

GENERAL ECONOMICS

Paper – I

*Time Allowed : **Three Hours***

*Maximum Marks : **200***

Question Paper Specific Instructions

Please read each of the following instructions carefully before attempting questions :

*There are **THIRTEEN** questions divided under **THREE** sections.*

*The **ONLY** question in Section A is **compulsory**.*

*In Section B, **FIVE** out of **SEVEN** questions are to be attempted.*

*In Section C, **THREE** out of **FIVE** questions are to be attempted.*

Candidates should attempt questions / parts as per the instructions given in the sections.

The number of marks carried by a question / part is indicated against it.

Candidates are required to write clear, legible and concise answers.

Attempts of questions shall be counted in sequential order. Unless struck off, attempt of a question shall be counted even if attempted partly.

Any page or portion of the page left blank in the Question-cum-Answer (QCA) Booklet must be clearly struck off.

*Answers must be written in **ENGLISH** only.*

SECTION A
(Compulsory Section)

Q1. Answer all the following questions.

5×7=35

- (a) In a two-good world, show that both the goods cannot be inferior. 5
- (b) Calculate the elasticity of substitution for the following production function : 5
- $$Q = \left(L^{\rho} + K^{\rho} \right)^{\frac{\gamma}{\rho}}$$
- (c) Differentiate between adverse selection and moral hazards in determining pricing under incomplete information. 5
- (d) In a two-input framework, state and prove the adding up theorem with necessary assumptions. 5
- (e) How do you derive the aggregate demand for a private good and a public good ? 5
- (f) Give the economic interpretations of the Lagrange Multiplier for the following constrained optimisation problems : 5
- (i) Utility maximisation
 - (ii) Expenditure minimisation
 - (iii) Output maximisation
 - (iv) Cost minimisation
- (g) Explain the role of the degrees of freedom in statistical inference. 5

SECTION B

Answer any *five* out of the following seven questions :

18×5=90

- Q2.** (a) (i) Explain the relevance of including an intercept term in a classical linear regression model.
- (ii) How do you calculate elasticity from a linear regression model ? 5+3=8
- (b) The following estimated equation was obtained by OLS with sample size 80 :

$$\hat{Y}_i = 2.2 + 0.11x_{1i} + 3.48x_{2i} + 0.34x_{3i}$$

(3.4) (0.005) (2.2) (0.15)

Figures in parentheses indicate standard errors. The explained sum of square was 112.5 and the residual sum of square was 19.5.

- (i) Calculate the values of R^2 and $\bar{R}^2$.
- (ii) Test the significance of the slope coefficients by using t statistic at 5% level of significance.

[Given that $t_{0.95, 76} = 1.98$]

- (iii) Test for overall significance of the model at 5% level of significance.

10

[Given that $F_{0.95, 76} = 1.35$]

- Q3.** (a) Specify Leontief closed input-output system. Interpret the conditions for non-trivial solution of this model.

10

- (b) Why do you prefer coefficient of variation to standard deviation as a measure of dispersion ?

4

- (c) In a regression equation of Y on X, the value of X is fixed at 5. What will the regression equation look like ?

4

- Q4.** (a) Derive the Pareto optimality conditions in consumption in a two-commodity framework with two consumers.

10

- (b) Show that the Pareto optimality may not ensure equitable distribution.

8

- Q5.** (a) (i) Distinguish between monopolistic and monopsonistic exploitations in determining wage rate under imperfect competition. 7+3=10
- (ii) "Trade unions have a role in reducing the monopsonistic exploitation but not the monopolistic exploitation." Discuss. 8
- (b) Compare the views of Marx and Kaldor with reference to the theory of distribution. 8

- Q6.** (a) "In a duopolistic market, the first mover's advantage disappears as one moves away from the quantity adjustment model to the price adjustment model." Elaborate. 10
- (b) Suppose that a monopolistic competitive market consists of 11 firms with the following identical demand and cost functions :

$$p_k = 150 - 2q_k - 0.2 \sum_{\substack{i=1 \\ i \neq k}}^{11} q_i$$

$$c_k = 0.5 q_k^3 - 20 q_k^2 + 270 q_k$$

$$k = 1, 2, \dots, 11$$

Determine the maximum profit and the corresponding price and quantity for a representative firm. Assume that number of firms in the industry does not change. 8

