Name _____ _____   Enrollment No.____ _____

Jaypee Institute of Information Technology, Noida
End Term Examination, 2022-2023
B.Tech III Semester

Course Title: Economics
Course Code: 15B11HS211

Maximum Time: 2Hrs
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. Mr. Paul owns and manages his own fruit stand. The financial information for the [CO1,3Marks]
stand is given below (all values are monthly):

Wholesale fruit cost $2000	Fruit stand lease cost	$1000
Labour cost $800	Monthly Revenue	$5000

Answer the following based on the information provided.
a) Calculate the accounting profit.
b) If his other employment opportunity is to earn $1000 per month working at a t-shirt stand (he is equally happy selling fruit or t-shirt), what is his economic profit? Should he continue selling fruit?

Q2. Given Q=700-2P+0.02Y, where Price (P)=$25 and Income (Y)=$5000. Calculate: [CO2,2Marks]
a) the price elasticity of demand.
b) the income elasticity of demand.

Q3. Calculate the returns to scale and output elasticities of the inputs for the following [CO3,3Marks]
production functions:
a) $Q=75 L^{0.60} K^{0.70}$
b) $Q= 50L+50K+50LK$
c) $Q= 50L^2+50K^2$

Q4. The following data given the height in inches (X) and the weight in lb. (Y) of a [CO5,3Marks]
random sample of 6 students of age 17 years is:

X	61	68	68	64	65	70
Y	112	123	130	115	110	125

Estimate the weight of a student having height of 75 inches.

Q5. The demand and supply for the soft drinks are given by Q=20-P and Q=3P [CO2,3Marks]
respectively.
a) Solve for the equilibrium price and quantity.
b) Suppose, the government imposes a per unit tax of $4 on the sellers. Solve for the new quantity, price received by the sellers and price paid by the consumers.
c) Calculate the government revenue from the taxation.

Q6. Suppose, concrete supplying industry is perfectly competitive and produces concrete [CO4,4Marks]
at marginal cost MC=10+Q. If the industry is monopolized, the new marginal cost is
MC=14+Q. The market demand for concrete is given by P=50-4Q. Calculate the dead
weight loss resulting from the monopolization of the concrete industry.

Q7. Assume that a very large number of firms in an industry, all have the access to the $\quad$ [CO4,4Marks]
same production technology. The total cost function of an individual firm associated
with this technology is TC=400-24q+4q^2. The demand function for the industry
product is Q=116-P.
a) Find the number of firms when the market is at its long run competitive
equilibrium.
b) At a market price of $60 how much the firms will be willing to supply in the
market?

Q8. Company A and B are selling similar petroleum products. The market demand curve $\quad$ [CO4,4Marks]
for the petroleum products is given by P=140-q$_1$-q$_2$, where q$_1$ and q$_2$ are the quantities
produced by company A and B respectively and P is the selling price. The short run
total cost functions of A and B are:
$$TC_1=20q_1+q_1{}^2+30 \quad \text{and} \quad TC_2=30q_2+3q_2{}^2+40$$
Assume that company A and B form a cartel to act as a monopolist and maximize total
industry profit.
a) Determine the profit maximizing price output combination of cartel and optimum
output and selling price for each company.
b) Calculate the individual profit of both the companies along with profit of the cartel.

Q9. From the following data, calculate NNP at factor cost (National Income) by $\quad$ [CO6,3Marks]
a) Income method
b) Expenditure method

Sr. No	Items	Rs.(in crores)
1	Gross domestic capital formation	420
2	Interest	200
3	Rent	300
4	Private final consumption expenditure	1300
5	Government final consumption expenditure	730
6	Net exports	-20
7	Depreciation	60
8	Net factor income from abroad	-50
9	Profits	600
10	Compensation of employees	1200
11	Net indirect taxes	70

Q10. Explain the main characteristics of similarity and difference between a perfect $\quad$ [CO4,2Marks]
competitor and a monopolistic competitor.

Q11. The business cycle allows people to understand the direction of the economy and plan $\quad$ [CO6,2Marks]
accordingly. In the light of this statement explain different phases of business cycle.

