

Time 3Hours

Marks: 100

- Note: (i) All questions are compulsory.
 (ii) Each question carries 20 marks.
 (iii) The use of simple calculator is allowed.

- Q1. Attempt any two of the following: (20)
- A (i) Given $A = \{a, b, c, d\}$, $B = \{a, b, g, e, f\}$. Find $A \cap B$ and $B - A$. (05)
 (ii) Find the y-intercept for the following equation.
 $Y = 5X - 17$ (05)
- B (i) Draw the graph of $Y = 2^x$ by taking any hypothetical values of X. (04)
 (ii) If the demand function and supply function are given as $D = 2 - 3P$ and $S = 5P - 1$, find the price and equilibrium level of output. (06)
- C Given $C = 50 + 0.25Y$ (10)
 $I = 10 + 0.25Y$
 $G = 50$ (Government Expenditure)
 Find equilibrium values of income (Y), Consumption (C) and Investment (I).
- Q2. Attempt any two of the following: (20)
- A i Find the Maxima and Minima for the following function $Y = 2x^3 - 6x$.
 ii Optimize the following profit function $Z = 12x - 2x^2 - 2$ and find the quantity where the profit is maximized.
- B Find all second order partial derivatives for the following:
 $Z = -x^2 + xy - y^2 + 2x + y$
- C Solve the following using the method of Lagrange Multiplier:
 $Q = L^{0.8} K^{0.2}$ subject to the constraint $5L + 3K = 75$ and find the values of L and K.
- Q3. Attempt any two of the following: (20)
- A Evaluate the following:
 i $\int_0^2 25 - 3x - 3x^2$
 ii $\int_0^2 25 - 3x - 3x^2$
- B Find the consumers and producers surplus for the following demand function $P = 15 - x$ and supply function $P = 0.3x + 2$.
- C The function of Lorenz curve is given as $\int_0^1 (\frac{x}{10} + \frac{9x^2}{10})$. Find the Gini coefficient value.

Q4. Attempt any two of the following : (20)

A Let $A = \begin{bmatrix} 3 & 6 \\ 7 & 0 \end{bmatrix}$ $B = \begin{bmatrix} -1 & 7 \\ 8 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 5 & 4 \\ 1 & 9 \end{bmatrix}$. Then verify that $(A+B) - C = A + (B - C)$

B Find the value of x , y and z using the method of Cramer's rule for the following: $4x - 6y = -8$ and $5x + 3y = 12$

C From the following input output transaction table, find equilibrium levels of output when final demand are changed to 175 and 300 for the two sectors.

Producing sectors	Receiving Sector		Final demand	Total demand
	1	2		
1	150	200	50	400
2	175	250	275	700

Q5. Attempt any two of the following : (20)

A i Draw the graph for $y = 2x + 1$ by taking any hypothetical values of x .
ii Given $y = 5x^3 + 2x^2 + 10$, find dy/dx

B If $TC = q^3 - 3q^2 + 15q + 25$, then find AC and MC and their values at $q=5$.

C Find the area under the curve for $y = 5x + 1$ for $x = 1$ to $x = 4$

D Find Rank of the following matrix.

$$A = \begin{bmatrix} 2 & 3 & 1 \\ 1 & 4 & 3 \\ 4 & 5 & 3 \end{bmatrix}$$

OR

Q5. Choose the correct option for the following questions and rewrite: (20)

_____ was the first mathematician to study sets systematically.

i George Cantor

ii Ramanujan

iii Pythagorous

iv Archimidies

2. A _____ is a collection of well defined, distinguishable objects or entities.
- group
 - Set
 - Clan
 - Division
3. If demand function is $P = 50 - 3x$ and quantity (x) = 10, then the price = _____
- 30
 - 20
 - 60
 - 40
4. The first order derivative of $x =$ _____
- 1
 - 2
 - 3
 - 4
5. The necessary condition for maxima and minima _____
- $dy/dx = 1$
 - $dy/dx = 2$
 - $dy/dx = 3$
 - $dy/dx = 0$
6. If $TR = 40x^2 + 20$, then $MR =$ _____
- $80x$
 - 80
 - $60x$
 - 20
7. The second order derivative of $4x^5$ is _____
- $12x^5$
 - $20x^5$
 - $30x^5$
 - $80x^3$
8. If demand function is $P = 30 - 12D$ then find the value of TR for $D = 4$ units
- 66
 - 56
 - 76
 - 86
9. If $Q = 100KL + 8K^2 + 5L^2$ then find Marginal productivity of labour and capital.
- $MPL = 100K + 10L$ and $MPK = 100L + 16K$
 - $MPL = 50K + 10L$ and $MPK = 200L + 20K$
 - $MPL = 50L + 10K$ and $MPK = 200L + 20K$
 - $MPL = 50K + 10L$ and $MPK = 200K + 20L$

- 15 If $P = 40$ and $Q = 20$, then the TR = _____
- i. 400
 - ii. 500
 - iii. 700
 - iv. 800
- 16 _____ matrix is a matrix with order $1 \times n$
- i. Column
 - ii. Zero
 - iii. Triangular
 - iv. Row
- 17 By deleting a few rows and columns we get a new matrix called as _____
- i. Null-matrix
 - ii. Sub-matrix
 - iii. Rectangular matrix
 - iv. Row matrix
- 18 The formula for inverse of matrix $A =$ _____
- i. Adjoint of A / Determinant of A
 - ii. Determinant of A / Adjoint of A
 - iii. (Determinant of A) . (Adjoint of A)
 - iv. Determinant of $A +$ Adjoint of A
- 19 _____ is the analysis based on the idea that a transaction from the sellers point of view may be interpreted as a sale of output whereas from the buyer's point of view, it is a purchase of input.
- i. Linear Programming
 - ii. Input-Output Analysis
 - iii. Game theory
 - iv. General equilibrium analysis
- 20 Input Output analysis was propagated by _____
- i. Prof. Alfred Marshal
 - ii. Prof. Walrus
 - iii. Prof. Pigou
 - iv. Prof. Leontief