Duration:2 hours

Max.Marks:80

INSTRUCTIONS:
5. All questions are compulsory.
6. Start each new question on fresh page.
7. Figures to the right indicate full marks
8. Graph paper and Log tables are provided with request.

Q.1   Attempt the following: (5 X 4 = 20)

a   Find the coordinates of the point dividing the segment joining the points
      (1, 2), (3, 4) externally in the ratio 1:2.

b   Find the derivative of the following w.r.t x if
           ii) $y = x^2 - 7x + 5$ ii)$y = (x - 5) + logx$

c   If $f(x) = x - 12$ and $g(x) = 4x + 7$, find $f(g(x))$ and $g(f(x))$.

d   Evaluate the following integrals:
           ii) $\int (x^7 + 5x + 1)\ dx$ ii)$\int (2x + 3)^2\ dx$

OR

Q.I   Attempt the following: (5 X 4 = 20)
w   Find the equation of a line having slope 3 and passing through the point
      (4,1).

x   Find the derivative of the following w.r.t x if
           ii) $y = 5x^{54} + x^{-3} - \sqrt{x}$

y   If $f(x) = 2x - 300$ and if $f(x + 1) = f(x - 1)$, find x.
z   Evaluate the following integrals:
           i)$\int_1^3 (12x + 5)dx$ ii)$\int_0^6 \left(e^x + \frac{1}{x}\right) dx$

Q.2   Attempt the following: (5 X 4 = 20)
a   Find $\lim\limits_{x \to 2} \frac{x^2-4}{x^2-x-2}$.

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b   If the total cost function is given by C=x^2+x+2,find the average cost and marginal cost when x=2

c   Solve graphically, the following L.P. problem.

$$\text{Maximize } z = x + y$$
$$\text{subject to : } \quad x + 2y \leq 8, \quad 3x + 2y \leq 12, \quad x \geq 0, y \geq 0$$

d   For the function $f(x,y) = x^2 + 2xy + y^2$. Find f_x and f_y at $(1, 2)$.

OR

Q.II   Attempt the following: (5 X 4 = 20)

W   If f is continuous at $x = 4$ where

$$f(x) = \quad x^2 - 2x + 1 \qquad 0 \leq x \leq 4$$
$$= \quad 4x + a \qquad 4 < x \leq 8$$

$find \ a.$

X   Find out when $f(x) = x^3 - 27x + 10$ is increasing and decreasing on R.

Y   Formulate the LPP:

A company produces soft drinks that have a contract which requires that a minimum of 80 units of the chemical A and 60 units of the chemical B to be present in each bottle of the drink. The chemicals are available in a prepared mix from to two suppliers S and T. Supplier S has a mix of 4 units of A and 2 units of B that cost Rs. 10. Supplier T has a mix of 1 unit of A and 1 unit of B that costs Rs. 4. How many mixes from S and T should the company purchase to minimize the cost and honor the contract requirements?

Z   For $f(x,y) = x^2 + xy - y^2$, find $f(x,y)$,
       for (i) $x = -2$ (ii)$y = 1$ (iii) $(x,y) = (2,1)$.

Q.3   Attempt the following: (5 X 4 = 20)

A   In how many years, the amount of money will be three times the principal at simple interest of 10% per annum?

B   Find the equation of line passing through the points A(1,6) and B(-5,0).

C   If the Marginal Revenue function for a certain product is
      $MR = 12 - 3x^2 + 4x$. Find the Revenue function and the corresponding demand function.

d   Find the extreme values of the function $f(x) = x^4 - 4x$.

OR

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Q.III Attempt the following: (5 X 4 = 20)
w   Find the present value of an annuity of Rs. 4,000 per year for 2 years at
       10% per annum.
x   Find the equation of the line whose x-intercept is 5 and which is
       perpendicular to the line x-2y+14=0.
y   The demand function for a certain commodity is $p = 100 - 5x$. Find the
       consumer's surplus at $x = 5$
z   If $y = logx + 3x^2 + 100$ Find $\frac{d^2y}{dx^2}$.

Q.4   Attempt the following: (5 X 4 = 20)
a   e. A bank has decided to collect Fixed Deposit at the rate of 10% p.a, to
           be compounded quarterly basis. Find the effective rate of interest.

b   f. Show that (3,-5), (4,3) and (11,-4) are the vertices of an isosceles
           triangle.

c   g. If marginal revenue (MR) =20 and elasticity of demand w.r.t price
           is 2, find the price.

d   h. Evaluate: $\int (x^2 - 30x + e^x)\, dx$

OR

Q.IV   Attempt the following   (5 X 4 = 20)
w   Find the sum borrowed by Rohit from a bank on compound interest at
       5% per year, to be calculated annually, if he had to pay back Rs.
       26,460 after 2 years

x   Obtain the equation of a straight line having slope 2 and making y-
       intercept 5.

y   A manufacturer sell x items at a price p=210-x. The total cost of
       producing these items is C (x) $=x^2 +10x+15$. Find x for which the profit
       is maximized.

z   Evaluate: $\int_0^2 (1 + 40x^2 - 10x^3)dx$

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