LNMIIT
The LNM Institute of Information Technology

The LNM Institute of Information Technology
Department: Humanities and Social Sciences
Applied Economics (4161)
Exam Type: Mid Term

Time: 90 minutes **Date:** 04/10/2019 **Max. Marks:** 30 (Weight: 30%)

General Instructions:

- Questions are self-explanatory. Read the questions well!
- Answer all the questions.

Q.1 (a) Define an iso-quant. [1]

(b) For a production function of the form $Q = K^{\alpha}L^{\beta}; \alpha, \beta > 0$ and $\alpha + \beta = 1$; show mathematically that its iso-quant is *downward* sloping and is *convex* to the origin. [1 + 2]

(c) Explain using economic concept(s) why iso-quant are *downward* as well as *convex* to the origin. [0.5+1.5]

Q.2 XYZ Corporation has statistically estimated the following production function $Q = 1.5LK - 0.3L^2 - 0.15K^2$. Per-unit labor costs are Rs. 60 and capital costs are Rs. 74. The firm wants to *maximize output* subject to *cost constraint* of Rs. 1500. Based on this information answer the following questions:

a. What optimal amounts of labour and capital should be used? [2]

b. What is the total output from the above combination? [1]

Q.3 For a typical production function of the form $Q = f(K, L)$ with factor price for K and L given as r and w, respectively; show mathematically that a firm's problem of finding optimal values of K and L are *dual* in nature. Explain your answers using a diagram too. [2+2=4]

Q.4 Suppose there is a perfectly competitive industry where all the firms are identical with identical cost curves. The total cost function for a representative firm is given by $TC = 100 + q^2 + q$; where q is the quantity of output produced. The market demand for this product is given as $Q = 500 - \frac{P}{2}$ and the market supply is given as $Q = P - 100$. Calculate the following:

a. The market equilibrium price and output. [1]

b. The representative firm's profit maximizing output and price level. Comment on whether the firm is operating in the short-run or long-run. [2+1]

Q.5 Answer the following with detailed labelling:

a. Explain using graph the short run supply curve of a firm operating in a perfectly competitive market. [2]

b. The i^{th} firm in the perfectly competitive market has a total cost function of the form $c_i = 0.04q_i^3 - 0.8q_i^2 + 10q_i + 10000$. Calculate the representative firm short run supply function. [3]

Q.6. A monopolist firm faces a demand with constant elasticity of −2.0. It has a constant marginal cost of $20 per unit and sets a price to maximize profit. If marginal cost should increase by 25 percent, would the price charged also rise by 25 percent? [3]

Q.7 Suppose the monopolist produces output at a constant marginal cost of 5. The monopolist sells his output in two different markets separated by some distance. The demand curves in the two markets is given by $X_1 = 55 - p_1$ and $X_2 = 70 - 2p_2$. Calculate the (a) total output, (b) quantity sold in each market, (c) price in each market and (d) monopolist total profits. [1+0.5+0.5+1 = 3]

Q.8. Prove or disprove the following statement mathematically "A discriminating monopolist would charge a higher price to that group of buyer that has more elastic demand". [2]

----------End of Paper----------