

**MCA I Semester Supplementary Examinations, August 2010**  
**PROBABILITY & STATISTICS**  
**(For Students admitted in 2009-2010)**

Time: 3 hours

Max Marks: 60

**Answer any FIVE questions**  
**All questions carry equal marks**

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1. (a) State and prove the multiplication theorem of probability.  
 (b) In a factory, machine A produces 40% of the output and machine B produces 60% on the average, 9 items in 1000 produced by A are defective and 1 item in 250 produced by B is defective. An item drawn at random from a day's output is defective. What is the probability that it was produced by A or B?

2. (a) Find the expected values of x and standard deviation for the following discrete distribution.

X:	8	12	16	20	24
P(x):	1/8	1/6	3/8	1/4	1/12

- (b) For the continuous probability function  $f(x) = Kx^2e^{-x}$  where  $x \geq 0$ , find i) K ii) Mean iii) Variance.
3. (a) The mean of Binomial distribution is 3 and the variance is 9/4. Find
  - i. the value of n
  - ii.  $p(x \geq 7)$
  - iii.  $p(1 \leq x < 6)$
- (b) When the mean of marks was 50% and S.D 5% then 60% of the students failed in an examination. Determine the grace marks to be awarded in order to show that 70% of the students passed. Assume that the marks are normally distributed.

4. (a) A random sample of size 100 is taken from an infinite population having the mean  $\mu = 76$  and the variance  $\sigma^2 = 256$ . What is the probability that  $\bar{x}$  will be between 75 and 78.  
 (b) In 16 one hour test runs, the gasoline consumption of an engine averaged 16.4 gallons with a S.D of 2.1 gallons. Test the claim that the average gasoline consumption of this engine is 12.0 gallons per hour.

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) Construct a 99% confidence interval for the true mean weight loss if 16 persons on diet control after one month had a mean weight loss of 3.42kgs with S.D of 0.68kgs.

6. (a) A manufacturer claims that only 4% of his products are defective. A random sample of 500 were taken among which 100 were defective. Test the hypothesis at 0.05 level.  
 (b) A sample of 105 iron bars whose mean length is 10ft, is drawn. Is it drawn from a population whose mean is 12ft and standard deviation 4 ft?

7. (a) The time taken by workers in performing a job by method I and method II is given below:

Method I	20	16	26	27	23	22	-
Method II	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly?

- (b) A pair of dice are thrown 360 times and the frequency of each sum is indicated below.

Sum:	2	3	4	5	6	7	8	9	10	11	12
Frequency:	8	24	35	37	44	65	51	42	26	14	14

Would you say that the dice are fair on the basis of the Chi-square test at 0.05 level of significance?

8. (a) Fit the curve of the form  $y = ab^x$  by the method of least square

X:	2	3	4	5	6
Y:	8.3	15.4	35.1	65.2	127.4

- (b) 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

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