

Code No: R22011

R10
SET - 1
II B. Tech II Semester Supplementary Examinations, November-2017
PROBABILITY AND STATISTICS

(Com. to CE, CHEM, PE)

Time: 3 hours

Max. Marks: 75

 Answer any **FIVE** Questions
 All Questions carry **Equal** Marks
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1. a) In a certain town 40% have brown hair, 25% have brown eyes and 15% have both (8M)  
 brown hair and brown eyes. A person is selected at random from the town.  
 i) if he has brown hair, what is the probability that he has brown eyes also  
 ii) If he has brown eyes determine the probability he does not have brown hair.
- b) There are 21 tickets consecutively numbered from these 3 are drawn at random. (7M)  
 Find the chance that the numbers form an arithmetic progression.
  
2. a) a) A continuous Random variable X has the distribution function (7M)  

$$F(x) = \begin{cases} 0 & \text{if } x \leq 1 \\ k(x-1)^2 & \text{if } 1 \leq x \leq 3 \\ 1 & \text{if } x > 3 \end{cases}$$
 Find i) f(x) ii) k iii) mean
- b) Let X be the a random variable with the following distribution. (8M)  

|        |     |     |     |
|--------|-----|-----|-----|
| x      | -3  | 6   | 9   |
| P(X=x) | 1/6 | 1/2 | 1/3 |

 Find  $E[X]$ ,  $E[X^2]$ ,  $E[2X+1]^2$ .
  
3. a) Explain "the characteristics of the normal distribution"? (7M)
- b) If 3 of 20 tyres are defective and 4 of them are randomly chosen for inspection, (8M)  
 what is the probability that only one of the defective tyre will be included
  
4. a) The mean of certain population is equal to the standard error of the mean of the (7M)  
 samples of 64 from that distribution. Find the probability that the mean of the  
 sample size 36 will be negative.
- b) A random sample of 400 items is found to have mean 82 and standard deviation of (8M)  
 18. Find the maximum error of estimation at 95% confidence interval

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5. a) In an investigation on the machine performance, the following results are obtained: (7M)

|           | No. of units inspected | No of defectives |
|-----------|------------------------|------------------|
| Machine-1 | 375                    | 17               |
| Machine-2 | 450                    | 22               |

Test whether there is any significant difference in the performance of two machines at  $\alpha=0.05$

- b) A manufacturer claims that only 4% of his products are defective. Random samples of 500 were taken among which 100 were defective. Test the hypothesis at 5% level. (8M)
6. a) In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers? (7M)
- b) Three different machines are used for a production. On the basis of the outputs, set up One-way ANOVA table and hence, test whether the machines are equally effective. (8M)

| OUTPUTS   |            |             |
|-----------|------------|-------------|
| Machine-I | Machine-II | Machine-III |
| 10        | 9          | 20          |
| 5         | 7          | 16          |
| 11        | 5          | 10          |
| 10        | 6          | 14          |

7. a) The method of least squares fit a parabola of the form  $y=a+bx+cx^2$  to the following data. (7M)

|   |      |       |       |       |       |
|---|------|-------|-------|-------|-------|
| X | 2    | 4     | 6     | 8     | 10    |
| Y | 3.07 | 12.85 | 31.47 | 57.38 | 91.29 |

- b) A drilling machine bores holes with a mean diameter of 0.5230 cm and a Standard deviation of 0.0032 cm. calculate the 2-sigma and 3-sigma upper and lower control limits for means of samples 4, and prepare a control Chart. (8M)
8. a) Explain (M/M/1) : (∞/FCFS) Queuing model. (7M)
- b) Arrival of telephone calls at a telephone booth are according to Poisson distribution with an average time of 12 minutes between two consecutive call arrivals the length of telephone call is assumed to be exponentially distributed with mean 4 minutes. (8M)
- i) Find the probability that a caller arriving at the booth will have to wait.
- ii) Find the average queuing length that forms from times time to time.