19/12/2023 **Qn. Set Code-1**

Semester: 3rd
Programme: B.Tech
Branch: CSE, IT, CSCE, CSSE

AUTUMN END SEMESTER EXAMINATION-2023

3rd Semester B.Tech

ENGINEERING ECONOMICS

HS_2002

(For 2022 (L.E), 2021 & Previous Admitted Batches)

Time: 3 Hours | Full Marks: 50

Answer any SIX questions.
Question paper consists of four SECTIONS i.e. A, B, C and D.
Section A is compulsory.
Attempt minimum one question each from Sections B, C, D.
The figures in the margin indicate full marks.
All parts of a question should be answered at one place only.

SECTION-A

1. Answer the following questions: [1 × 10]

(a) What is marginal rate of substitution? Explain the convexity property of indifference curve in the theory of consumer's behavior.

(b) Explain why the demand curve is downward slopping? Give an example where the law of demand will not be applicable.

(c) Given the initial price and quantity to be Rs 10 and 30 units for commodity 'A', respectively. Suppose the price of the commodity 'A' reduced to Rs. 8 and at the same time the quantity demanded increases to 36 units. Calculate the price elasticity of demand and explain the nature of the commodity.

(d) Derive the relationship between marginal revenue and elasticity from the total revenue function. Explain such relationship.

(e) What is the difference between inferior goods and Giffen goods? Explain with example.

(f) $1200 is placed in an account at 4% compounded annually for 2 years. It is then withdrawn at the end of the two years and placed in another bank at the rate of 5% compounded annually for 4 years. What is the balance in the second account after the 4 years?

(g) Explain the concepts of GDP and GNP at market price and factor cost.

(h) The management of Health Supplement Inc. wants to reduce its labor cost by installing a new machine. Two types of machines are available in the market– machine X and machine Y. Machine X would cost $18,000 where as machine Y would cost $15,000. Both the machines can reduce annual labor cost by $3,000. Which is the best machine to purchase according to payback method?

(i) Given Q=15-5P, where Q is output and P is price. Find the average and marginal revenue functions.

(j) Explain the relationship between marginal cost (MC) and average total cost (ATC) with suitable diagram.

SECTION-B

2. (a) Write short notes on break-even point with diagram. [4]

(b) Explain three important instruments of monetary policy of the Reserve Bank of India (RBI). Explain about the mechanism of each instrument to control inflation. [4]

3. (a) Outside Bhubaneswar Railway Station, Vipin (a shopkeeper) is running a tea shop. The demand function for tea cups is [4]

$$Q = 150 - 10P$$

Where Q is the quantity demanded of tea cups and P is price per tea cup.

(i) Write total revenue (TR) function and determine at what quantity of tea cups sold and price fixed, TR is maximized.

(ii) Find out value of marginal revenue (MR) where TR is maximize.

(b) Using the information given in Q2 (a), show that at the quantity sold where TR is maximized, price elasticity of demand is equal to unity. [4]

SECTION-C

4. (a) A firm's total variable cost (TVC) function is given by the following: [4]

$$TVC = 75Q - 10Q^2 + Q^3$$

Where Q is output level.

Will the firm produce the product if price of the product is Rs. 40?

(b) Explain the firm's equilibrium and shut-down point of a perfectly competitive firm with the help of a suitable diagram. [4]

5. (a) The production function is given as follows: [4]

$$Q = 100K^{1/2}L^{1/2}$$

Determine the optimal input combination for producing 1444 units o output if wage rate of labour (w) is Rs. 30 and price per unit of capital (r) is Rs. 40. What is the minimum cost of production?

(b) Mr. Praveen invests a sum of US$50,000 in one of the US based bank at a nominal (annual) interest rate of 8% for 10 years. Find the maturity amount given that the compounding is quarterly. [4]

6. (a) Pepsi Company produces a single article. Following cost data is given about its product: [4]

Selling price per unit= Rs.40

Marginal cost per unit = Rs.24

Fixed cost per annum= Rs. 16000

Calculate: (a) price volume (P/V) ratio (b) break even sales (c) sales to earn a profit of Rs. 2,000.

(b) Using the information given in Q5 (a), also calculate: [4]
(a) Profit at sales of Rs. 60,000 (b) New break even sales, if price is reduced by 10%.

SECTION-D

7. (a) Sunlight company needs a machine for its manufacturing process. The cost of the new machine is $80,700. The expected useful life of the machine is 8 years. At the end of 8-year period, the machine would have no salvage value. After installation, the machine would increase cash inflows by $30,000 per year. Sunlight is interested to know the net present value of the machine to accept or reject this investment. The minimum required rate of return of the company is 16% on all capital investments. [4]

    1. Compute net present value of the machine.
    2. Is it acceptable to purchase the machine?

(b) A machine can reduce annual cost by $40,000. The cost of the machine is 223,000 and the useful life is 15 years with zero residual value. [4]

    1. Compute net present value of the machine.
    2. Is it acceptable to purchase the machine?

8. (a) A Company has purchased equipment whose first cost is Rs. 80,000 with an estimated life of eight years. The estimated salvage value of the equipment at the end of its lifetime is Rs. 18,000. Calculate the depreciation and the book value using the declining balance method of depreciation by assuming 0.2 for K. [4]

(b) Dunkin City wants to build a new bypass between two major roads that will cut travel time for commuters. The road will cost $14,000,000 and save 17,500 people $100/yr in gas. The road will need to be resurfaced every year at a cost of $7,500. The road is expected to be used for 20 years. Determine if Dunkin City should build the road using B/C analysis. The cost of money is 8%. [4]

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