



Date: 28-04-2025

Dept. No.

Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

SECTION A – K1 (CO1)

Answer ALL the questions

(5 x 1 = 5)

1 Choose the correct answer:

- a) What is the null hypothesis (H_0)?
 - A. The hypothesis that we are trying to prove.
 - B. The hypothesis that we are trying to disprove.
 - C. The hypothesis that there is no difference between the groups.
 - D. The hypothesis that there is a difference between the groups.
- b) Which of the following non-parametric tests is used to test the independence of two categorical variables?
 - A. Kruskal-Wallis test
 - B. Wilcoxon signed-rank test
 - C. Spearman's rank correlation coefficient
 - D. Chi-square test
- c) Partial correlation measures the relationship between two variables while controlling for the effects of:
 - A. A third variable.
 - B. Multiple variables.
 - C. No other variables.
 - D. All other variables.
- d) The normal equations derived from a multiple regression model are used to:
 - A. Estimate the standard errors of the coefficients.
 - B. Calculate the R-squared value.
 - C. Determine the significance of the model.
 - D. Estimate the coefficients of the model.
- e) Moving averages are used to:
 - A. Measure the correlation between variables.
 - B. Forecast future values of a time series.
 - C. Determine the trend of a time series.
 - D. All of the above.

SECTION A – K2 (CO1)

Answer ALL the questions

(5 x 1 = 5)

2 Define the following:

- a) Power of the test.
- b) Parametric test.
- c) Partial Correlation.
- d) Adjusted R^2 .
- e) Seasonal variations.

SECTION B – K3 (CO2)

Answer any THREE of the following in 100 words each.

(3 x 10 = 30)

- 3 Explain the procedure for testing the significance of variability of two samples drawn from a normal population.
- 4 Compare the contrast parametric and non-parametric tests.
- 5 Explain the concepts of partial and multiple correlations.
- 6 Outline the tests conducted for testing multicollinearity.
- 7 Briefly explain the components of a time series.

SECTION C – K4 (CO3)

Answer any TWO of the following in 200 words each.

(2 x 12.5 = 25)

- 8 There are three main brands of a certain product. A set of 120 sales is examined and found to be allocated among four groups (A, B, C, and D) and three brands (I, II and III) as given below:

Brands	Groups			
	A	B	C	D
I	0	4	8	15
II	5	8	13	6
III	18	19	11	13

Using one-way ANOVA, test whether there is any significant difference in brand preference.

- 9 One thousand girls in a college were graded according to their I.Q. and the economic conditions of their homes. Use Chi-square test to find out whether there is any association between economic conditions at home and the I.Q. of the girls:

Economic Conditions	I.Q.		
	High	Low	Total
Rich	100	300	400
Poor	350	250	600
Total	450	550	1000

- 10 The simple correlation coefficients between temperature(X_1), corn yield (X_2) and rainfall (X_3) are $r_{12}=0.59$, $r_{13}=0.46$ and $r_{23}=0.77$. Calculate the partial correlation coefficient $r_{12.3}$ and the multiple correlation coefficient $R_{1.23}$.

- 11 Given the following data on the heights of fathers and their sons:

Father's Height (inches)	68	72	70	65	75
Son's Height (inches)	70	74	72	68	76

Calculate the regression equation to predict a son's height based on his father's height.

SECTION D – K5 (CO4)

Answer any ONE of the following in 500 words

(1 x 15 = 15)

- 12 The following table shows the corresponding values of three variables X_1 , X_2 and X_3 . Find the least square regression equation of X_3 on X_1 and X_2 . Estimate X_3 when $X_1 = 10$ and $X_2 = 6$.

X_1 :	3	5	6	8	12	14
X_2 :	16	10	7	4	3	2
X_3 :	90	72	54	42	30	12

- 13 Illustrate the steps followed for Testing of Hypothesis.

SECTION E – K6 (CO5)**Answer any ONE of the following in 1000 words****(1 x 20 = 20)**

- 14 a. A researcher wants to investigate the relationship between the number of hours students study per week and their final exam scores. The following data was collected from a sample of 10 students:

Student	1	2	3	4	5	6	7	8	9	10
Hours Studied	10	12	8	15	5	13	7	11	9	14
Final Exam Score	85	92	78	98	65	89	72	87	80	95

Calculate Spearman's rank correlation coefficient to determine the relationship between hours studied and final exam scores. (10 marks)

- b. Two large samples, one of size 1000 and the other of size 800, were taken from two different populations. The sample means were found to be 85 and 92, respectively. The population standard deviations are known to be 15 and 18, respectively. Test the hypothesis that the population means are equal at a 5% level of significance. (10 marks)

- 15 The following data gives the figures of production ('000 qtls) of a sugar factory:

Year;	2011	2012	2013	2014	2015	2016	2017
Production ('000 qtls):	80	90	92	83	94	99	92

- a. Fit a straight-line trend to these figures. (15 marks)
- b. Plot these figures on a graph and show the trend line. (5 marks)
