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 :

$$\hat{Y}_i = \underset{}{2{\cdot}2} + \underset{(0{\cdot}005)}{0{\cdot}11x_{1i}} + \underset{(2{\cdot}2)}{3{\cdot}48x_{2i}} + \underset{(0{\cdot}15)}{0{\cdot}34x_{3i}}$$
$$(3{\cdot}4)$$

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 $t_{0{\cdot}95,\ 76} = 1{\cdot}98$]

(iii) Test for overall significance of the model at 5% level of significance. *10*

[Given that $F_{0{\cdot}95,\ 76} = 1{\cdot}35$]

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.

(ii) "Trade unions have a role in reducing the monopsonistic exploitation but not the monopolistic exploitation." Discuss. *7+3=10*

(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 :

$$p_k = 150 - 2q_k - 0{\cdot}2 \sum_{\substack{i=1 \\ i \neq k}}^{11} q_i$$

$$c_k = 0{\cdot}5\ q_k^3 - 20 q_k^2 + 270\ q_k$$

$$k = 1, 2 \ldots . 11$$

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 :

$$N = 506 + 0{\cdot}06G - 0{\cdot}01E - 19{\cdot}8P$$

(1·399) (3·227) (– 0·033) (– 0·142)

$R^2 = 0{\cdot}97$, 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*