

Code: IT3T3

**II B.Tech - I Semester–Regular/Supplementary Examinations  
November 2016**

**PROBABILITY AND STATISTICS  
(INFORMATION TECHNOLOGY)**

Duration: 3 hours

Max. Marks: 70

**PART – A**

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1.

- a) In a single throw with two dice find the probability of throwing a sum which is a perfect square.
- b) Three students are chosen at random from a class consisting of 12 boys and 4 girls. Find the probability for three students chosen one after another in succession to be boys.
- c) If  $f(x) = \begin{cases} cx(2-x), & \text{if } 0 \leq x \leq 2 \\ 0, & \text{otherwise} \end{cases}$  find the value of  $c$ .
- d) Determine the binomial distribution for which the mean is 4 and variance 3.
- e) If  $x$  is a normal variate with mean 30 and standard deviation 5. Find the probability that  $x \geq 45$ .
- f) Find the value of the finite population correction factor for  $n = 10$  and  $N = 100$ .
- g) A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95% confidence?
- h) Define Critical Region.

- i) If sample size  $n = 144$ , standard deviation  $\sigma = 4$  and the mean = 150, find 95% confidence interval for  $\mu$ .
- j) Write formula for  $\chi^2$  test for goodness of a fit.
- k) What is the significance of ANOVA?

## PART – B

Answer any **THREE** questions. All questions carry equal marks.

3 x 16 = 48 M

2.

- a) Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each draw. Find the probability that (i) both are white (ii) first is red and second is white. 8 M

- b) A continuous random variable has the probability density

$$f(x) = \begin{cases} kxe^{-\lambda x}, & \text{for } x \geq 0, \lambda > 0 \\ 0, & \text{otherwise.} \end{cases}$$

function

Determine: i) k ii) mean iii) variance. 8 M

3.

- a) 20% of items produced from a factory are defective. Find the probability that in a sample of 5 chosen at random 8 M

i) none is defective    ii) one is defective    iii)  $P(1 < x < 4)$

- b) A manufacturer of cotter pins knows that 5% of his product is defective. Pins are sold in boxes of 100. He guarantees that not more than 10 pins will be defective.

What is the approximate probability that a box will fail to meet the guaranteed quality? 8 M

4.

a) A population consists of five numbers 6, 8, 10, 12 and 14. If all samples of size 2 are drawn from this population with replacement. Find, (i) The total number of samples with replacement (ii) the mean of the population (iii) The standard deviation of the population (iv) The mean of the sampling distribution of means (v) The standard deviation of the sampling distribution of means (i.e., standard error of means). 8 M

b) A sample of size 10 was taken from a population standard deviation of sample is 0.03. Find the maximum error with 99% confidence. 8 M

5.

a) In a big city 325 men out of 600 men were found to be smokers. Does this information supports the conclusion that the majority of men in this city are smokers? (at 5% level of significance) 8 M

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 upto the standard? (at 5% level of significance) 8 M

6.

a) Pumpkins were grown under two experimental conditions. Two random samples of 11 and 9 pumpkins,

show the sample standard deviations of their weight as 0.8 and 0.5 respectively. Assuming that the weight distributions are normal, test hypothesis that the true variances are equal. 8 M

b) Three different machines are used for a production. On basis of the outputs, test whether the machines are equally effective (one-way). 8 M

Outputs		
Machine 1	Machine 2	Machine 3
10	9	20
5	7	16
11	5	10
10	6	4