

Code: 06MC104

MCA - I Semester Supplementary Examinations, August/September 2012

PROBABILITY AND STATISTICS

(For students admitted in 2006, 2007 & 2008 only)

Time: 3 hours

Max Marks: 60

Answer any FIVE questions

All questions carry equal marks

- 1 (a) A and B throw alternatively with a pair of dice. One who first throws a total of nine wins. What are their respective chances of winning if A starts the game?
(b) Determine: (i) $P\left(\frac{B}{A}\right)$
(ii) $P\left(\frac{A}{B^c}\right)$, if A and B are events with $P(A) = \frac{1}{3}$, $P(B) = \frac{1}{4}$, $P(A \cup B) = \frac{1}{2}$.
- 2 (a) Let x denote the minimum of the two numbers that appear when a pair of fair dice is thrown once. Determine the:
(i) Discrete probability distribution. (ii) Expectation (iii) Variance.
(b) If x is a continuous random variable and k is constant, then prove that:
(i) $\text{Var}(x + k) = \text{Var}(x)$. (ii) $\text{Var}(kx) = k^2 \text{var}(x)$.
- 3 (a) Out of 800 families with 5 children each, how many would you expect to have:
(i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys. Assume equal probabilities for boys and girls.
(b) If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3 kgs, how many students have masses:
(i) Greater than 72 kg. (ii) Less than or equal to 64 kg.
(iii) Between 65 and 71 kg inclusive.
- 4 (a) A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative.
(b) A manufacturer claims that any of his lists of items cannot have variance more than 1 cm^2 . A sample of 25 items has a variance of 1.2 cm^2 . Test whether the claim of the manufacturer is correct.

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- 5 (a) What is the maximum error one can expect to make with probability 0.90 when using the mean of a random sample of size $n = 64$ to estimate the mean of population with $\sigma^2 = 2.56$.
- (b) Find 95% confidence limits for the mean of a normality distributed population from which the following sample was taken 15, 17, 10, 18, 16, 9, 7, 11, 13, 14.
- 6 (a) Experience had shown that 20% of a manufactured product is of the top quality. In one day's production of 400 articles only 50 are of top quality. Test the hypothesis at 0.05 level.
- (b) An ambulance service claims that it takes on the average less than 10 minutes to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 minutes and the variance of 16 minutes. Test the significance at 0.05 level.
- 7 (a) A group of 5 patients treated with medicine A weigh 42, 39, 48, 60, and 41 kgs, second group of 7 patients from the same hospital treated with medicine B weigh 38, 42, 56, 64, 69 and 62 kgs. Do you agree with the claim that medicine B increases the weight significantly?
- (b) From the following data, find whether there is any significant linking in the habit of taking soft drinks among the categories of employees.

Employees

Soft Drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumps up	15	30	65
Fanta	50	60	30

- 8 (a) Compute the coefficient of correlation and the two lines of regression for the following data:

Price(x):	14	16	17	18	19	20	21	22	23
Demand (y):	84	78	70	75	66	67	62	58	60

- (b) Fit a Parabola for the following data:

X:	1	2	3	4	5	6	7	8	9
Y:	2	6	7	8	10	11	11	10	9
