***POSSESSION OF MOBILES IN EXAM IS UFM PRACTICE.***

**Name** _____ _____ **Enrollment No.**____ _____

**Jaypee Institute of Information Technology, Noida**

**End Term Examination, 2021**
**B.Tech III Semester**

**Course Title: Economics** **Maximum Time : 2 Hours**
**Course Code: 15B11HS211** **Maximum Marks : 35**

| | |
|---|---|
| CO1 | Explain the basic micro and macroeconomic concepts. |
| CO2 | Analyse the theories of demand, supply, elasticity and consumer choice in the market. |
| CO3 | Analyse the theories of production, cost, profit and break even analysis. |
| CO4 | Evaluate the different market structures and their implications for the behaviour of the firm. |
| CO5 | Examine the various business forecasting methods. |
| CO6 | Apply the basics of national income accounting and business cycles to Indian economy. |

**Q1.** Krishna has a job as a pharmacist, earning Rs. 30,000 per year and he is deciding whether to take another job as the manager of another pharmacy for Rs. 40,000 per year or to purchase a pharmacy that generates a revenue of Rs. 2,00,000 per year. To purchase the pharmacy, Krishna would have to use his Rs. 2,00,000 saving which earns 10 per cent interest per year. He also has to borrow another Rs. 80,000 @ 10 per cent interest per year. The pharmacy that Krishna is contemplating purchasing has additional expenses of Rs. 80,000 for supplies, Rs. 40,000 for salesman, Rs. 10,000 for rent and Rs. 5,000 for utilities. [3Marks,CO1]

(a) What would be the business and economic profit if Krishna purchased the pharmacy?
(b) Should Krishna purchase the pharmacy?

**Q2.** A Minor league baseball team is considering changing ticket prices for the upcoming season. Currently, a typical fan pays an average ticket price of $10. The price elasticity of demand for tickets is -0.6. Management is thinking of raising the average price to $11. Compute the predicted percentage change in tickets sold. Would you expect ticket revenue to rise or fall? [2Marks,CO2]

**Q3.** Suppose Jack has an income of $12 to buy two goods: apples and oranges. The price of one apple is $1 and the price of an orange is $2. Assume Jack's utility function is U(x,y)= xy, where x is the consumption amount of apples and y is consumption amount of oranges. [3Marks,CO2]

(a) Find the utility maximisation consumption bundle of x and y.
(b) Suppose the price of an apple increases from $1 to $2. Find his new utility maximisation consumption.
(c) On the basis of above calculations, find Jack's demand equation of apples.

**Q4.** A pharmaceutical company is investigating the relationship between advertising expenditure (AD) and sales of some over-the-counter (OTC) drugs. The following data represents a sample of 6 common OTS drugs. The computed regression line is given by $\hat{y} = 9.04 + 2.49x$.

| | | | | | | |
|---|---|---|---|---|---|---|
| AD (in millions) | 22 | 25 | 29 | 35 | 38 | 42 |
| Sales (in millions) | 64 | 74 | 82 | 90 | 100 | 120 |

(a) Calculate the coefficient of determination. [2Marks,CO5]
(b) Determine how sales depend on factors other than advertising expenditure. [1Marks,CO5]

**Q5.** A firm operating in a perfectly competitive market has a total cost function, $TC = 1000 + 200q - 7q^2 + 0.75q^3$. If there are 500 identical firms in the market, calculate the aggregate supply of the market at a price of Rs. 205. Also, calculate the minimum price offered by the market, so that the firms continue to operate in the market. [4Marks,CO4]

**Q6.** A firm faces a demand curve for its product $P = 100 - 0.5Q$ above a particular price and $P = 120 - 1.5Q$ below that price. The firm has a total cost function $TC = 100 + 40Q + 2.5Q^2$. Determine the profit maximising price and quantity and the corresponding profit of the firm. [4Marks,CO4]

**Q7.** Estimate the national income of India using the following information: [3Marks,CO6]

| Items | Amount (Figures in Crores) |
|---|---|
| (a) Government Expenditure | 7,000 |
| (b) Net Factor Income from Abroad | 275 |
| (c) Gross Domestic Capital Formation | 4,500 |
| (d) Net Export | -290 |
| (e) Net Indirect Tax | 150 |
| (f) Private Consumption Expenditure | 2000 |

**Q8.** A monopoly faces market demand $Q = 30 - P$ and has a cost function $TC = 1/2Q^2$. [3Marks,CO4]
(a) Find the profit maximising price and quantity and the resulting profit to the monopoly.
(b) What is the social optimal price? Calculate the Deadweight Loss due to the monopolist behaviour of the firm. Calculate consumer surplus and producer surplus.

