Code: R7210501

R07

II B.Tech I Semester (R07) Supplementary May 2012 Examinations
PROBABILITY & STATISTICS
(Common to Computer Science & Engineering, Information Technology and Computer Science & Systems Engineering)

Time: 3 hours **Max. Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) For n events $A_1, A_2, \ldots\ldots A_n$ prove that

$$P(\cup_{i=1}^{n} Ai) = \Sigma_{i=1}^{n} P(Ai) - \sum_{1 \le i<j \le n}\sum P(A_i \cap A_j) + \sum_{1 \le i<j<k \le n}\sum\sum P(A_i \cap A_j \cap A_k) + \ldots + (-1)^{n-1} P(A_1 \cap A_2 \cap \ldots \cap A_n).$$

   (b) A can hit a target once in five shots. B can hit two targets in 3 targets. C can hit one target in 4 shots. What is the probability that 2 shots hit the target?

2. (a) For the continuous probability functions $f(x) = kx^2e^{-x}$ when $x \ge 0$ find (1) k (2) mean (3) variance.
   (b) Find the mean and the variance of the uniform probability distribution given by $f(x) = \frac{1}{n}$ for $x = 1,2,3,\ldots,n$.

3. (a) Show that as $n \to \infty$ binomial distribution approaches the Poisson distribution.
   (b) In a distribution exactly normal 7% of the items are under 35 and 89 % are under 63. What are the mean and standard deviation of the distribution?

4. (a) Take 30 slips of paper and label 5 each -4 and 4, four each -3 and 3, three each -2 and 2 each -1, 0 and 1. If each slip of paper has the same probability of being drawn find the probabilities of getting -4, -3, -2,-1,0,1,2,3,4 and find the mean and variance of this distribution.
   (b) A normal population has a mean of 0.1 and a S.D of 2.1. Find the probability that the mean of simple sample of 900 members will be negative.

5. (a) Prove that for a random sample of size n,$x_1, x_2, \ldots x_n$ taken from a finite population $S^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2$ is not unbiased estimator of the parameter σ^2 but $\frac{1}{n-1} \sum_{i=1}^{n}(x_i - \bar{x})^2$ is unbiased.
   (b) A random sample of 400 items is found to have mean of 82 and S.D of 18.7 and 95 % confidence limits for the mean of the population from which the sample is drawn.

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 levels.
   (b) A manufacturer of electric bulbs claims that the percentage defectives in his product does not exceed 6. A sample of 40 bulbs is found to contain 5 defectives. Would you consider the claim justified?

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7. (a) Two independent samples of 8 and 7 items respectively has the following values of the variables.

Sample I	9	11	13	11	16	10	12	14
Sample II	11	13	11	14	10	8	10	

Do the estimates of population variances differ significantly?

7. (b) In 120 throws of a single die the following distribution of faces was obtained. Do these data indicate an unbiased die?

Faces	1	2	3	4	5	6
Frequencies	30	25	18	10	22	15

8. (a) Explain the characteristics of the queneing theory.
   (b) A self service canteen employs one cashier at its counter. 8 customers arrive per every 10 min on an average. The cashier can serve on average one per minute. Find
   (1) The average number of customers in the system.
   (2) The average queue length.
   (3) Average time a customer's spends in the system.
   (4) Average waiting time of each customer.

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