



Name :

Roll No. :

Invigilator's Signature :

CS/MMA/SEM-2/MMA-208/2013

2013

STATISTICAL AND ECONOMETRIC METHODS-II

Time Allotted : 3 Hours

Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

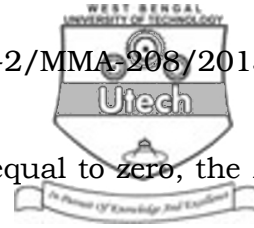
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following : $10 \times 1 = 10$

- i) The regression model $Y_i = e^{(\beta_1 + \beta_2 X_i + u_i)}$ is
 - a) intrinsically linear model
 - b) intrinsically non-linear model
 - c) Taylor series
 - d) non-linear in variables.
- ii) Regression of U_i on itself lagged one period is referred as
 - a) AR (1) model
 - b) AR (2) model
 - c) coefficient of auto covariance model
 - d) white noise model.



- iii) According to Goldfeld and Quandt the problem with Park test is that the
- a) error term is heteroscedasticity
 - b) expected value of V_i is non-zero
 - c) V_i is serially correlated
 - d) model is non-linear in parameter.
- iv) Which of the following remedial measure for heteroscedasticity is used when σ_i^2 is known for a regression model ?
- a) Koenker-Bassett method
 - b) Weighted Least Square method
 - c) OLS method
 - d) White's procedure.
- v) Heteroscedasticity in a regression model according to Goldberger refers to
- a) a type of multicollinearity
 - b) sample size being zero
 - c) sample size n being slightly greater than the number of parameters to be estimated
 - d) sample size n being slightly smaller than the number of parameters to be estimated.



- vi) When R^2 for a regression model is equal to zero, the F value is equal to
- a) infinity b) high positive value
c) low positive value d) zero.
- vii) To test for structural break in a time series data, we use
- a) t -test b) F -test
c) MWD test d) Chow test.
- viii) The test used to make a choice between linear regression model and log linear model is
- a) t -test b) F -test
c) MWD test d) Chow test.
- ix) Multiple co-efficient of determination measures the
- a) goodness of fit of multiple regression model
b) homoscedasticity of multiple regression model
c) heteroscedasticity of multiple regression model
d) multicollinearity of multiple regression model.
- x) If we multiply both Y and X by 1000 and re-estimate the regression, the slope coefficient and its standard error will
- a) increase by 1000 times
b) decrease by 1000 times
c) remain same
d) increase by $(1/1000)$ times.



GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. What is econometrics ? Distinguish between theoretical and applied econometrics.
3. Prove that $t^2 = F$.
4. The estimated savings function for a 31 period is given by

$$\hat{S}_t = 6.44 + 0.085 X_t$$

$$(117.6) \quad (0.005) \quad R^2 = 0.903$$

After arranging the X 's in ascending order and omitting nine central observations we are left with two subsets of data, one with the lower values of X and with higher values of X .

Applying OLS to each subset we obtain,

For subset 1,

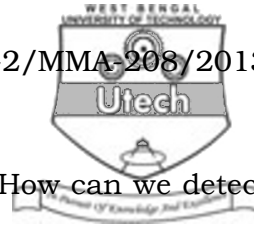
$$\hat{S}_1 = -738 + 0.088 X \quad R^2 = 0.787$$

$$(189.4) \quad (0.015) \quad \text{and} \quad \sum e_1^2 = 144,771.5$$

$$\text{For subset 2, } \hat{S}_2 = 1141.07 + 0.029X \quad R^2 = 0.152$$

$$\text{and } \sum e_2^2 = 769,899.2$$

By using Goldfeld and Quandt test, examine whether the problem of heteroscedasticity exists or not in this problem
 $(F_{0.05, 9, 9} = 3.18)$



5. What do you mean by multi collinearity ? How can we detect it in a problem ?

6. Suppose that Mr. A estimates a consumption function and obtains the result :

$$\begin{array}{ll} \hat{C} = 15 + 0.81 Y_d & n = 19 \\ (3.1) \quad (18.7) & R^2 = 0.99 \end{array}$$

\hat{C} is consumption; Y_d is disposable income, the number in parentheses are t -ratios.

- Test the significance of Y_d statistically using t -ratios.
- Determine the estimated standard deviations of the parameter estimators.
- Construct a 95% confidence interval for the coefficient of Y_d .

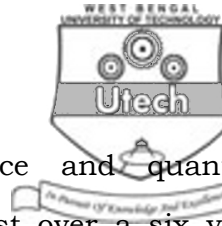
GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. State and prove the properties of the least square estimators relating to a two variable linear regression model (CLRM).

6 + 9



8. The following table includes the price and quantity demanded of the product of a monopolist over a six year period

| Year | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|----------------|------|------|------|------|------|------|
| Quantity (kg.) | 8 | 3 | 4 | 7 | 8 | 0 |
| Price (Rs.) | 2 | 4 | 3 | 1 | 3 | 5 |

- a) Estimate the demand function, assuming a linear demand function. Comment on the values of the estimated co-efficient (α^{\wedge} and β^{\wedge})
- b) Estimate the average elasticity of demand
- c) Estimate the elasticities of demand at price 4
- d) Forecast the level of demand if price rises to 5.
Comment on your forecast. 4 + 3 + 3 + 5

9. What is the problem of autocorrelation ? Explain Durbin-Watson test in brief for testing the problem of autocorrelation. Point out the major limitations of D-W test.

3 + 7 + 5

10. Given : $Y_i = \alpha + \beta X_i + u_i$ with $(u_i^2) = k^2 X_i^2$. Prove that OLS estimators possess greater variance than the OLS estimates of the transformed version of the model.



11. Distinguish between "correlation" and "regression". Discuss various methods of measuring regression. In trying to evaluate the effectiveness of its advertisement campaign a firm compiled the following information :

| Year : | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|----------------------------|------|------|------|------|------|------|------|------|
| Ad. Expenditure ('000 Rs.) | 12 | 15 | 15 | 23 | 24 | 38 | 42 | 48 |
| Sale (lakh Rs.) | 5 | 5.6 | 5.8 | 7 | 7.2 | 8.8 | 9.2 | 9.5 |

Calculate the regression equation of sales on Ad. Expenditure. Estimate the probable sales when Ad. Expenditure is Rs. 60 thousand. 6 + 3 + 6