**Q9.** In a monopolistically competitive market, a firm faces the following demand and total cost function in short run $P = 140 - 4Q$, $TC = 100 + 120Q - 12Q^2 + 2Q^3$, where P and TC are in Rs. and Q is in '000 units.
(a) Find the profit maximising price and quantity and the maximum profit the firm could earn in the market.
(b) Assuming a parallel shift in the demand line in the long run and the total cost function, $TC = 120Q - 12Q^2 + 2Q^3$, calculate the new demand line when the firm is in equilibrium. [3Marks,CO4]

**Q10.** Explain the three stages of production for a typical production function in short run. [3Marks,CO3]

**Q11.** (a) How the business cycle can tell us about the economic performances? [2Marks,CO6]
(b) Distinguish between demand pull and cost push inflation. [2Marks,CO6]



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# End Term. Soln.

1) Revenue = 2,00,000

| Explicit | Implicit |
|---|---|
| $\frac{10}{100} \times 80,000$ | 40,000 |
| 80,000 | $\frac{10}{100} \times 2,00,000$ |
| 40,000 | 60,000 — [0.5] |
| 10,000 | |
| 5,000 | |
| 1,43,000 — [0.5] | |

(a) BP = 2,00,000 − 1,43,000 = 57,000 — [0.5]

EP = 2,00,000 − 1,43,000 − 60,000 = −3000 [0.5]

(b) No, as EP is negative — [1]

2) $P_1 = 10$

$Ep = -0.6$

$P_2 = 11$

$$-0.6 = \frac{Q_2 - Q_1}{Q}$$

$$-0.6 = \frac{\%\Delta Q}{\%\Delta P}$$

$$-0.6 = \frac{\%\Delta Q}{\frac{11-10}{10} \times 100}$$

$\%\Delta Q = 6\% \downarrow$. [1]

$E_p = -0.6$

It is inelastic

$\therefore$ Revenue will increase. ] [1]

'OR'

3) Calculating % change through arc elasticity.

$$-0.6 = \frac{\dfrac{Q_2 - Q_1}{(Q_2 + Q_1)/2} \times 100}{\dfrac{P_2 - P_1}{(P_2 + P_1)/2} \times 100}$$

$$-0.6 = \frac{\dfrac{Q_2 - Q_1}{\dfrac{Q_2 + Q_1}{2}} \times 100}{\dfrac{11 - 10}{\dfrac{11 + 10}{2}} \times 100}$$

$$\frac{\dfrac{Q_2 - Q_1}{\dfrac{Q_2 + Q_1}{2}} \times 100}{} = -0.6 \times 9.52 = -5.71$$

—[1]

% change = 5.71% ↓. [1]

$E_p = -0.6$, it is inelastic, Revenue will ↑

$I = 12$

$P_a = 1$, $P_o = 2$

$U(x, y) = xy$.

(a) $\frac{MU_x}{MU_y} = \frac{P_x}{P_y}$

$\frac{y}{x} = \frac{1}{2}$ $\quad x = 2y$

$12 = 1x + 2y$

$12 = 1(2y) + 2y$ ] [0.5]

$4y = 12$, $y = 3$, $x = 6$. [0.5]

(b) $P_a = 2$.

$\frac{MU_x}{MU_y} = \frac{2}{2}$

$\frac{y}{x} = 1$. $\quad x = y$.

$12 = 2x + 2y$. —— [0.5]

$4x = 12$, $x = 3$, $y = 3$. [0.5]

(c) Demand eqⁿ of apple.

P = 1  X = 6 (demand)

P = 2  X = 3 (demand)

$$\frac{2-1}{3-6} = -\frac{1}{3} = \text{Slope.}$$

[0.5]

$$P = a - \frac{1}{3}Q.$$

$$1 = a - \frac{1}{3}(6)$$

$$1 = a - 2$$

$$a = 1 + 2 = 3$$

[0.5]

$$\left[P = 3 - \frac{1}{3}Q.\right]$$ Demand line of apple.

(5)

4.

| X | Y | | Y CAP | | EXPL. VAR | | TOTAL VAR | |
|---|---|---|---|---|---|---|---|---|
| 22 | 64 | | 63.82 | | 600.7401 | | 591.9489 | |
| 25 | 74 | | 71.29 | | 290.3616 | | 205.3489 | |
| 29 | 82 | | 81.25 | | 50.1264 | | 40.0689 | |
| 35 | 90 | | 96.19 | | 61.7796 | | 2.7889 | |
| 38 | 100 | | 103.66 | | 235.0089 | | 136.1889 | |
| 42 | 120 | | 113.62 | | 639.5841 | | 1002.9889 | |
| | | | | | 1877.6007 | | 1979.3334 | |
| | | | [0.5] | | [0.5] | | [0.5] | |
| y bar | 88.33333 | | | | | | | |
| | | | | | Exp Var/Total Var | | | |
| | | | | | | | | |
| | | | | | R^2 | 0.948603 | | |
| | | | | | | [0.5] | | |

a) $R^2 = 94.86\%$.

b) ~~94~~ $100 - 94.86 = 5.14\%$.

