

Register Number	7	3	2	9	2	1	C	S	R	O	1	7
VELALAR COLLEGE OF ENGINEERING AND TECHNOLOGY												
(An Autonomous Institution, Affiliated to Anna University, Chennai)												
Continuous Assessment Test – 2				QP Set			1		Regulations -2021			
Programme:	B.E/B.TECH		Date:	10.05.2023	Max. Marks:	60	Duration	2 Hrs				
Class:21CS4A&B	Time: 10.30 am to 12.30pm											
Course Code & Title:	21MAT45 – PROBABILITY AND STATISTICS											
Knowledge Levels (KL)	K1 - Remembering			K3 - Applying			K5 - Evaluating					
	K2 - Understanding			K4 - Analyzing			K6 - Creating					
(Use of Statistical tables permitted)												

Part A - Answer ALL Questions.

12 × 2 = 24 Marks

No.	Question	CO	KL
1.	State any two properties of t-distribution.	CO3	K1
2.	State the conditions under which chi-square test of goodness of fit is valid.	CO3	K1
3.	State the basic principles of experimental design.	CO4	K1
4.	What are the basic assumptions in analysis of variance?	CO4	K1
5.	Write down the ANOVA table for one-way classification.	CO4	K1
6.	Compare and contrast Latin Square design and Randomized block design.	CO4	K2
7.	Why a 2x2 Latin square design is not possible? Explain.	CO4	K2
8.	Distinguish between Chance variation and Assignable variation.	CO5	K1
9.	Explain briefly the types of Control Charts for attributes.	CO5	K1
10.	Mention any two uses of Statistical quality control.	CO5	K1
11.	Mention any two practical situations where C-chart is needed.	CO5	K1
12.	During an examination of equal length of cloth, the following are the number of defects observed: 2, 3, 4, 0, 5, 6, 7, 4, 3, 2. Draw a control chart for the number of defects and comment whether the process is under control or not	CO5	K3

Part B - Answer ALL Questions.

3 × 12 = 36 Marks

No.	Question	Marks	CO	KL
13.	a) i) Ten oil tins are taken at random from an automatic machine. The mean weight of the tins is 15.8 kg and standard deviation is 0.5 kg. Does the sample mean differ significantly from the intended weight of 16 kg?	6	CO3	K3
	ii) The following data gives the number of aircraft accidents that occurred during the various days of a week. Find whether the accidents are uniformly distributed over the week.	6	CO3	K3

Days:	Sun	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents :	14	16	8	12	11	9	14

OR

b) (i)	A group of 10 rats fed on diet A and another group of 8 rats fed on diet B, recorded the following increase in weight.	6	CO3	K3
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Diet A:	5	6	8	1	12	4	3	9	6	10
Diet B:	2	3	6	8	10	1	2	8		

Find if the variances are significantly different.

(ii)	In a certain sample of 2000 families, 1400 families are consumers of tea. Out of 1800 hindu families, 1236 families consume tea. Use chi square test and state whether there is any significant difference between consumption of tea among hindu and non-hindu families.	6	CO3	K3
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14. a) (i) A Company appoints 4 salesman A,B,C,D and observes their sales in three seasons. The figures (in lakhs of rupees) are given in the following table. 12 CO4

Season	Salesman A	Salesman B	Salesman C	Salesman D
Summer	45	40	38	37
Winter	43	41	45	38
Monsoon	39	39	41	41

Perform a Two-way classification to the following data. (Use coding method subtract 40 from the given numbers)

OR

- b) (i) Analyze the variance in the latin square of yields (in kgs) of paddy where P,Q,R,S denote the different methods of cultivation. 12 CO4

S122 P121 R123 Q122
Q124 R123 P122 S125
P120 Q119 S120 R121
R122 S123 Q121 P122

Examine whether the different methods of cultivation have given significantly different yields. (Use coding method subtract 120 from the given numbers)

15. a) (i) The following data gives the measurements of the axles of bicycle wheels. 12 samples were taken so that each sample contains the measurements of 4 axles. Draw the control charts for mean and range and comment on the state of control. 12 CO5

SAMPLE NO	1	2	3	4	5	6	7	8	9	10	11	12
VALUES OF X	139	140	142	136	145	146	148	145	140	140	141	138
	140	142	136	137	146	148	145	146	139	140	137	140
	145	142	143	142	146	149	146	147	141	139	142	144
	144	139	141	142	146	144	146	144	138	139	139	138

OR

- b) (i) An inspection of 10 samples of size 400 each from 10 lots revealed the following number of defective units: 17, 15, 14, 26, 9, 4, 19, 12, 9, 15. Calculate control limits for the number of defective units. Plot the control limits and the observations and state whether the process is under control or not. 6 CO5 K3

- (ii) The data given below are the number of defectives in 10 samples of 100 items each. Construct a p-chart and comment on the results: 6 CO5 K3

Sample No	1	2	3	4	5	6	7	8	9	10
No. of defectives	6	16	7	3	8	12	7	11	11	4
