11819

3 Hours / 70 Marks Seat No.

Marks

1.   **Solve any FIVE of the following:**   **10**

a)   If $f(x) = 3x^2 - 5x + 7$ show that $f(-1) = 3f(1)$

b)   Define odd and even function with suitable examples.

c)   Find dy/dx if $y = a^x + x^a + a^a + \sqrt{x}$

d)   Evaluate $\int \dfrac{1}{x^2 + 4} \, dx$

e)   Evaluate $\int x \cdot e^x \, dx$

f)   If $z_1 = 4 - 5i$ and $z_2 = 3 + 7i$ find $|z_1 + z_2|$.

g)   Find the area enclosed by $y = 3x^2$, the lines $x = 1$, $x = 3$ and x-axis

P.T.O.

Marks

2.   **Solve any THREE of the following:**   **12**

a)   Find dy/dx if $x^3 + y^3 = 3axy$

b)   Find dy/dx if $x = 1/t$ and $y = 1 - 1/t$

c)   A bullet is fired into a mud bank and penetrates $(120t - 3600t^2)$m. in 't' sec. after impact. Calculate maximum depth of penetration.

d)   Find radius of curvature to the curve $y = x^3$ at (2, 8)

3.   **Solve any THREE of the following:**   **12**

a)   Find equation of tangent to curve $4x^2 + 9y^2 = 40$ at (3, 2)

b)   Find dy/dx if $y = \sec^{-1}\left[\dfrac{1}{4x^3 - 3x}\right]$

c)   If $y^x = e^y$ prove that $\dfrac{dy}{dx} = \dfrac{(\log y)^2}{\log y - 1}$

d)   Evaluate $\displaystyle\int \dfrac{(x-1)e^x}{x^2 . \sin^2(e^x/_x)}dx$

4.   **Solve any THREE of the following:**   **12**

a)   Evaluate $\displaystyle\int \dfrac{dx}{4\cos^2 x + 9\sin^2 x}$

b)   Evaluate $\displaystyle\int \dfrac{\log x}{x\big[2 + \log x\big]\big[3 + \log x\big]}\,dx$

c)   Evaluate $\displaystyle\int_2^5 \dfrac{\sqrt{x}}{\sqrt{7-x} + \sqrt{x}}\,dx$

d)   Evaluate $\displaystyle\int x \cdot \tan^{-1}x \cdot dx$

e)   Evaluate $\displaystyle\int \dfrac{x}{(x+1)(x+2)}\,dx$

Marks

5.   **Solve any TWO of the following:**   12

a)   Find by integration the area between the curves $y = x^2 + 1$ and line $y = 2x + 1$

b)   Solve the following.

(i)   Verify that $y = \log x$ is a solution of differential equation

$$x\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$$

(ii)   The velocity of a particle is given by $v = t^2 - 6t + 7$. Find distance covered in 3 second. initially $x = 0$ when $t = 0$

c)   Solve the following.

(i)   Solve $(1 + x^2)dy - (1 + y^2)dx = 0$

(ii)   Solve $\frac{dy}{dx} + y\cot x = \cos x$

6.   **Solve any TWO of the following:**   12

a)   If $\omega_1 = \frac{-1}{2} + i\frac{\sqrt{3}}{2}$ and $\omega_2 = \frac{-1}{2} - i\frac{\sqrt{3}}{2}$ show that $\omega_1 2 = \omega_2$

b)   Find $L\left[e^3 t \cdot (t^2 + t)\right]$

c)   Find $L^{-1}\left[\frac{2s^2 - 4}{(s + 1)(s - 2)(s - 3)}\right]$

d)   Solve differential equation using Laplace Transform.

$$\frac{dy}{dt} + 2y = e^{-t}, \text{ given } y(0) = 2$$

_____