

Code No: R21052

**R10**

**SET - 1**

**II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2017**

**PROBABILITY AND STATISTICS**

(Com. to CSE, IT)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
All Questions carry **Equal** Marks  
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1. a) A class had 10 boys and 5 girls. Three students are selected at random one after the other. Find the probability that
  - i) first two are boys and third is girl
  - ii) first and third of same sex and second is of opposite sex.
- b) A and B throw alternatively a pair of ordinary dice. A wins if he throws 6 before 7 and B wins if he throws 7 before A throws 6. If A begins, show that his chance of winning is 30/61. (8M)
  
2. Probability density function of a random variable X is (15M)
 
$$f(x) = \begin{cases} \frac{1}{2} \sin x, & 0 \leq x \leq \pi \\ 0, & \text{elsewhere} \end{cases}$$
 Find the mean, mode and median of the distribution.
  
3. a) The marks obtained in mathematics by 1000 students is normally distributed with mean 78% and standard deviation 11%. Determine (8M)
  - i) What was the highest mark obtained by the lowest 25% students?
  - ii) Within what limit did the middle 90% of the student lie?
- b) A student takes a true false examination consisting of 8 questions. He guesses each answer. Find the smallest value of  $n$  that the probability of guessing atleast  $n$  correct answers is less than  $\frac{1}{2}$ . (7M)
  
4. a) Take 30 slips of paper and label 5 each -4 and 4, four each -3 and 3, three each -2 and 2, 2 each -1, 0 and 1. If each slip of paper has the same probability of being drawn find the probability of getting -4, -3, -2, -1, 0, 1, 2, 3, 4 and find the mean and variance of this distribution. (8M)
- b) The mean of certain normal population is equal to the standard error of the mean of the samples of 64 from that distribution. Find the probability that the mean of the sample size 36 will be negative? (7M)

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5. a) Discuss various types of alternative hypothesis with suitable example. (8M)
- b) A machine runs on an average of 125 hours/year. A random sample of 49 machines has an annual average use of 126.9 hours with standard deviation 8.4 hours. Does this suggest believing that machines are used on the average more than 125 hours annually at 0.05 level of significance? (7M)
6. a) Under quality improvement programme some teachers are trained by instruction methodology A and some by methodology B. In a random sample of size 10, taken from a large group of teachers exposed to each of these two methods, the following marks are obtained in an appropriate achievement test (8M)
- Method A    65 69 73 71 75 66 71 68 68 74
- Method B    78 69 72 77 84 70 73 77 75 65
- Assuming that populations sampled are approximately normally distributed has same variance. Test the claim that method B is more effective at 0.05 LOS.
- b) Explain steps involved in computation of one-way Analysis of Variance? (7M)
7. a) Find the rank correlation for the following marks obtained by 12 students in Mathematics and Statistics (8M)
- |             |    |    |    |    |    |    |    |    |
|-------------|----|----|----|----|----|----|----|----|
| Mathematics | 78 | 56 | 36 | 66 | 25 | 75 | 82 | 62 |
| Statistics  | 84 | 44 | 57 | 58 | 60 | 68 | 62 | 58 |
- b) What are the various techniques used for statistical quality control. (7M)
8. a) Define the terms (8M)
- expected queue length
  - ideal period
  - Busy period
  - Mean service rate
- b) Show that for a single service station, Poisson arrivals and exponential service time, the probability that exactly  $n$  calling units are in the queuing system is  $P_n = (1-\rho)\rho^n$ ,  $n \geq 0$ , where  $\rho$  is the traffic intensity. (7M)