

B.Tech II Year II Semester (R13) Supplementary Examinations May/June 2017

**PROBABILITY & STATISTICS**

(Common to CE &amp; ME)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

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

- Mean and variance of binomial distribution is 4 and  $\frac{4}{3}$ . Find n and p.
- If X is normally distributed with mean 12 and standard deviation 4 then find the probability if  $X \geq 20$ .
- Define critical region.
- Write the properties of t-distribution.
- Write a short note on analysis of variance.
- Define R.B.D.
- Define statistical quality control.
- Define the terms "chance causes and assignable causes".
- Define traffic intensity.
- Write the characteristics of queuing theory.

**PART – B**

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

**UNIT – I**

- Derive mean and variance of binomial distribution.
  - A car hire firm has two cars, which it hires out day by day. The number of demands for a car on each day is distributed as a Poisson distribution with mean 1.5. Calculate the proportion of days on which:
    - Neither car is used.
    - The proportion of days on which some demand is refused?

**OR**

- Write chief characteristics of normal distribution.
  - The mean yield for one-acre plot is 662 kilos with a s.d. 32 kilos. Assuming normal distribution, how many one-acre plots in a batch of 1,000 plots would you expect to have yield:
    - Over 700 kilos.
    - Below 650 kilos.
    - What is the lowest yield of the best 100 plots?

**UNIT – II**

- In a sample of 1000 people in Maharashtra, 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in this state at 1% level of significance?
  - A cigarette manufacturing firm claims that its brand A of the cigarettes outsells its brand B by 8%. If it is found that 42 out of a sample of 200 smokers prefer brand A and 18 out of another random sample of 100 smokers prefer brand B, test whether the 8% difference is valid claim.

**OR**

- The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that the average height is greater than 64 inches? Test at 5% significance level assuming that for 9 degrees of freedom  $P(t > 1.83) = 0.05$ .
  - From the following data, find whether there is any significant liking in the habit of taking soft drinks among the categories of employees.

Soft Drinks	Clerks	Teachers	Officers
Pepsi	10	25	65
Thumpsup	15	30	65
Fanta	50	60	30

**UNIT – III**

- 6 Set up an analysis of variance table for the following per acre production data for three varieties of wheat, each grown on 4 plots and state if the variety differences are significant.

Plot of Land	Per Acre Production Data		
	Variety of Wheat		
	A	B	C
1	6	5	5
2	7	5	4
3	3	3	3
4	8	7	4

**OR**

- 7 Explain various steps involved in the analysis of Latin Square Design.

**UNIT – IV**

- 8 Five samples of four items each were taken at random at an interval of one hour each. Find mean and ranges for the following data then draw  $\bar{x}$  chart range chart and give your comment. ( $A_2 = 0.729$ ;  $D_1 = 0$ ;  $D_4 = 2.28$  for sample size  $n = 4$ ).

Sample No	Weight of part (gms)			
1	10	12	10	12
2	10	12	13	13
3	10	10	9	11
4	11	10	9	14
5	12	12	12	12

**OR**

- 9 (a) An inspection of 10 samples of size 400 each from 10 lots revealed the following number of defective items. 17, 15, 10, 26, 10, 7, 19, 12, 9, 15. Draw the np-chart and give your comment.  
 (b) A set of 5 assemblies of 15 sub-groups.

Group No.	No. of defects	Group No.	No. of defects
1	75	9	47
2	64	10	77
3	75	11	59
4	45	12	57
5	93	13	84
6	55	14	40
7	49	15	95
8	65	-	-

Draw a suitable chart and give your comment.

**UNIT – V**

- 10 Explain (M / M / 1): ( $\infty$  / FCFS) Queuing model.

**OR**

- 11 (a) Define Queue Behavior.  
 (b) A self service canteen employs one cashier at its counter. 8 customers arrive per every 10 minutes on an average. The cashier can serve on an average one per minute. Assuming that the arrivals are Poisson and the service time distribution is exponential. Find: (i) The average number of the customers in the system. (ii) The average queue length. (iii) Average time a customer spends in the system. (iv) Average waiting time of each customer.

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