Q12. Compare and contrast between demand pull and cost push inflation. $\quad$ [CO6,2Marks]

Solution

Ans:1 (a) Accounting profit $=$ Revenue $-$ Explicit cost

$$= 5000 - (2000 + 1000 + 800)$$
$$= 5000 - 3800$$
$$= \$1200 \quad \text{————————[1]}$$

(b) Economic Profit $=$ Revenue $-$ (Explicit cost $+$ Implicit cost)

$$= 5000 - (3800 + 1000)$$
$$= 5000 - 4800 = \$200 \quad \text{————[1]}$$

Yes, he should continue selling fruits, since economic profit is +ve. ———— [1]

Ans:2 $\quad \varepsilon_d = \dfrac{\partial Q}{\partial P} \cdot \left(\dfrac{P}{Q}\right)$

$\left(\begin{array}{l}\text{Price elasticity}\\\text{of demand}\end{array}\right) \dfrac{\partial Q}{\partial P} = -2 \quad$ and $Q = 700 - 2(25) + 0.02(5000)$
$$= 750.$$

$\quad\longrightarrow \varepsilon_d = -2\left(\dfrac{25}{750}\right) = -0.067. \quad\text{————[1]}$

$\begin{array}{l}\text{Income}\\\text{elasticity}\\\text{of demand}\end{array} = \dfrac{\partial Q}{\partial Y}\left(\dfrac{Y}{Q}\right) = 0.02\left(\dfrac{5000}{750}\right) = 0.133. \text{——[1]}$

<u>Ans:3</u>

$$\begin{bmatrix} \text{(a) increasing returns to scale} \\[4pt] \text{(b) } \underset{\text{increasing}}{\text{Constant}} \text{ returns to scale} \\[4pt] \text{(c) } \underset{\text{constant}}{\text{increasing}} \text{ returns to scale} \end{bmatrix} \times$$

In sequance
after ques No9

<u>Ans:4</u>

$\Sigma X = 396$
$\Sigma Y = 715$ $[0.5]$
$\Sigma X^2 = 26190$
$\Sigma XY = 47296$

<u>Eq's</u>

$715 = 6a + 396b$ $[1]$
$47296 = 396a + 26190b$

$a = -10.38$ $[0.5]$
$b = 1.96$

Regression line $= -10.38 + 1.96X$

Y at $X = 75$
$$Y = -10.38 + 1.96(75)$$
$$= 136.62 \qquad [0.5]$$

Ans:5 $Q_d = 20 - P$

$Q_s = 3P$

(a) for eqm $Q_d = Q_s$

$20 - P = 3P$

$20 = 4P$ ⇒ $\boxed{P = 5}$ [0.5]

$\boxed{Q_d = 20 - 5}$

$\boxed{\text{Equilibrium Quant} = 15}$

(b) $4 tax on producer

Supply curve will be $P = \dfrac{Q}{3} + 4$

Eq^m ⇒ $\dfrac{Q}{3} + 4 = 20 - Q$ [0.5]

$Q = 12$

~~sellers will recieve~~ $\dfrac{12}{3} + 4 = \$8$ [1]

consumers will pay $20 - 12 = \$8$

Gout will recieve \$4 tax amount so seller will reciev

(c) Government revenue $\$4 \times 12 = \boxed{\$48}$ $\$8 - \$4 = \$4$

[1]

Ans:6. Perfect competition

$P = MC$

$50 - 4Q = 10 + Q$

$Q = 8$

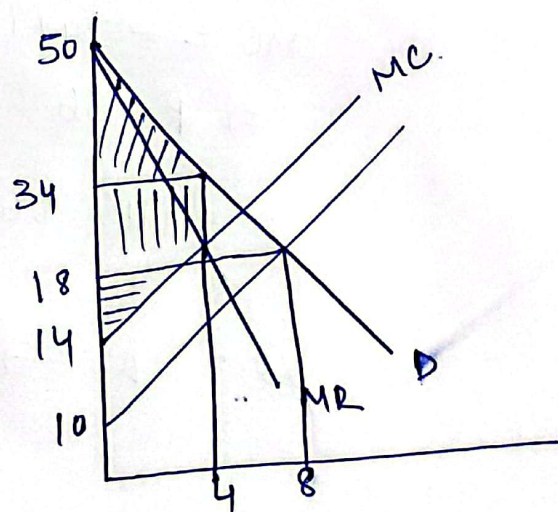$P = 50 - 4(8) = 18$ [1]

<u>Monopoly</u> $\underline{MR = MC}$

$MR = 50 - 8Q$

$50 - 8Q = 14 + Q$

$Q = 4$

$P = 50 - 4(4) = 34$ [1]

$$DW = C.S_{PC} + P.S._{PC} - CS_M - \pi_{lm} - P.S._M$$
$$= \frac{1}{2}(50-18) \times 8 + \frac{1}{2}(18-10) \times 8 - \left[\frac{1}{2}(50-34)4 + (34-18)4 + \frac{1}{2}(18-14)4\right]$$

$$= 56 \qquad [2]$$

Ans:7 $\qquad TC = 400 - 24q + 4q^2$
$$Q = 116 - P$$

(a) long run eqm $\qquad AC = MC$.

