Code No: RT22051 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, November - 2018
PROBABILITY AND STATISTICS
(Com. to CSE, IT, CHEM, PE, PCE)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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PART –A

1. a) Let X have the density function (4M)

$$f(x)=\begin{cases}0.75\left(1-x^2\right), & if\ -1\le x\le 1\\ 0 & \text{elsewhere}\end{cases}$$ Find the Probabilities $P\left(\frac{-1}{2}\le x\le\frac{1}{2}\right)$.

b) Define Moment Generating Function. (3M)

c) Define Population and Sample with examples. (4M)

d) Derive normal equations to fit the straight line. (4M)

e) Define simple correlation and write formula for simple correlation coefficient. (4M)

f) Write the control line and three - sigma limits for the range chart. (3M)

PART –B

2. a) An experiment consists of four tosses of a coin. Denoting the outcomes HHTH, THTT, ….and assuming that all 16 outcomes are equally likely, find the probability distribution for the total number of heads. (8M)

b) Define the Weibull Distribution and find its mean and variance. (8M)

3. a) Define Mathematical Expectation and write its properties. (8M)

b) Find Moment Generating Function for Binomial distribution. (8M)

4. a) A population consists of five numbers 2, 3, 6, 8 and 11. Consider all possible samples of size 2 that can be drawn with replacement from this population. Find (8M)
(i) The mean of the population. (ii) The standard deviation of the population.
(iii) The mean of the sampling distribution of means and
(iv) The standard deviation of the sampling distribution of means

b) Determine a 95% confidence interval for the mean of a normal distribution with variance $\sigma^2 = 0.25$, using a sample of $n=100$ values with mean $\bar{x}=212.3$. (8M)
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5. a) A company claims that its light bulbs are superior to those of its main competitor. If a study showed that a sample of $n_1 = 40$ of its bulbs has a mean life time of 1647 hours of continuous use with a standard deviation of 27 hours, while a sample of $n_2 = 40$ bulbs made by its main competitor had a mean life time of 1638 hours of continuous use with a standard deviation of 31 hours, does this substitute the claim at the 0.05 level of significance? (8M)

   b) A study of TV viewers was conducted to find the opinion about the mega serial 'Ramayana'. If 56% of a sample of 300 viewers from south and 48% of 200 viewers from north preferred the serial, , test the claim at 0.05 level of significance that there is a difference of opinion between south and north. (8M)

6. a) The following data pertain to the cosmic ray doses measured at various altitudes: (8M)

Altitude(feet) x	50	450	780	1200	4400	4800	5300
Count y	28	30	32	36	51	58	69

Fit an exponential curve.

   b) Find the Correlation Coefficient for the following data: (8M)

x	1	2	3	4	5
y	2	5	3	8	7

7. The following data show the values of sample mean $\bar{X}$ and the range R of 20 samples for the sample of size 4 each. Calculate the values for central line and control limits for mean-chart and range chart and determine whether the process is in control (16M)

Sample No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
$\bar{X}$	1.75	1.32	1.18	0.18	2.30	1.25	1.52	1.78	1.90	1.72
R	1.0	1.3	0.4	1.3	1.4	1.9	1.0	1.3	2.4	2.0
Sample No.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
$\bar{X}$	2.40	3.20	2.52	2.05	1.68	2.00	1.28	1.92	1.00	1.35
R	1.9	2.7	1.7	0.6	0.5	3.1	2.6	2.7	1.0	1.7

Note :- Statistical tables and Control Chart Constants are required