[This question paper contains 4 printed pages.]

Sr. No. of Question Paper : 626 **Roll No............**

Name of the Course : **B.A. (H) Business Economics**

Name of the Paper : Econometrics Theory and Applications (OC) XXIII & XXIV (Group F(ii))

Semester : VI

Duration : 3 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **five** questions in all.
3. Q. No. **1** is compulsory.
4. Use of commercial calculators is allowed.
5. **All** questions carry equal marks.

1. Comment on the following giving sufficient reasoning. (4×3)

   (a) If a qualitative variable has n-categories, we should introduce (n+1) dummy variables to estimate the effect of each category.

   (b) Type II error is more serious than Type I error.

   (c) Mean of sampling distribution is always equal to the population mean.

   (d) In regression we try to minimize the sum of the squares of residuals.

2. (a) Prove that the OLS estimator of slope is linear and has minimum variance. (7)

P.T.O.

(b) You are given the following regression result (5)

$$Y_t = 16899 - 2978.5\ x_t$$
$$t = (8.5152) \qquad (-4.728)$$
$$R^2 = 0.6149$$

Find the sample size underlying the result.

3. (a) What are reciprocal models ? Give an example. What are the various shapes it can attain ? Discuss. (5)

(b) Given below is the relationship between income (Y) and advertising expenditure (X) for a sample of 21 firms.

Model 1: $Yi = 22.163 + 0.3631\ X_i$

$$S.E = (7.089) \qquad (.0971)$$
$$r^2 = 0.424$$

Model 2: $Y_i = 7.059 + 1.0847\ X_i - 0.0040\ X_i^2$

$$S.E = (9.986) \qquad (0.3699) \qquad (0.0019)$$
$$R^2 = 0.53$$

(i) Interpret model 2.

(ii) Is the addition of a variable incorporated in model II justified ? (Use F test) (3,4)

4. (a) What do you understand by the term Auto correlation ? How it detected and what is are the remedies for it ? Give one example of each. (5)

(b) The sale of refrigerators is given by the following function :

$$Y_t = 456.24 + 242.49\ D_{2t} + 325.26\ D_{3t} - 86.08\ D_{4t} + 2.773\ x_{t.}$$
$$t = (2.56) \qquad (3.69) \qquad (4.94) \qquad (-1.307) \qquad (4.4)$$
$$R^2 = 0.729$$

Where

Y_t = refrigerator sales in thousands rupees

X_t = Expenditure on durable goods in thousand rupees.

D_2 = 1 in quarter II, 0 otherwise

D_3 = 1 is Quarter III, 0 otherwise

D_4 = 1 in Quarter IV, 0 otherwise

(i) Interpret the model.

(ii) Write down the equations for sale of refrigerators in Quarter I, II, III & IV.

(iii) How would you alter the model to introduce interaction effects between the quarterly dummy and expenditure on durable goods ? (2,4,1)

5. (a) Show what happens to the regression coefficients of explanatory variables if there is perfect collinearity amongst them. (5)

(b) Given the following regression model :

$$Y_t = \beta_1 + \beta_2 X_{2t} + \beta_3 X_{3t} + \beta_4 X_{4t}$$

Where Y = demand for petrol in liters

X_2 = price of petrol in Rupees

X_3 = price of diesel in Rupees

X_4 = Income of consumer in Rupees.

The following results were obtained

$$Y = 732 - 0.65\ X_2 + 0.73\ X_3 + 23.2\ X_4$$

$$t = (0.76) \quad (-0.032) \quad (.056) \quad (2.06)$$

$$R^2 = 0.72$$

(i) Interpret the model.

(ii) What is the likely problem in the model ? What are its causes ?

(iii) Suggest a remedy for the problem. (2,3,2)

6. Write short notes on any **three** :

(i) JB Test of normality

(ii) R^2 vs Adjusted R^2

(iii) Regression through the origin

(iv) Double log models (3×4)