Code No: MC1314/R13

MCA I Semester Supplementary Examinations, January-2018

PROBABILITY AND STATISTICAL APPLICATIONS

Time: 3 Hours **Max. Marks: 60**

Answer Any **FIVE** *Questions*
All Questions Carry Equal Marks

1. a If A, B and C are three events then prove that 6M

$$P(A \cup B / C) = P(A/C) + P(B/C) - P(A \cap B/C)$$

b The chance that doctor A will diagnose a disease x correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease, x died .what is the chance that his disease was diagnosed correctly. 6M

2. a Let $f(x) = 3x^2, when\ 0 \le x \le 1$ be the probability density function of a continuous random variable X. Determine 'a' and 'b' such that i) $P(X \le a) = P(X > a)$ ii) $P(X > b) = 0.05$. 6M

b Fit a Poisson distribution to the following frequency distribution: 6M

	0	1	2	3	4	5	6
	13	25	52	58	32	16	4

3. a A random sample of size 100 is taken from an infinite population having the mean μ =76 and the variance σ^2 = 256. What is the probability that the mean between 75 and 78. 6M

b 20 people were attacked by a disease and only 18 survived. Will you reject the hypothesis that the survival rate if attacked by this disease is 85% in favors of the hypothesis that is more at 5% level? 6M

4. a Calculate the coefficient of correlation between X and Y from the following data: 6M

X	1	3	7	8	11	15	16
Y	1	3	4	8	11	16	18

b Fit a least square quadratic curve to the following data 6M

X	3	5	7	9	13	17	19
Y	2	5	11	14	17	18	21

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5. a A random sample of size 125 is taken from an infinite population having the mean 55 and variance 169. What is the probability that sample mean will be lie between 50 and 60. 6M

   b The mean heights of two large samples of sizes 100 and 200 members are 72 inches and 69.0 inches respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5 inches? 6M

6. A Machine is set to deliver packets of a given weight . 10 samples of size 5 each were recorded. Below are given relevant data: 12M

Sample No.	1	2	3	4	5	6	7	8	9	10
Mean ($\bar{x}$)	15	17	15	18	17	14	18	15	17	16
Range (R)	7	7	4	9	8	7	12	4	11	5

Calculate the values for the central line and the control limits for the mean chart and the range chart and mean then comment on the state of control. (conversion Factors for $n = 5, A_2 = 0.58, D_3 = 0, D_4 = 2.11$).

7. a Derive the moment generating function of binomial variate. 6M

   b Let X be a random variable with density function $f(x) = \begin{cases} \frac{x^2}{3}, & -1 < x < 2 \\ 0, & elsewhere \end{cases}$. Find the expected value of g(X)= 4X+3 6M

8. A bank plans to open a single server drive-in banking facility at a certain centre. It is estimated that 20 customer's transaction, determine 12M
   i) The proportion of time that the system will be idle
   ii) On the average, how long a customer will have to wait before reaching the server.
   iii) The fraction of customers who will have to wait.

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