5.14% of variation in sales are due to other factors.

—[1]

(6)

$TC = 1000 + 200q - 7q^2 + 0.75q^3$

$MC = 200 - 14q + 2.25q^2$

$P = MR = MC$

$205 = 200 - 14q + 2.25q^2$ [0.5]

$2.25q^2 - 14q - 5 = 0$ —— [0.5]

$$q = \frac{-(-14) \pm \sqrt{(-14)^2 - 4(2.25 \times -5)}}{2(2.25)}$$

$$= \frac{14 \pm \sqrt{196 + 45}}{2(2.25)}$$

$$q = \frac{14 \pm 15.52}{2(2.25)}$$

$q = 6.56$ —— [0.5]

$Q_s = 6.56 \times 500 = 3280$ —— [1]

Minimum price to be offered

5) AVC min

$AVC = 200 - 7q + 0.75q^2$

$\frac{dAVC}{dq} = 0$

$-7 - 7 + 1.5q = 0$

$q = \frac{7}{1.5} = 4.66$ ——— [1]

$AVC = 200 - 7(4.66) + 0.75(4.66)^2$

$AVC_{min} = 183.66 = P$. ——— [1]

6) $P = 100 - 0.5Q$ $\quad$ $P = 120 - 1.5Q$

$MR_1 = 100 - Q$ $\quad$ $MR_2 = 120 - 3Q$

Kink - $100 - 0.5Q = 120 - 1.5Q$

$Q = 20$ ——— [0.5]

$P = 100 - 0.5(20) = 90$. ——— [0.5]

at $Q = 20$

$MR_1 = 80$. $\quad$ $MR_2 = 60$.

[0.5] $\quad$ [0.5]

$TC = 100 + 40Q + 2.5Q^2$ (8)

$MC = 40 + 5Q$

at $Q = 20$ [0.5]

$MC = 140.$

It is falling above the range hence it will cut $MR_1$.

$MR_1 = MC.$ ——— [0.5]

$\therefore \quad 100 - Q = 40 + 5Q$

$6Q = 60, \quad Q = 10.$

$P = 100 - 0.5(10) = 95.$

Profit max$^m$ $P = 95$ $Q = 10.$ ——— [0.5]

$\pi = (P - AC)Q$, $AC = \frac{100}{Q} + 40 + 2.5Q = 75$ $\pi = (95 - 75) \times 10 = 200$ [0.5]

7). $GDP_{MP} = C + I + G + (X - M)$

$= 2000 + 4500 + 7000 + (-290)$

$= 13500 - 290$

$= 13210.$ ——— [1.5]

$NNP_{FC} = GDP_{MP} - Dep + NFIA - NIT$

$= 13,210 - 0 + 275 - 150$

$= 13,335$ ——— [1.5]

$Q = 30 - P$ , $TC = \frac{1}{2}Q^2$

$P = 30 - Q$, $MC = Q$

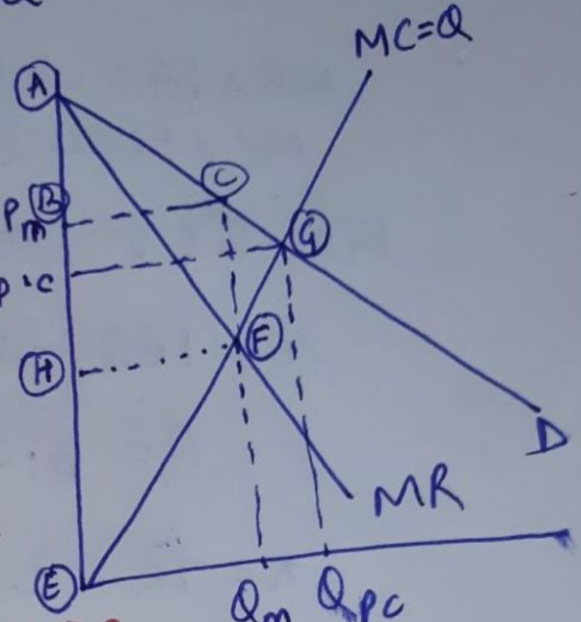
(a) $MR = 30 - 2Q$

$30 - 2Q = Q$

$3Q = 30$

$Q_m = 10$

$P_m = 30 - 10 = 20$ [0.5]




