1. Answer the following questions as directed:

1 \times 10 = 10

(a) Total cost \((C) = \) ______ + total variable cost \((VC)\).

(Fill in the blank)

(b) If \(C = 100 + 2Q - 5Q^2\), where \(C\) is total cost and \(Q\) is output, what is the total fixed cost?

(c) State Euler's Theorem.
(d) Given the Cobb-Douglas production function $Q = AL^\alpha K^\beta$. What do $\alpha$ and $\beta$ indicate?

(e) In a two-person zero-sum game, a saddle point always exists. (Write True or False)

(f) Obtain the total revenue function from the following marginal revenue function:

$$MR = 100 - 0.5Q$$

where $Q$ denotes quantity of output.

(g) Determine the marginal propensity to save from the consumption function

$$C(Y) = 50 + 0.8Y^{\frac{1}{2}}$$

where $C$ is consumption and $Y$ is income.

(h) What is feasible solution?

(i) Who has written The Theory of Games and Economic Behaviour?

(j) Define elasticity in terms of $AR$ and $MR$.

2. Answer the following questions: $2 \times 5 = 10$

(a) Given the total cost function,

$$C = 2Q^2 + 5Q + 18$$

where $Q$ is output level, find the output at which average cost is minimum.

(b) If the rate of investment is given by

$$I(t) = 3t^\frac{1}{2}$$

find the time path of capital formation when $k(0) = 50$.

(c) Define pure strategy and mixed strategy.

(d) Find out equilibrium national income $\bar{Y}$ and consumption $\bar{C}$ from the following national income model:

$$Y = C + I$$

$$C = 50 + 0.8Y$$

$$I = 100$$

where $Y$, $C$ and $I$ denote national income, consumption and investment.

(e) If $Q = \sqrt{2 + p}$ is a supply function, find the elasticity of supply with respect to price at $P = 2$.

3. Answer any four of the following questions: $5 \times 4 = 20$

(a) Show the relationship between marginal cost (MC) and average cost (AC) using the product rule of differentiation.

(b) Given two goods market models:

\[
\begin{align*}
\text{Market—I} & \\
D_1 &= S_1 \\
D_1 &= 25 - 2P_1 + P_2 \\
S_1 &= -5 + 4P_1 \\
\text{Market—II} & \\
D_2 &= S_2 \\
D_2 &= 20 + 2P_1 - 2P_2 \\
S_2 &= -10 + 5P_2 \\
\end{align*}
\]

Obtain equilibrium prices $P_1$ and $P_2$. 

/154 2 [ Contd.  

/154 3 [ P.T.O. ]
(c) Give the general formulation of linear programming problem.

(d) In a perfectly competitive market, the total revenue and total cost of a firm are given by

\[ TR = 12Q \quad \text{and} \quad TC = 2 + 4Q + Q^2 \]

Obtain profit maximizing output and total profit.

(e) Given the demand function \( P = 40 - 2Q^2 \), find the consumer's surplus, if free goods, \( P = 0 \).

(f) The total cost function of a firm is given by

\[ C = Q^3 - 12Q^2 + 36Q + 8 \]

where \( C \) is total cost and \( Q \) is quantity of output. What is total fixed cost? Also derive the average cost function and marginal cost function.

4. Answer the following questions:

(a) A firm has the total cost function \( C = 7Q^2 + 5Q + 120 \) and demand function \( P = 180 - 0.5Q \). If a subsidy of \( \text{Rs} \) 5 per unit of output is paid by the government, find—

(i) the profit maximizing output and price;

(ii) the impact of subsidy on equilibrium output and price.

(b) Given the market model

\[ D = a - bp, \quad (a, b > 0) \]
\[ S = -c + dp, \quad (c, d > 0) \]
\[ D = S = Q \]

where \( Q, D, S, P \) are quantity, demand, supply and price respectively and \( a, b, c, d \) are parameters.

(i) Find equilibrium price \((\bar{P})\) and equilibrium quantity \((\bar{Q})\).

(ii) Examine the effect of increase in the intercept and slope of demand curve on the equilibrium price and quantity.

Or

The sales revenue function of a firm is given by

\[ R = 18L + 24M + 10ML - 5M^2 - 8L^2 \]

where \( R, L \) and \( M \) denote revenue, labour and machine respectively. Determine the amount of machines and labour needed to maximize revenue of the firm.

(c) A monopolist discriminates prices in two markets of its product and his
average revenue \((AR)\) and total cost \((C)\) functions are given by

\[
AR_1 = 60 - 4Q_1 \\
AR_2 = 42 - 3Q_2
\]

where \(Q_1\) and \(Q_2\) are the outputs of first and second markets and the total cost function is given by

\[
C = 50 + 12Q, \text{ where } Q = Q_1 + Q_2
\]

Find profit maximizing output, prices and maximum profit.

Or

(i) Define the term ‘player’ in the game theory. Solve the following game where the pay-off matrix of firm A is given below:

<table>
<thead>
<tr>
<th></th>
<th>(B_1)</th>
<th>(B_2)</th>
<th>(B_3)</th>
</tr>
</thead>
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<tr>
<td>(A_1)</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>(A_2)</td>
<td>0</td>
<td>-4</td>
<td>-3</td>
</tr>
<tr>
<td>(A_3)</td>
<td>1</td>
<td>5</td>
<td>-1</td>
</tr>
</tbody>
</table>

(ii) In Domar growth model, the equilibrium condition requires that capacity creation should be equal to income generation and is given by

\[
\frac{dI}{dt} = p \frac{dK}{dt}
\]

Find out the time path of investment.

(d) Solve the following linear programming problem by graphic method:

Maximize \(\pi = 4x_1 + 3x_2\)

subject to

\[
x_1 + x_2 \leq 4 \\
2x_1 + x_2 \leq 6
\]

and \(x_1 \geq 0\) and \(x_2 \geq 0\)

Or

Write short notes on ‘two-person zero-sum game’ and ‘non-zero-sum games’.

***

\[\text{Contd.}\]