

Indian Institute of Technology, Kharagpur
Department of Humanities and Social Sciences

Date: FN/AN Time: 3 hours Full Marks: 50

No. of students 32 End Autumn Semester Examination 2011

Sub. No. HS20005 Sub. Name: Micro Economics I 2nd Year M. Sc. (Economics)

All questions carry equal marks. Answer any five

- 1 Show algebraically from the first principle that the price elasticity of the ordinary demand curve equals the price elasticity of the compensated demand curve less the corresponding income elasticity multiplied by the proportion of total expenditure spent on the commodity in question. Draw the underlying diagram and indicate how you would extend the relationship to account for the cross-price effects.
2. (a) If a consumers demand for tea increases at the rate of two cups of tea per 1 rupee increase in the price of coffee, deduce from the first principle by how much his purchases of coffee would increase per 1 rupee increase in the price of tea.

(b) How would you define substitutes and complements in a rigorous manner? Hence comment on the statement that only substitutability can occur in a two commodity world.
3. Suppose r_1 and r_2 are the prices of the current inputs X_1 and X_2 and Z is the output. The short run production function is given by:

$$Z = X_1^a X_2^b$$

Find out the total variable cost, average variable cost and the marginal cost functions. Interpret your results when $a + b = 1$

- 4(a) Show that a for a competitive firm the expansion path is a straight line passing through the origin, if the production function is homogeneous of any degree. Analyse the implications of this result. What happens when the production function is homothetic?
- (b) Find out the expansion path of a firm with the following production function:

$$Y = 2 \ln X_1 + 4 \ln X_2$$

r_1 and r_2 being the constant prices of the inputs x_1 and x_2 respectively.

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This question paper consists of 2 pages

5. A competitive firm produces s outputs with the help of n inputs. How would you state its production function in implicit form and use it for the formulation of a generalized problem of profit maximization subject to the technical rules given by this production function?

With reference to this problem, how would you obtain the first-order and the second order conditions for optimization in the following situations:

- (i) To maximize profit with respect to many inputs subject to constancy of all outputs.
 - (ii) Unconstrained maximization of profit with respect to many inputs and many outputs.
 - (iii) To maximize profit with respect to many outputs subject to constancy of all inputs.
6. From the concepts of technical and economic efficiencies how would you derive short and long run total cost functions? How would you relate long-run cost curves (average, total and marginal) with their short-run counterparts? What would be the bearing of different types of returns to scale on this relationship and the pattern of plant utilization?
7. (a) Compare and contrast the firm's equilibrium under monopoly and perfect completion.
- (b) Suppose that a monopolist discriminates in price between the two segments of a market with the following demand functions:

$$Q_1 = 120 - 10P_1$$

$$Q_2 = 120 - 20P_2$$

Further the cost function is given by:

$$C = 90 + 2(Q_1 + Q_2) = 90 + 2Q$$

notations having their usual meanings.

What would be the output levels that the firm would sell in the two segments of the market and what prices will it charge? How much profit will it earn?

What would be output price and profit of the firm in the absence of price discrimination? What would be the values of the same parameters if in an integrated market the firm follows the competitive pricing rule?