~~$\pi_m = BHFC$~~ $\pi = TR - TC$ or $(P - AC)Q$

~~at $Q = 10$~~ ~~$MC = AC = 10$~~

$\therefore \pi_m = (20 - \cancel{10})(10) = \cancel{100}\ \overset{150}{\overset{5}{}}$ — [0.5]

(b) $P = 30 - Q$

$MC = Q$

$30 - Q = Q$

$2Q = 30$ $Q_{PC} = 15$

$P_{PC} = 30 - 15 = 15$

OR

$C.S_m = ABC$

$= \frac{1}{2}(30 - 20) \times 10 = 50$ [0.5]

$P.S_m = HEF$

$= \frac{1}{2}(10) \times 10 = 50$ [0.5]

$C.S_{PC} = ADG = \frac{1}{2}(30 - 15) \times 15 = 112.5$ — [0.5]

$P.S_{PC} = DEG = \frac{1}{2}(15) \times 15 = 112.5$ — [0.5]

$DW = CFG = \frac{1}{2}(20 - 10)(15 - 10) = 25$ — [1]

9)(a) $P = 140 - 4Q$

$TC = 100 + 120Q - 12Q^2 + 2Q^3$

$MR = 140 - 8Q$

$MC = 120 - 24Q + 6Q^2$

$140 - 8Q = 120 - 24Q + 6Q^2$

$20 + 16Q - 6Q^2 = 0$

$Q = 3.59 \approx 3.6$ ——— [0.5]

$\pi = TR - TC$

$\pi = (140Q - 4Q^2) - (100 + 120Q - 12Q^2 + 2Q^3)$

at $Q = 3.6$

$\pi = (452.16) - (469.792)$

$\pi = -17.632$. ——— [0.5]

(b) $TC = 120Q - 12Q^2 + 2Q^3$

$AC = 120 - 12Q + 2Q^2$

$P' = (140 + x) - 4Q$

$MC = 120 - 24Q + 6Q^2$

$(140 + x) - 4Q = 120 - 12Q + 2Q^2$ ——— [0.5]

↳ $P = AC$.

Solving

~~(140+~~ $(20 + x) + 8Q - 2Q^2 = 0$ — (1)

(11)

$MR = MC$

$(140+x) - 8Q = 120 - 24Q + 6Q^2$

Solving

$(20+x) + 16Q - 6Q^2 = 0$ ——(2) ——[0.5]

Solving (1) and (2) simultaneously

$(20+x) + 8Q - 2Q^2 = 0$

$(20+x) + 16Q - 6Q^2 = 0$

$8Q - 4Q^2 = 0$

$Q = 2$

$(20+x) + 8(2) - 2(2)^2 = 0$

$(20+x) + 16 - 8 = 0$

$20 + x + 8 = 0$

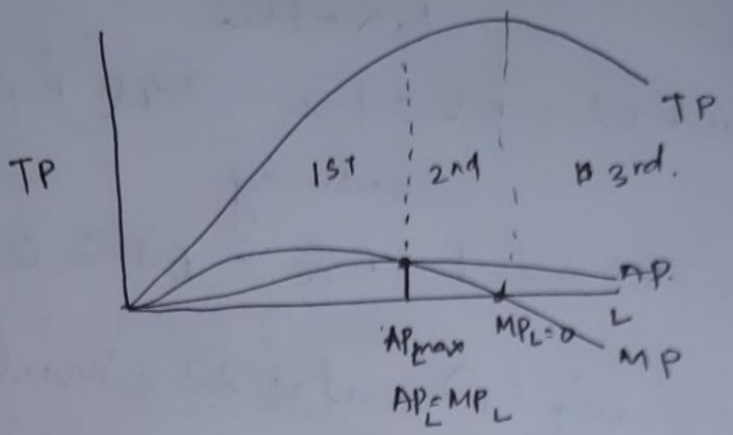
$x = -28$ ——[0.5]

New demand line is -

$P' = (140 - 28) - 4Q$

$P' = 112 - 4Q$ ——[0.5]

Q10.




$L=0 \rightarrow AP_{max}$ or $AP=MP$ — I st stage — [1]

$AP=MP$ (or $AP_{max}$) $\xrightarrow{MP_L=0}$ II nd stage. — [1]

$MP_L$ 0 onwards ⟶ III stage. — [1]

Q11. ⇨ Business cycle tells us the direction of the economy (GDP). it

four phases — Expansion — [0.5]
Peak — [0.5]
Contraction — [0.5]
Trough — [0.5]

(b) Demand Pull - originates from demand side
Rise in prices caused by increase in AD.
— [1]

Cost push — originates from supply side.
Increase in prod$^n$ cost leading to an increase in price. caused by rising cost of production — [1]