Code No: RT21012 **R13** SET - 1

II B. Tech I Semester Supplementary Examinations, May/June - 2016
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 **THREE** Questions from **Part-B**
4. Statistical tables are required

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PART – A

1. a) Find the mean value of the of the random variable whose probability density function is given by $f(x, y) = \frac{3}{5}\ 10^{-5}\ x\ (100 - x),\ \ 0 \leq x\ \leq 100$
   b) Find the probability of getting a total of 5 at least once in three tosses of pair of fair dice?
   c) What is the probability that the average $\bar{X}$ will be between 75 and 78 if a random sample of size 100 taken from an infinite population has mean 76 and variance 256
   d) Write a sort note on types-I and type-II errors
   e) Prove that the arithmetic mean of the regression coefficient in greater than the correlation co-efficient
   f) Explain in brief mean chart

PART – B

2. a) Ten coins are tossed simultaneously, Find the probability of getting at least 7 heads. (8M)
   b) If a random Variable has a passion distribution such that $P(1) = P(2)$, find $P(4)$ (8M)

3. a) Suppose 2% of the people on the average are left handed. Find (8M)
   i) the probability of finding 3 or more left handed
   ii) the probability of finding ≤ 1 left handed
   b) Suppose the heights of American men are normally distributed with mean = 68 inches and standard deviation 2.5 inches. Find the percentage of people whose heights lie between i) 68 inches and 71 inches ii) at least 6 ft. (8M)

4. a) If $x_1, x_2, \ldots\ldots x_n$ are random observations on a Bernoulli variable X taking the value 1 with probability θ and the value 0 with probability $(1 - \theta)$, show that $\frac{\tau(\tau-1)}{n(n-1)}$ is an unbiased estimate of θ^2 where $\tau = \sum_{i=1}^{n} x_i$ (8M)
   b) If $x_1, x_2, \ldots\ldots x_n$ is a random sample from a normal population $N(\mu, 1)$ show that $t = \frac{1}{n}\sum_{i=1}^{n} {x_i}^2$ is an unbiased estimator of $\mu^2 + 1$ (8M)
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5. a) 400 articles from a factory are examined and 3% are found to be defective. Construct 95% confidence interval. (8M)

   b) A die is thrown 256 times and even digit turns up 150 times. Can we say that the die is unbiased? (8M)

6. a) Let the random variable X has the marginal density function $g(x) = 1, \frac{-1}{2} < x < \frac{1}{2}$ and let the conditional density of Y be $h\left(\frac{y}{x}\right) = 1,\ x < y < x+1$ $\frac{-1}{2} < x < 0 = 1,\quad -x < y < 1-x,\ 0 < x < \frac{1}{2}$ (8M)

   Show that the variables $X$and Y are uncorrelated

   b) If the random variable X is uniformly distributed in (0, 1) and $Y = X^2$, find (8M)

   i) $v = (y)$ ii) r_{xy}

7. A textile company wishes to implement a quality control programme on a certain garment with respect to the number of defects found in the final production. A garment was sampled on 33 consecutive hours of production. The number of defects found per garment is given hereunder (16M)

   Defects: 5,1,7,1,0,2,3,4,0,3,2,4,3,4,4,1,4,2,1,3,4,3,11,3,7,8,5,6,1,2,4,7,3.

   Compute the upper and lower 3-sigma control limits for monitoring the number of defects.