From B   50 have gone to A   and 100 to C

From C   25 have gone to A

Prepare the transition probability matrix and find the number of clients associated with A, B, C after one year.

OR

Q.5 (a) A man while going to office he uses either of the two modes of transportation either a city bus or his scooter. The transition probability is given by [8]

$$P = \begin{array}{c} \\ Bus \\ scooter \end{array} \begin{array}{c} Bus \quad Scooter \\ \left[\begin{array}{cc} 0 & 1 \\ 1/2 & 1/2 \end{array} \right] \end{array}$$

The initial state of probability distribution i.e. on first day is

$$P(1) = \left[\frac{5}{6}, \quad \frac{1}{6} \right]$$

Find

(i) The probability that he takes a bus on the third day.

(ii) The probability that he goes by scooter in the long run.

(b) A house wife buys three kinds of cereals: A, B, C. she never buys the same cereals on successive weeks. If she buys cereals A, then the next week she buys cereal 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]

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