Code No: R1621011 **R16** SET - 1

II B. Tech I Semester Supplementary Examinations, May - 2018
PROBABILITY AND STATISTICS
(Civil Engineering)

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 **FOUR** Questions from **Part-B**

~~~~~~

PART –A

1. a) Define a discrete random variable and give an example. (2M)
   b) Define a distribution function for a continuous random variable. (2M)
   c) Find the value of the finite population correction factor for $n = 10$ and $N = 1000$. (2M)
   d) Define null and alternative hypothesis. (3M)
   e) Define simple correlation and write formula for simple correlation coefficient. (3M)
   f) Write the expression for the control line and three sigma for mean Chart (2M)

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. (7M)
   b) Define the geometric distribution and find its mean and variance. (7M)

3. a) Let X be a continuous random variable with distribution : (7M)

$$f(x)=\begin{cases} k\,x^2 & if\ \ 0\le x\le 1 \\ 0 & elsewhere \end{cases}$$

   (i) Evaluate k (ii) Find $p(1/4 \le X \le 3/4)$. (iii) Find $p(X > 2/3)$.
   b) Define the Gamma Distribution and find its mean and variance. (7M)

4. a) Take 30 slips of paper and label five each with -4 and 4,four each with -3 and 3,three each with -2 and 2, and two each with -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 the variance of this distribution. (7M)
   b) Find the value of $F_{0.95}$ for $v_1 = 12$ *and* $v_2 = 15$ degrees of freedom. (7M)

5. a) A trucking firm is suspicious of the claim that the average lifetime of certain tires is at least 28,000 miles. To check the claim, the firm puts 40 of these tires on its trucks and gets a mean life time of 27, 463 miles with a standard deviation of 1, 348 miles. What can it conclude if the probability of a Type I error is to be at most 0.01? (7M)
   b) Explain procedure for one-way classification of analysis of variance. (7M)
~~~~~~

Code No: R1621011 **R16** SET - 1

6. a) The following are the measurements of the air velocity and evaporation coefficient of burning fuel droplets in an impulse engine: (7M)

Air velocity(cm/s) x	20	60	100	140	180	220	260	300	340	380
Evaporation coefficient (mm^2/s) y	0.18	0.37	0.35	0.78	.056	.075	1.18	1.36	1.17	1.65

Fit a straight line to these data by the method of least squares and use it to estimate the evaporation coefficient of a droplet when the air velocity is 190 cm/s.

b) Find the Correlation Coefficient for the following data: (7M)

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

7. Consider the following data taken on subgroups of size 5. The data contain 20 averages and ranges on the diameter (in millimeters) of an important component part of an engine. Display $\bar{X}$ and R Charts. Does the process appear to be in control? (14M)

Sample	$\bar{X}$	R	**Sample**	$\bar{X}$	R
1	2.3972	0.0052	**11**	2.3887	0.0082
2	2.4191	0.0117	**12**	2.4107	0.0032
3	2.4215	0.0062	**13**	2.4009	0.0077
4	2.3917	0.0089	**14**	2.3992	0.0107
5	2.4151	0.0095	**15**	2.3889	0.0025
6	2.4027	0.0101	**16**	2.4107	0.0138
7	2.3921	0.0091	**17**	2.4109	0.0037
8	2.4171	0.0059	**18**	2.3944	0.0052
9	2.3951	0.0068	**19**	2.3951	0.0038
10	2.4215	0.0048	**20**	2.4015	0.0017

<u>Note</u> :- Statistical tables and Control Chart Constants are required