$$AC = \frac{400}{q} - 24 + 4q$$

$$MC = -24 + 8q$$

$$\Rightarrow \qquad -24 + 8q = \frac{400}{q} - 24 + 4q$$

$$4q = \frac{400}{q}$$

$$q^2 = 100 \Rightarrow \boxed{q = 10} \qquad [1]$$

$$MC = -24 + (80) = 56$$

$$\Rightarrow P = 56$$

$$Q = 116 - 56 = 60$$

$$Q = nq \cdot \Rightarrow 60 = n.10$$
$$\Rightarrow \boxed{n = 6} \qquad [1]$$

(b) Given $P = 60$

supply line of firm $P = MC$.

$$\Rightarrow P = -24 + 8q$$

$$q = \frac{P}{8} + 3 \qquad [1]$$

no.of firms in long run are 6 (calculated in part (a))

$$\Rightarrow \text{Market supply} \ (Q) = n \cdot q$$

$$= 6 \times \left(\frac{P}{8} + 3\right)$$

$$= 6 \times \left(\frac{60}{8} + 3\right)$$

$$= 6 \times (7.5 + 3)$$

$$= 6 \times 10.5 = 63. \qquad [1]$$

Ans:-8

$$TC_1 = 20q_1 + q_1^2 + 30$$

$$MC_1 = 20 + 2q_1 \Rightarrow q_1 = \frac{-20 + MC_1}{2}$$

$$TC_2 = 30q_2 + 3q_2^2 + 40$$

$P = 140 - Q.$

$MR = 140 - 2Q.$ $\quad MC_2 = 30 + 6q_2 \Rightarrow q_2 = \frac{-30 + MC_2}{6}$

$$q_1 + q_2 = 0.5MC - 10 + 0.16MC - 5 \qquad [0.5]$$

$$Q = 0.66 \, \Sigma MC - 15 \quad \Rightarrow \quad \Sigma MC = \frac{Q + 15}{0.66}$$

Taking
$MR = MC$ $\quad 140 - 2Q = 1.51Q + 22.72 \qquad = 1.51Q + 22.7$

$$140 - 22.72 = (1.51 + 2) Q \qquad [1]$$

$$117.28 = 3.57 Q$$

$$Q = 33.5$$

$$MR = 140 - 2 \times 33.5$$
$$= 140 - 67 = 73$$

$$MR = MC_1 \qquad [0.5]$$
$$73 = 20 + 2q_1$$
$$53 = 2q_1 \Rightarrow q_1 = \frac{53}{2} = 26.5$$

$$MR = MC_2 \qquad [0.5]$$
$$73 = 30 + 6q_2$$
$$43 = 6q_2 \Rightarrow q_2 = \frac{43}{6} = 7.1$$

$$P = 140 - 26.5 - 7 = 106.5$$

Total Profit $= TR - TC_1 - TC_2$

~~$A(Ppp0 e00)00$ ooo~~

$$= 106.5 \times 33.5 - 1262.5 - 397 \qquad [0.5]$$
$$= 1908.5$$

Profit (firm A) $= TR_A - TC_A$
$$= 2822.25 - 1262.5 \qquad [0.5]$$
$$= 1559.75$$

Profit (Firm B) $= TR_B - TC_B$
$$= 106.5 \times 7 - 397$$
$$= 745.5 - 397 = 348.5 \qquad [0.5$$

(b)

Ans:-9 (a) NNP FC by Income method

$$NNP_{FC} = CoE + Interest + Rent + Profits + NFIA$$

$$= 1200 + 200 + 300 + 600 + (-50)$$

$NDP_{fc} = 2300$ $= \text{Rs } 2250$ crores $-[0.5]$ $\boxed{1.5}$

[1]

(b) By Expenditure method

$$NNP_{FC} = \text{Pvt final consumption Exp} + \text{Govt final Cons. Exp}$$
$$+ GDCF + \text{Net Exports} - NIT + NFIA - \text{Depriciation}$$

$GDP_{mp} =$ $= 1300 + 730 + 420 + (-20) - 70 + (-50) - 60$

2430

[1] $= \text{Rs. } 2250$ crores. $-[0.5]$ $\boxed{1.5}$

Ans:-3 (a) $Q = 75 \, L^{0.60} \, k^{0.70}$

$\alpha = 0.60$ $\alpha + \beta > 1 \Rightarrow$ Increasing returns to scale

$\beta = 0.70$ $[0.5]$

Output elasticity of labour $= 0.60$

Output elasticity of Capital $= 0.70$ $\left. \right] [0.5]$

[Award 0.5 marks if elasticity is calculated for output, any of the inputs.]

