B.Tech II Year I Semester (R13) Supplementary Examinations June 2016

PROBABILITY & STATISTICS

(Common to CSE and IT)

(Use of statistical tables is permitted in the examination hall)

Time: 3 hours Max. Marks: 70

PART – A

(Compulsory Question)

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1 Answer the following: (10 X 02 = 20 Marks)

(a) If A and B are two events such that $P(A) = \frac{1}{3}, P(B) = \frac{3}{4}$ and $P(A \cup B) = \frac{11}{12}$. Find $P(A/B)$ and $P(B/A)$.

(b) State Baye's theorem of probability.

(c) If X is a discrete random variable, then prove that $v(ax + b) = a^2 v(x)$, where $v(x)$ is variance of X and a, b are constants.

(d) Find the mean and variance for the following probability distribution.

x:	-3	6	9
p(x):	1/6	½	1/3

(e) For the continuous probability function $f(x) = K\,x^2\,e^{-x}$ when $x \geq 0$, $find\ K$.

(f) If a random variable has a Poisson distribution such that P(1) = P(2), find mean of the distribution.

(g) Define Null hypothesis and alternative hypothesis.

(h) What is test statistic,'t' to test the difference of means for small samples?

(i) Suppose the inter arrival time is 15 min and inter service time is 10 min, find the traffic intensity.

(j) If $\lambda = 8\ and\ \mu = 12$ per hour, find the average time spent by a customer in the system.

PART – B

(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

2 In a bolt factory machine A, B and C manufacture respectively 25%, 35% and 40% of the total of their output 5, 4, 2 percents are defective bolts. A bolt is drawn at random from the product and is found to be defective. What are the probabilities that it was manufactured by machines A, B and C?

OR

3 (a) The probability that John hits a target is ½. He tires 6 times, find the probability that he hits the target: (i) Exactly 2 times. (ii) At least once.

(b) Suppose the weights of 800 male students are normally distributed with mean $\mu = 140$ pounds and standard deviation 10 pounds. Find the number of students whose weights are: (i) Between 138 and 148 pounds. (ii) More than 152 pounds.

UNIT – II

4 (a) A random sample of size 100 is taken from a population with $\sigma = 5.1$. Given that the sample mean $\overline{x} = 21.6$. Construct 95% confidence interval for the population mean μ.

(b) Samples of two types of electric light bulbs were tested for length of life and following data were obtained:

Type – I	Type – II
Sample size , $n_1 = 8$	$n_2 = 7$
Sample mean, size , $\overline{x} = 1234$ hrs	$\overline{y} = 1036$ hrs
Sample standard deviation(S.D), $s_1 = 36$ hrs	$s_2 = 40$ hrs

Is the difference in the means sufficient to warrant that Type – I is superior to Type – II regarding length of life.

OR

5 (a) In two independent samples of sizes 8 and 10 the sum of squares of deviations of the sample values from the respective sample means were 84.4 and 102.6. Test whether the difference of variances of the populations is significant or not. Use a 0.05 level of significance.

(b) From the following data, find whether there is any significant linking in the habit of taking soft drinks among the categories of employees.

Soft drinks	Employees		
	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumsup	15	30	65
Fanta	50	60	30

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UNIT – III

6 Explain the meaning of ANOVA. Describe briefly the technique of ANOVA for two-way classification.

OR

7 A manager of a Merchandizing firm wishes to test its three sales man A, B, C tend to make sales of the same size or whether they differ in their selling abilities. During a week there have been 14 sale calls; A made 5 calls, B made 4 calls and C made 5 calls. Following are the weekly sales record (in Rs.) of the three salesmen.

A	500	400	700	800	600
B	300	700	400	600	-
C	500	300	500	400	300

Perform the analysis of variance and draw your conclusion.

UNIT – IV

8 Discuss the basic principles underlying control charts. Explain in brief how control limits are determined for: (i) $\overline{X}$ – Chart. (ii) R – Chart.

OR

9 The table below gives the sample means and ranges for ten samples, each of size 5. Construct the control charts for mean and range and test whether the process is in control or not by drawing the charts.

Mean ($\overline{X}$)	4.98	4.92	5.02	4.98	4.98	5.08	5.04	4.95	4.95	4.92
Range (R)	0.3	0.2	0.4	0.1	0.4	0.2	0.7	0.4	0.4	0.5

UNIT – V

10 Discuss $(M/M/1) : (\infty/FCFS)$ queuing model and find the variance of customers in the system.

OR

11 Customers arrive at a one window drive in bank according to a Poisson distribution with mean 10 per hour. Service time per customer is exponential with mean 5 minutes. The car space in front of the window including that for the serviced can accommodate a maximum of 3 cars. Other cars can wait outside the space.

(a) What is the probability that an arriving customer can drive directly to the space in front of the window?
(b) What is the probability that an arriving customer will have to wait outside the indicated space?
(c) How long an arriving customer expected to wait before starting service?

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