

N-56090

Seat No. _____

M. Sc. (Part - II) Examination

April / May – 2003

Statistics : Paper - VIII

(Mathematical Economics, Economics Statistics & Econometrics)

Time : 3 Hours]

[Total Marks : 75

- Instructions :** (1) All questions carry **equal** marks.
(2) Use of scientific calculator and statistical tables is permitted.

- 1** (a) Explain the concepts of multipliers and accelerator in Economic models. Discuss Harod-Domar model which make use of these concepts.
(b) Define CES production function and state its general form. Show that this production function is homogeneous of degree one and has constant elasticity of substitution.

OR

- 1** (a) Discuss fully Leontief's open system input output model. What is the usefulness of this model ? Show how it can be related to a linear programming problem.
(b) Explain the terms :
(i) CRTS
(ii) Elasticity of substitution for input factors of production
(iii) MRS.
(c) Discuss advantages and limitations of CES production function over Cobb-Douglass production function.
- 2** (a) What is meant by income distribution ? Explain how the (i) Lorentz curve and (ii) Pareto distribution law of income useful in studying the pattern of income distribution of an economy.

- (b) Distinguish between the monopoly and duopoly problems.
- (c) Explain the terms marginal propensity to consume and save.

OR

- 2**
- (a) What are iterated averages ? Discuss its significance while analysing time series data.
 - (b) Describe Splensor's 15 point formula.
 - (c) What is meant by logistic curve ? How would you fit to the population data ? Explain its importance.
- 3**
- (a) Describe how seasonal component of a time series is separated.
 - (b) Explain the following terms clearly :
 - (i) Stationary time series
 - (ii) Autoregressive time series
 - (iii) Serial correlation.
 - (c) For autoregressive series, in usual notations,
 $u_{t+2} + au_{t+1} + bu_t = \epsilon_{t+2}$, show that

$$\frac{V(u_t)}{V(\epsilon_t)} = \frac{1+b}{(1-b)\{(1+b)^2 - a^2\}}$$

OR

- 3**
- (a) What is periodogram ? How does it differ from correlation in a stationary time series ? Describe the importance of correlogram and periodogram.
 - (b) Describe moving average method of determining trend of a time-series. Discuss the effect of trend elimination by moving average on (i) Cyclic component and (ii) Random component.

- 4 (a) Define market equilibrium with reference to given demand and supply functions. Show that it is only the equilibrium price which prevails over the market.
- (b) Explain the term Elasticity of demand. Obtain elasticity of demand for demand functions :
- (i) $p = \sqrt{a - bx}$
- (ii) $p = a - bx^2$
- (c) Define utility function. Determine the first and second order conditions for maximisation of utility, when consumer consumes two commodities.

OR

- 4 (a) For the linear model $\underline{Y} = X\underline{\beta} + \underline{u}$, in usual notations, show that
- (i) If $\underline{u} \sim N_n(\underline{0}, \sigma^2 I)$, $\hat{\underline{\beta}} \sim N_k(\underline{\beta}, \sigma^2 (X' X)^{-1})$
- (ii) The residual terms $\underline{e} = \underline{Y} - X\hat{\underline{\beta}}$ are uncorrected with $X\hat{\underline{\beta}}$.
- (b) How does one know that multicollinearity is present in the model involving more than two explanatory variables. When imperfect multicollinearity is present in the data, show that the OLSE remains BLUE but many times it gives unsatisfactory estimators.
- 5 (a) Describe the situation where a researcher is likely to face to problem of auto-correlation of disturbance terms in a linear model. Describe a suitable method of estimation of parameters of the linear model $y_t = \alpha + Bx_t + u_t$, $u_t = \rho u_{t-1} + \epsilon_t$, $|\rho| < 1$; $\epsilon_t \sim i.i.d. N(0, \sigma_\epsilon^2)$, $t = 1, 2, 3, \dots, n$.
Comment on your estimators.

- (b) For the linear model $\underline{Y} = X\underline{\beta} + \underline{u}$, if one of the X variables is not uncorrelated with \underline{u} , even in limit, then show that the OLSE $\hat{\underline{\beta}}$ of $\underline{\beta}$ is inconsistent. Describe briefly one method of obtaining consistent estimator of $\underline{\beta}$ in such a situation.

OR

- 5 Write explanatory notes on the following :
- (a) Simultaneous equations systems
 - (b) Identification problem
 - (c) Errors of measurement.