- Q7.** (a) A production function following constant returns to scale can follow diminishing returns to a factor. Justify with logic. 8
- (b) Define the concept of technical efficiency as proposed by Farrell. How is it different from allocative efficiency ? Illustrate your answer graphically by considering a two-input and one-output framework. 10

- Q8.** (a) Explain the concepts of a weakly separable and a weakly additive utility function. 10
- (b) (i) "In Edgeworth model, an increase in demand will lead to a rise in price." Justify your answer.
- (ii) Show that a monopolist can charge higher price in a market with less elastic demand. 4+4=8

SECTION C

Answer any *three* out of the following five questions :

25×3=75

Q9. (a) "Heteroscedasticity is a problem in cross-section data, but not in time series data." Discuss. 8

(b) A researcher estimated an employment (N) equation with GDP (G), education (E) and price (P) as explanatory variables. The estimated equation is given below :

$$N = 506 + 0.06G - 0.01E - 19.8P$$

(1.399) (3.227) (-0.033) (-0.142)

$$R^2 = 0.97, \text{ number of observations} = 16$$

[Figures in parentheses are t-statistics]

- (i) Interpret the estimated coefficients.
- (ii) Identify the problems in the estimation.
- (iii) How can you improve the estimation ?

3+3+3=9

(c) Distinguish between the deterministic trend and the stochastic trend in time series analysis. 8

Q10. (a) Show that principal components are obtained from the eigenvectors corresponding to the covariance matrix of the variables in a given sample. 10

(b) (i) Distinguish between the time and factor reversal tests of a price index.

(ii) For the data given below, calculate the price index by using Fisher's formula, and interpret your result. 5+5=10

Commodities	2019		2022	
	P	Q	P	Q
A	4	10	5	9
B	5	8	3	6
C	2	6	2	4
D	3	9	1	7
E	5	5	4	5

- (c) Interpret the coefficients from the following estimated equations :

5

$$\ln \hat{Y} = \hat{\alpha} + \hat{\beta}_1 \ln X_1 + \hat{\beta}_2 \ln X_2$$

$$\ln \hat{Y} = \hat{a} + \hat{b}_1 X_1 + \hat{b}_2 X_2$$

- Q11.** (a) What are the basic properties of idempotent matrix ? Mention its application in econometrics.

8

- (b) The general solution of a second order non-homogeneous difference equation, $Y_t = \beta_0 + \beta_1 Y_{t-1} + \beta_2 Y_{t-2}$, has two components : particular solution and homogeneous solution. Explain the implications of these two solutions.

7

- (c) (i) Differentiate between concavity and quasi-concavity.
(ii) What is the implication of the point of inflection in a short-run production function ?

5+5=10

- Q12.** (a) Given a two-input Cobb-Douglas production function, derive the short-run supply function of a competitive firm.

15

- (b) Suppose that two firms are selling a homogeneous product. They can charge high price (H) or low price (L). The pay-offs from their actions are given in the following game matrix :

		Firm-2	
		H	L
Firm-1	H	8, 8	3, 10
	L	10, 3	5, 5

- (i) Find Nash equilibrium for the given game.
(ii) Is there any dominant strategy in this game ? Explain.

10

Q13. (a) Show that the substitution effect is always negative by using the weak axiom of revealed preference theory. 10

(b) A farmer grows 70 kg of X_1 and 20 kg of X_2 . He keeps some parts of X_1 and X_2 for self-consumption and sells the rest in the market. His utility function is

$$U(X_1, X_2) = \min(2X_1, X_2)$$

and prices of X_1 and X_2 are ₹ 2 and ₹ 3 respectively.

Suppose that price of X_1 increases to ₹ 4 and at the same time his consumption of X_1 also increases.

Explain the behaviour of the farmer using substitution effect, income effect and endowment effect. 15

