Reg. No.											

Question Paper Code	11728

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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Second Semester

Computer Science and Business Systems

20BSMA203 - STATISTICAL METHODS WITH LABORATORY

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Write the properties of coefficient of correlation.	*2,K1,CO1*
2.	The coefficient of correlation between two variables X and Y is 0.48. The covariance is 36. The variance of X is 16. Find the standard deviation of Y.	*2,K2,CO1*
3.	Mention the properties of good estimator.	*2,K1,CO1*
4.	Define Sufficient estimator.	*2,K1,CO1*
5.	Define is Null and alternate hypothesis	*2,K1,CO3*
6.	Define parameter and statistic.	*2,K1,CO3*
7.	What are the advantages of Non Parametric test	*2,K1,CO4*
8.	What adjustment to be done for tie values to find rank correlation?	*2,K1,CO4*
9.	Write two examples of time series.	*2,K1,CO5*
10.	Write down the components of time series	*2,K1,CO5*

PART - B (5 × 16 = 80 Marks)

Answer ALL Questions

11. a) The heights of mothers and daughters in inches are given in the following table. Find the regression lines and also find the correlation coefficient. Estimate height of the daughter when the height of the mother is 64.5 inches, *16,K3,CO1*

Height of the mother	62	63	64	64	65	66	68	70
Height of the daughter	64	65	61	69	67	68	71	65

OR

b) Four farmers each used four types of manures for a crop and obtained the yields(in quintals) as below: *16,K3,CO1*

Treatments					
		1	2	3	4
Farmers	A	22	16	21	12
	B	23	17	19	13
	C	21	14	18	11
	D	22	15	19	10

If there any significant difference between i) farmers ii) manures.

12. a) (i) Find the maximum likelihood estimate for the parameter λ of a Poisson distribution on the basis of a sample size n. *12,K3,CO2*

(ii) Show that sample mean $\bar{X}$ is an unbiased estimator of the population mean μ. *4,K3,CO2*

OR

b) (i) Show that $\bar{X}$ is consistent estimator of μ in $N(\mu, \sigma^2)$. *12,K3,CO2*

(ii) In a study of an automobile insurance a random sample of 80 body repair costs had a mean of Rs.472.36 and the Standard Deviation of Rs.62.35. If $\bar{X}$ is used as a point estimate to the true average repair costs, with what confidence we can assert that the maximum error doesn't exceed Rs.10. *4,K3,CO2*

13. a) (i) A survey of 320 families with 5 children revealed the following distribution: *10,K3,CO3*

No. of boys:	0	1	2	3	4	5
No. of girls:	5	4	3	2	1	0
No. of families:	12	40	88	110	56	14.

Is this result consistent with the hypothesis that male and female births are equally probable?

(ii) A certain stimulus administered to each of 12 patients resulted in the following change in blood pressure (B.P) 5, 2, 8, -1, 3, 0, -2, 1, 5, 0, 4, 6. Can it be concluded that the stimulus will in general be accompanied by an increase in blood pressure *6,K3,CO3*

OR

b) (i) State and Prove Neymann- Pearson Lemma. *12,K3,CO3*

(ii) Before an increase in excise duty on tea, 800 people out of a sample of 1000 were consumers of tea. After the increase in duty, 800 people were tea drinkers in a sample of 1200 people. Find whether there is a significant decrease in the consumption of tea after the increase in excise duty. *4,K3,CO3*

14. a) (i) In a study of sedimentary rocks, the following data were obtained from samples of 32 grains from two kinds of sand : *10,K3,CO4*

Sand I : 63 17 35 49 18 43 12 20 47 136
51 45 84 32 40 44 25

Sand II 113 54 96 26 39 88 92 53 101 48 89
107 111 58 62

Apply Mann-Whitney U test with suitable null and alternative Hypotheses.

(ii) In an industrial production line items are inspected periodically for defectives. The following is a sequence of defectives items (D) and non- defective items (N) produced by these production line. *6,K3,CO4*

DD NNN D NN DD NNNNN DDD NN D NNNN D N D

Test whether the defectives are occurring at random or not at 5% level of significance.

OR

b) (i) The following data show the employee's rates of defective work before and after a change in the wage incentive plan. Compare the following two sets of data to see whether the charge lowered the defective units produced. Using the sign test with 1 % level of significance. *8,K3,CO4*

Before	8	7	6	9	7	10	8	6	5	8	10	8
After	6	5	8	6	9	8	10	7	5	6	9	8

(ii) Apply the K-S test to check that the observed frequencies match with the expected frequencies which are obtained from Normal distribution. (Given at n=5, D(0.01)=0.510) *8,K3,CO4*

Test Score	: 25-30	31-36	37-42	43-48	49-54	55-60	61-66
Obs. Freqency :	9	22	25	30	21	12	6
Exp. Frequency:	6	17	32	35	18	13	4

15. a) Find the seasonal variation by the ratio to trend method from the data given below. *16,K3,CO5*

Year	I Quarter	II Quarter	III Quarter	IV Quarter
1994	60	80	72	68
1995	68	104	100	88
1996	80	116	108	96
1997	108	152	136	124
1998	160	184	172	164

OR

b) Derive ARIMA model equation of order (p,q,d) *16,K3,CO5*