29/6/2016

4E4162

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4E4162

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

OR

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

$P(X = x) = \frac{1}{8}\,{}^{3}Cx;\quad x = 0, 1, 2, 3$ and then find μ_1^1 and μ_2^1 [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.

(i) More than ₹ 90 [8]

(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]

OR

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	2.6	2.7	3.4	4.1

[8]

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

$n = 18, \Sigma x = 12, \Sigma y = 18, \Sigma x^2 = 60, \Sigma y^2 = 96, \Sigma xy = 48.$ [8]

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

(i) Average line length

(ii) Average queue length

(iii) Average waiting time in queue

(iv) Average time spent by a customer in the system [8]

(b) If for a period of 2 hours in a day, customers arrive in a barber's shop that has a 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.

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

(ii) Average number of customers in the shop. [8]

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]

$$P = \begin{matrix} \\ \text{Bus} \\ \text{scooter} \end{matrix} \begin{matrix} \begin{matrix} \text{Bus} & \text{Scooter} \end{matrix} \\ \begin{bmatrix} 0 & 1 \\ 1/2 & 1/2 \end{bmatrix} \end{matrix}$$

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]
