

B.Tech II Year II Semester (R13) Regular Examinations May/June 2015

**PROBABILITY & STATISTICS**

(Common to CE, ME &amp; IT)

Time: 3 hours

Max. Marks: 70

Part – A

(Compulsory question)

- 1 Answer the following: (10 X 02 = 20 Marks)
- (a) If  $P(A) = \frac{7}{3}$ ,  $P(B) = \frac{9}{13}$  and  $P(A \cap B) = \frac{4}{13}$  find  $P\left(\frac{A}{B}\right)$ .
- (b) The chances of three students A, B and C solving a problem given in mathematics Olympiad are  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$  respectively. What is the probability of the problem being solved?
- (c) A sample of size 10 and standard deviation 0.03 is taken from a population. Find the maximum error with 99% confidence.
- (d) Give contingency table for two attributes A and B write the expected frequencies.
- (e) Write basic principle of ANOVA.
- (f) Write short note on Latin square design.
- (g) What are causes of variations?
- (h) What are the  $3\sigma$  control limits for  $\bar{X}$ - chart?
- (i) Write Kendall's notation for representing queuing model.
- (j) What is the expected waiting time of a customer who has to wait?

Part – B

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

**UNIT – I**

- 2 (a) State and prove additive law of probability.
- (b) Each of the identical boxes  $B_1$ ,  $B_2$  and  $B_3$  contains two coins;  $B_1$  contains both gold coins,  $B_2$  both silver coins and  $B_3$  contains one gold and one silver coins. If a box is chosen at random and a coin is picked at random & if the coin is gold, what is the probability that the other coin in the box is also of gold.

(OR)

- 3 Derive mode of the normal distribution.

**UNIT – II**

- 4 (a) Show that  $S^2$  is an unbiased estimator of the parameter  $\sigma^2$ .
- (b) The mean and standard deviation of a population are 225 and 278 respectively. What can we assert with 95% confidence about the maximum error if  $\bar{X} = 225$  and  $n = 100$ ?

(OR)

- 5 Two random samples gave the following results:

Sample	Size	Sample mean	Sum of squares of deviations from the mean
1	10	15	90
2	12	14	108

Check whether the samples came from the same normal population.

**UNIT – III**

- 6 The following table shows the result of a sock length felting shrinkage experiment, the figures being percentage shrinkage after treatment in a wash wheel. The wash wheel takes four socks at a time and so the results are divided into six groups of four, corresponding to the six different runs on the machine. There are six runs so that 24 socks are tested in all. The division of socks into groups of four was done at random perform ANOVA then.

		Run number					
Socks	1	2	3	4	5	6	
1	9.5	4.3	6.5	6.1	10.0	9.3	
2	8.8	7.8	8.3	7.3	4.8	8.7	
3	11.4	3.2	8.6	4.2	5.4	7.2	
4	7.8	6.5	8.2	4.1	9.6	10.1	
Total	37.5	21.8	31.6	21.7	29.8	35.3	

(OR)

- 7 Set up the analysis of variance table for two-way ANOVA.

**UNIT – IV**

- 8 (a) List the advantages of S. Q. C.  
(b) What is control chart? Explain.

(OR)

- 9 A company manufactures screws to a nominal diameter  $0.500 \pm 0.030$  cm. Five samples were taken random from the manufactured lot and three measurements were taken on each sample at different lengths. The readings are

Measurement per sample x (in cm)			
Sample No	1	2	3
1	0.488	0.489	0.505
2	0.494	0.495	0.499
3	0.498	0.515	0.487
4	0.492	0.509	0.514
5	0.490	0.508	0.499

Calculate control limits on  $\bar{X}$  and on R then draw charts for  $\bar{X}$  and R.

**UNIT – V**

- 10 (a) What is queuing theory problem? Explain.  
(b) If for a period of 2 h in a day (8 – 10 am) trains arrive at the yard every 20 min, but the service time continues to remain 36 min and then calculate average queue length on the assumption that the time capacity of the yard is limited to 4 trains only.

(OR)

- 11 Explain (M/M): ( $\infty$ /FCFS) queuing model and find the expected line length  $E(L_s)$ .

\*\*\*\*\*