

Code No: R21052

R10
SET - 1
II B. Tech I Semester Supplementary Examinations, May/June - 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) There are 21 tickets consecutively numbered out of which 3 are drawn at random. Find the chance that the numbers form an arithmetic progression. (8M)
- b) State and prove Baye's theorem (7M)
2. a) Given the following probability distribution of X compute (i) E(x) (ii) E(2X±3) (iii) Var (X) (iv) Var (2X±3) (8M)

|      |      |      |      |   |      |      |      |
|------|------|------|------|---|------|------|------|
| x    | -3   | -2   | -1   | 0 | 1    | 2    | 3    |
| f(x) | 0.05 | 0.10 | 0.30 | 0 | 0.30 | 0.15 | 0.10 |

- b) The function defined  $f(x) = \begin{cases} e^{-x}, & x \geq 0 \\ 0, & x < 0 \end{cases}$  is a density function. (7M)

Determine the probability that the variate will fall in the interval (1,2) ? Find the cumulative probability F(2)?

3. a) In a sample of 1000 cases, the mean of a certain test is 14 and standard deviation is 2.5. Assuming the distribution to be normal, find (8M)
  - i) How many students score between 12 and 15? ii) How many score above 18?
  - iii) How many score below 18?
- b) Fit a Poisson distribution for the following data and calculate the expected frequencies (7M)

|      |     |    |    |   |   |
|------|-----|----|----|---|---|
| X    | 0   | 1  | 2  | 3 | 4 |
| f(x) | 109 | 65 | 22 | 3 | 1 |

4. Samples of size 2 are taken from the population 3, 6, 9, 15, 27 with replacement. Find i) The mean of the population ii) The standard deviation of the population iii) Mean of the sampling distribution of means iv) The standard deviation of the sampling distribution of means (15M)
5. a) A sample of 400 items is taken from a population whose S.D is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population. (8M)
- b) A sample of 26 bulbs gives a mean life of 990 hours with a standard deviation of 20 hours. The manufacturer claims that the mean life of bulbs is 1000 hours. Is the sample not up to the standard? (7M)

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6. a) Two horses A and B were tested according to the time (in seconds) to run a particular track with the following results. (8M)

|   |    |    |    |    |    |    |       |
|---|----|----|----|----|----|----|-------|
| A | 28 | 30 | 32 | 33 | 33 | 29 | 34    |
| B | 29 | 30 | 30 | 24 | 27 | 29 | ----- |

Test whether the two horses have the same running capacity.

- b) In 120 throws of a single die the following distribution of faces was obtained. (7M)  
 Does these data indicate that the die is unbiased?

|           |    |    |    |    |    |    |
|-----------|----|----|----|----|----|----|
| Faces     | 1  | 2  | 3  | 4  | 5  | 6  |
| frequency | 30 | 25 | 18 | 10 | 22 | 15 |

7. a) 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)
- b) The following are the marks obtained by 12 students in Economics and statistics. (7M)

|            |    |    |    |    |    |    |    |    |
|------------|----|----|----|----|----|----|----|----|
| Economics  | 78 | 56 | 36 | 66 | 25 | 75 | 82 | 62 |
| statistics | 84 | 44 | 57 | 58 | 60 | 68 | 62 | 58 |

Compute the Spearman rank correlation coefficient between.

8. a) Explain  $(M/M/1):(\infty/FCFS)$  Queuing model (8M)
- b) Barber A takes 15 minutes to complete one hair cut. Customers arrive in his shop at an average rate of one every 30 minutes. Barber B takes 25 minutes to complete one hair cut and customers arrive at his shop at an average rate of one every 50 minutes. The arrival processes are Poisson and the service times follow an exponential distribution. (7M)
- i) Where would you expect a bigger queue?
- ii) Where would you require more time waiting included to complete a hair cut