

**2025/FYUG/ODD/SEM/
ECODSC-303T/422**

FYUG Odd Semester Exam., 2025

ECONOMICS

(5th Semester)

Course No. : ECODSC-303T

(Introductory Econometrics)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

UNIT—I

1. Answer any two from the following : 2×2=4

(a) Mention two objectives of econometric study.

(b) Write the functional form of a linear and log-log model.

(c) State the significance of error term in a regression model.

(2)

2. Answer any *one* from the following : 10

(a) Explain the nature of econometrics. Make a distinction between econometrics and mathematical economics. 5+5=10

(b) Discuss the importance of econometric model in empirical research. Write down a two-variable simple linear regression model and explain its various components. 5+5=10

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UNIT—II

3. Answer any *two* from the following : 2×2=4

(a) Interpret the efficiency property of OLS estimators.

(b) Write two properties of R^2 .

(c) State the relationship among TSS, ESS and RSS. Can ESS be greater than TSS?

4. Answer any *one* from the following : 10

(a) (i) Write the assumptions of classical linear regression model.

(ii) Prove that OLS estimators are unbiased and efficient. 3+(3+4)=10

(3)

(b) (i) Given the following data :

$$\sum X_i Y_i = 200, \sum X_i^2 = 100, \sum Y_i^2 = 500,$$

$$\sum X_i = 27, \sum Y_i = 40, n = 27$$

Estimate the parameters of the model $Y = \beta_0 + \beta_1 X + u_i$ and compute R^2 . Interpret the result.

(ii) Show that the coefficient of determination (R^2) equals to the square of the correlation coefficient (r^2).

$$(2+3+2)+3=10$$

UNIT—III

5. Answer any *two* from the following : $2 \times 2 = 4$

(a) Define a multiple regression model.

(b) State the relationship between R^2 and adjusted R^2 .

(c) How do we test the significance of an individual variable and significance of an overall regression model?

6. Answer any *one* from the following : 10

(a) (i) Given the regression model

$$y_i = \alpha + \beta_1 X_{1i} + \beta_2 X_{2i} + u_i$$

derive OLS estimators $\hat{\alpha}$, $\hat{\beta}_1$ and $\hat{\beta}_2$.

(4)

- (ii) Write down the steps of testing the hypothesis $\beta_1 = 0$. 6+4=10

- (b) Estimate the regression equation :

$$Y = \beta_1 + \beta_2 X_2 + \beta_3 X_3 + u_i$$

From the following data, compute ANOVA :

$$\Sigma Y = 1052, \Sigma X_2 = 1017, \Sigma X_3 = 954$$

$$\bar{Y} = 116.9, \bar{X}_2 = 113, \bar{X}_3 = 106$$

$$\Sigma Y^2 = 124228, \Sigma X_2^2 = 115571$$

$$\Sigma X_3^2 = 101772, \Sigma X_2 Y = 119750$$

$$\Sigma X_3 Y = 111433, \Sigma X_2 X_3 = 107690$$

UNIT → IV

7. Answer any two from the following : 2×2=4

(a) Define multicollinearity.

(b) What does Durbin-Watson d -test measure? Write the range of d -statistic.

(c) Mention two causes of the problem of heteroscedasticity in estimating a regression model.

(5)

8. Answer any *one* from the following : 10

(a) What do you mean by perfect multicollinearity? Show that in case of the existence of perfect multicollinearity, the regression coefficient remains indeterminate. How will you detect the existence of multicollinearity?
2+4+4=10

(b) Show that the least square estimators in presence of heteroscedasticity are unbiased but inefficient. What are the remedial measures to resolve the problem of heteroscedasticity? 6+4=10

UNIT ~~V~~

9. Answer any *two* from the following : 2×2=4

(a) Point out two uses of dummy variables.

(b) Distinguish between intercept and slope dummy.

(c) What do you mean by dependent dummy variable?

10. Answer any *one* from the following : 10

(a) Explain the concept of dummy variables. Add a note on dummy variable trap. 5+5=10

((6))

- (b) Discuss the concept of linear probability model (LPM). What are the problems of applying OLS estimation method to LPM?

6+4=10
