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Your Roll No.....

Sl. No. of Question Paper : 9576

Unique Paper Code : 12481402

Name of the Paper : Basic Econometrics

Name of the Course : B.A. (Hons) Business Economics,
2018 (CBCS)

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

Write your Roll No. on the top immediately on receipt of this question paper.

Attempt five questions in all.

Question 1 is compulsory.

Use of Non Scientific Calculator and mathematical tables is permitted. Please note that in case any assumptions are made while attempting a problem, the same must be stated clearly.

Comment whether the following statements are true or false. Give reason or explanation for the same in 2-3 sentences (Attempt any five)

P.T.O

- (a) One of the assumptions of OLS is that the both the parameter and disturbance term must be normally distributed.
- (b) Dummy variables can also be used for Quantitative data.
- (c) Omission of a variable is more serious econometric problem than the inclusion of unnecessary variable.
- (d) Adjusted R square can never be higher than R Square.
- (e) 'ρ' of coefficient of autocorrelation must be around '0' for no autocorrelation.
- (f) In a regression line, there are always as many points above the fitted line as there are below it.
- (g) The term 'unrestricted' under Wald 'F' test means no restriction on the value to be taken by the parameters of the model.
- (h) For calculating the price elasticity of demand, we use the Lin-Log model.

(5×3=15)

2. The following regression model was established between Demand for a monthly Professional Programme (in terms of number of applications) as a function of percentile obtained by candidates in entrance exam & fees charged (in rupees); following are the results for a 5 year (60 months)

period); $R^2 = 0.99$, d computed (DW) = 1.22

The Final equation was

$$\ln DD_{mgt} = 5.3 - 1.33 \ln \text{percentile} - 0.29 \ln \text{fees} + u_t$$

S.E (0.33) (1.43) (0.26)

(DW table at 5%, $dL = 1.383$, $dU = 1.45$ for $n = 60$)

- (i) Compute 't' statistic for the coefficients for the independent variables and comment on the same in terms of their significance, sign of the coefficient and the functional form.
- (ii) Compute 'ρ' (coefficient of autocorrelation)
- (iii) The researcher commented that the regression suffered from positive autocorrelation. Do you agree with his statement. Show the basic steps for removal of autocorrelation taking the help of coefficient of autocorrelation.
- (iv) What additional problem(s) you are able to detect in the regression? Also can you provide a quick remedy to such problem(s).
- (v) Prove that $\text{Cov}(\hat{\beta}_1, \hat{\beta}_2) = -\bar{X} \text{Var} \hat{\beta}_2$ (4,2,3,3,3)

Demand for housing in a city (DD_H) is found to be a function of different variables, a survey of 100 cities was conducted and the following equation was tested :

$DD_H = \beta_1 + \beta_2 \text{ Population Density} + \beta_3 \text{ Value} + \beta_4 \text{ Income}$
 $+ \beta_5 \text{ Land Area} + \beta_6 \text{ Class of Employment} + \beta_7 \text{ Tax}$
Benefits on Housing loan; $n = 30, R^2 = 0.27$.

- (a) How would you test the hypothesis $\beta_2 = \beta_3 = \beta_4 = 0$.
- (b) Since R^2 in the model was very low, our researcher decided to take corrective action by removing two variables from the model which his friend told him were not directly related to the dependent variable and was confirmed of the t test of significance and these were **Class of Employment and Tax Benefits on Housing Loan**. Do you think he should go with his friend's suggestion?
- (c) Assume that the researcher goes ahead with removing of the variables as mentioned in {Q 3b} above. However he still finds that the R^2 shows no improvement, what do you think can be the likely reason behind it?
- (d) What additional problem(s) you are able to detect in the regression fitted above, can you suggest a remedy to such a problem(s). (4,3,3,5)
4. To study the impact of income on clothing the following equation is estimated;
- $\text{Exp } C_i = \beta_1 + \beta_2 Y_i$; where $\text{Exp } C_i$ is the expenditure on clothing of individual while Y_i is the Income.

- (a) You are required to add two dummies, one for Gender (M/F) and second for college student/not college student and incorporate these two dummies clearly in the regression.
- (b) Form a 2×2 matrix of regression coefficients where rows describe gender and column : college student /not college student. Interpret each cell of this matrix
- (c) Can you introduce a slope dummy in the above regression and interpret the same. Is it necessary to have an intercept dummy along with this slope dummy.
- (d) What is a dummy variable trap. What is the impact of such a trap on regression coefficients?
- (e) With an illustration explain how a dummy variable can be used in identifying a structural break. (2,4,3,2,4)

What kinds of functional forms are depicted from the equations given below. Show the formula for computation of slope coefficient in each case. Also if we make a plot of two variables, what shall be the shape of the curve in each of these cases

- (i) $Y_i = \beta_1 + \beta_2(X_i) + \beta_3 X_i^2 + u_i$
- (ii) $Y_i = \beta_1 + \beta_2 (1/X_i) + u_i$
- (iii) $Y_i = \beta_1 + \beta_2 \ln X_i + u_i$

$$(iv) \ln Y_i = \beta_1 + \beta_2 X_i + u_i$$

$$(v) \ln Y_i = \ln \beta_1 + \beta_2 \ln X_i + u_i$$

(5×3=)

6. Distinguish between **any three** of the following :

Use illustrations, diagrams and plots wherever necessary

(i) Actual Y & Predicted Y

(ii) Multicollinearity & Micronumerosity

(iii) Efficient & Inefficient Estimator

(iv) ANOVA & ANCOVA

(v) A Regressor & A Variable

(5×3=)

7. Write short notes on **any three** of the following :

(i) Pooled Regression

(ii) A variable exhibiting two roles in case of an omission of a variable

(iii) Spurious regression

(iv) Region of indecisiveness while applying DW test

(5×3=)