CT_FA-2_Question Bank-24-25

Sr.	Question
	Unit-III: Sampling and Hypothesis Testing

1 Explain what is sampling process and types of sampling. Give one example of,
i)Random sampling ii) systematic sampling iii) cluster sampling iv) snowball sampling v) purposive vi) quota sampling

2 Mice with an average lifespan of 32 months will live up to 40 months when fed by a certain nutritious food. If 64 mice fed on this diet have an average lifespan of 38 months and standard deviation of 5.8 months, is there any reason to believe that average lifespan is less than 40 months at 1% l.o.s? (Given: $z = -2.33$)

3 In a Mathematics examination, 6 students scored the following marks 52, 70, 42, 62, 36, 50. Test the hypothesis that the average score is 51 for the exam at 1% l.o.s. (Given: $t_{5,0.01} = 3.365$)

4 The lifetime (in months) of an item for a random sample of 8 from a large consignment is, 4.2, 4.6, 3.9, 4.1, 5.2, 3.8, 3.9, 4.3. Can we accept the hypothesis at 5% l.o.s that the average life time of item is 4 months? (Given: $t_{7,0.025} = \pm 2.365$)

5 An auditor claims that he takes on an average 10.5 days to file income tax returns. Can this claim be accepted if a random sample of 8 shows that he took 13, 19, 15, 10, 12, 11, 14, 18 days to file I.T. returns at $\alpha = 5\%$ l.o.s? (Given: $t_{7,0.05} = 1.895$)

6 A hospital utilizes four teller windows to render fast service to the patients. On a particular day 800 patients were observed and given service at different windows, (Given: $\chi^2_{0.05} = 7.815$)

Window no	1	2	3	4
No of patients	150	250	230	170

Test whether the patients are uniformly distributed over the windows at 5% level of significance.

7 The following table of frequencies of seeds were observed in an experiment on pea breeding:
(Given : $x^2_{3,0.05} = 7.815$)

Round and Green	Wrinkled and Green	Round and Yellow	Wrinkled and Yellow
316	102	109	33

Theory predicts that the frequencies should be in proportion 9:3:3:1. Examine the correspondence between theory and experiment at 5% level of significance.

8 The demand for a particular spare part in a factory was found to vary from day to day. In a sample study the following information was obtained:

Days:	Mon.	Tues.	Wed.	Thurs	Fri.	Sat.
No. of Parts Demanded:	24	21	17	20	23	15

Test the hypothesis that the number of parts demanded does not depend on the day of the week at 5% level of significance. [Given: $\chi^2_{5,0.05} = 11.07$]

9 Perform one-way analysis of variance (ANOVA) to determine if there is a significant difference in the means of 3 sets given below at 5% l.o.s: (Given: $\square_{2,9} = 4.26$)

A	8	5	9	6
B	6	5	8	5
C	9	6	10	7

10 Perform one-way analysis of variance (ANOVA) to determine if there is a significant difference in the means of 3 sets given below at 5% l.o.s: (Given: $F_{2,9} = 4.26$)

A	7	8	5	9	6
B	4	6	5		
C	5	7	4	8	

11	Three types of fertilizers are used on three groups of plants for 5 weeks. We want to check if there is a difference in the mean growth of each group. Using the data given below apply a one way ANOVA test at 0.05 significant level. Given F(0.05, 2, 15) = 3.68

Fertilizer 1	6	8	4	5	3	4
Fertilizer 2	8	12	9	11	6	8
Fertilizer 3	13	9	11	8	7	12

12	Make analysis of variance for following data, (Given: for dof $v_1 = 2, v_2 = 6$ at 5% los, F=5.14)

A	8	10	6
B	7	4	10
C	13	9	8

Unit-IV: Transportation and Assignment Problems

1	Consider a problem of allocating rental cars. For simplicity, generic locations will be used and the cars are assumed to be fungible (any car can be substituted for any other car). There is also a storage cost to keep an unwanted car at an origin location which must be accounted for. The base problem given is: Sites A, B, and C have 8, 12, and 10 cars on site, while Destinations X, Y, and Z require 9, 7, and 11 cars respectively. The storage cost for each site is 100, 100, and 80. The cost to move the cars between sites is shown in the table:

Site\Destination	X	Y	Z
A	460	350	640
B	510	420	350
C	480	620	530

Formulate Transportation as LP model to minimize the total transportation cost.

2	Determine an initial basic feasible solution to the following transportation problem by using i.North West Corner method (NWCM) ii. Least cost method (LCM)

	D_1	D_2	D_3	Supply
S_1	6	4	9	200
S_2	10	5	8	175
S_3	12	7	6	75
Demand	250	100	150	

3	Determine an initial basic feasible solution to the following transportation problem by using i.North West Corner method (NWCM) ii. Least cost method (LCM)

	D_1	D_2	D_3	Supply
S_1	2	3	1	30
S_2	5	4	8	40
S_3	5	6	8	20
Demand	20	50	20	

4	Determine an initial basic feasible solution to the following transportation problem by using Vogel's Approximation method (VAM).

	D_1	D_2	D_3	D_4	Supply
S_1	11	13	17	14	250
S_2	16	18	14	10	300
S_3	21	24	13	10	400
Demand	200	225	275	250	

5 Test the Optimality for given initial basic feasible solution of Transportation Problem using Modified Distribution (MODI) Method. Hence find the optimal solution.

	D_1	D_2	D_3	D_4	Supply
S_1	19 (5)	30	50	10 (2)	7
S_2	70	30	40 (7)	60 (2)	9
S_3	40	8 (8)	70	20 (10)	18
Demand	5	8	7	14	

[Numbers in ( ) represents number of allocation for respective S_i/D_j]

6 Test the Optimality for given initial basic feasible solution of Transportation Problem using Modified Distribution (MODI) Method. Hence find the optimal solution.

	D_1	D_2	D_3	Supply
S_1	6 (10)	3 (12)	5	22
S_2	5	9	2(15)	15
S_3	4(6)	7	8 (2)	8
Demand	16	12	17	

7 Test the Optimality for given initial basic feasible solution of Transportation Problem using Modified Distribution (MODI) Method. Hence find the optimal solution.

	D_1	D_2	D_3	D_4	Supply
S_1	6	3 (12)	5 (1)	4(9)	22
S_2	5	9	2(15)	7	15
S_3	5(7)	7	8(1)	6	8
Demand	7	12	17	9	

8 Test the Optimality for given initial basic feasible solution of Transportation Problem using Modified Distribution (MODI) Method. Hence find the optimal solution.

	D_1	D_2	D_3	D_4	Supply
S_1	6	5 (28)	8	5 (2)	30
S_2	5 (35)	11	9	7 (5)	40
S_3	8	9	7 (32)	13 (18)	50
Demand	35	28	32	25	

[Numbers in ( ) represents number of allocation for respective S_i/D_j]