(b). $Q = 50L + 50K + 50 LK$

putting $L = 1, K = 1$

$$Q = 50(1) + 50(1) + 50(1)(1) = 150$$

putting $L = 2, K = 2$

$$Q = 50(2) + 50(2) + 50(2)(2) = 400$$

$\Rightarrow$ Increasing Returns to scale $[0.5]$

output elasticity of labour $\left(\frac{MPL}{APL}\right) = \dfrac{1+k}{1+\frac{k}{L}+k}$

" " capital $\left(\frac{MPk}{APk}\right) = \dfrac{1+L}{1+\frac{L}{k}+L}$ [0·5]

(c) $Q = 50L^2 + 50k^2$

putting $L=1, k=1$

$Q = 50(1)^2 + 50(1)^2 = 100$

putting $L=2, k=2$

$Q = 50(2)^2 + 50(2)^2 = 400$

$\Rightarrow$ Increasing Returns to scale [0·5]

output elasticity of labour $\left(\frac{MPL}{APL}\right) = \dfrac{2L}{L+\frac{k^2}{L}}$

" " " capital $\left(\frac{MPk}{APk}\right) = \dfrac{2k}{\frac{L^2}{k}+k}$ [0·5]

Ans 10

Similarities between Perfect Competitor and Monopolistic Competitor

- ○ large number of relatively small buyers and sellers

- ○ easy market entry and exit

[1]

Difference between Perfect Competitor and Monopolistic Competitor

- • In Monopolistic Competitor Many firms selling products that are similar but not identical. But under Perfect Competitor it is standardized product

- • In Perfect Competition minimum point of ATC is tangent with Demand curve.

Comparing Monopolistic Competition and Perfect Competition long run
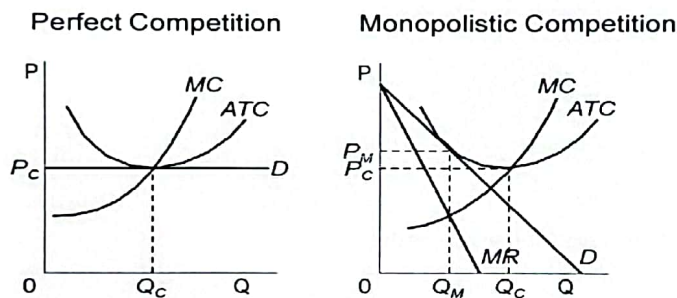
Perfect Competition   Monopolistic Competition   [1]

Ans11:

The **business cycle**, also known as the economic **cycle** or trade **cycle**, is the downward and upward movement of gross domestic product (GDP) around its long-term growth trend. The length of a **business cycle** is the period of time containing a single boom and contraction in sequence.

Phases of the Business Cycle

[0·5 each phase]

Expansion (Growing)

Expansion is the phase of the **business cycle** where real GDP grows for two or more consecutive quarters, moving from a trough to a peak. This is typically accompanied by a rise in employment, consumer confidence, and equity markets. **Expansion** is also referred to as an **economic** recovery.

Peak (Top)

A **peak** is the highest point between the end of an **economic** expansion and the start of a **contraction** in a **business cycle**. The **peak** of the **cycle** refers to the last month before several key **economic** indicators, such as employment and new housing starts, begin to fall.

Contraction (Shrinking)

Contraction, in economics, refers to a phase of the **business cycle** in which the economy as a whole is in decline. A **contraction** generally occurs after the **business cycle** peaks, but before it becomes a **trough.**

Trough (Bottom)

A **trough** is the stage of the **economy's business cycle** that marks the end of a period of declining **business** activity and the transition to expansion. These increase during expansion, recede during contraction, and **bottom** out during a **trough.**

Ans12:

The Demand-Pull inflation → originates from demand side of the economy

- ➡ A sustained rise in the price level caused by   increases in aggregate demand.

- ➡ If aggregate demand for domestic output exceeds economy's productive potential, then the [1]
  price level will rise

The Cost-Push inflation → originates from supply side of the economy   [1]

- ➡ An increase in production costs leading to an increase in prices

- ➡ It is caused by rising cost of production independently of the excess demand in the market