24209

21222

3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

Instructions – (1) All Questions are *Compulsory.*

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

(5) Assume suitable data, if necessary.

(6) Use of Non-programmable Electronic Pocket Calculator is permissible.

(7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

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

a) State whether the function $f(x) = x^3 - 3x + \sin x + x\cos x$ is an odd or even function.

b) If $f(x) = x^3 - 5x^2 - 4x + 20$. Show that $f(0) = -2\ f(3)$.

c) Find $\frac{dy}{dx}$ if, $y = e^{\log x}$

d) Evaluate : $\int \frac{1}{3x+5} \cdot dx$

e) Evaluate : $\int (x^{10} + 10^x + e^x) dx$

f) Find the Area under the curve $y = x^2$ and $x = 0$ to $x = 3$ with x - axis.

g) Show that roots of equation $x^3 - 2x - 5 = 0$ lies between (2, 3).

P.T.O.

Marks

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

a) If $f(x) = \log x$ and $g(x) = x^3$ then, show that $f[g(2)] = 3f(2)$.

b) Differentiate w.r.t. x : $\sin x^{\sqrt{x}}$

c) If $x = a \sin^3\theta$, $y = b \cos^3\theta$ then find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{3}$.

d) Divide 120 into two parts such that their product is maximum.

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

a) Find maximum and minimum value of the function $x^3 - \frac{15x^2}{2} + 18x$.

b) If $2x^2 - xy + 3y^2 = 18$ then find $\frac{dy}{dx}$ at (3, 1).

c) If $y = \tan^{-1}\left[\frac{x}{\sqrt{1-x^2}}\right]$ then find $\frac{dy}{dx}$.

d) Evaluate : $\int \frac{1}{x+\sqrt{x}} \cdot dx$

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

a) Evaluate : $\int \tan^{-1}x \; dx$

b) Evaluate : $\int \frac{dx}{2x^2+3x+2}$

c) Evaluate : $\int \frac{dx}{x^3-x}$

d) Evaluate : $\int \frac{dx}{5+4\cos x}$

e) Evaluate : $\int_0^5 \frac{\sqrt{9-x} \cdot dx}{\sqrt{9-x}+\sqrt{x+4}}$

Marks

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

a) Find the area bounded by the curve $y^2 = x$ and $x^2 = y$.

b) If 2% of electric bulbs manufactured by company are defective, find the probability that in a sample of 100 bulbs

i) 3 bulbs are defective

ii) at least 3 bulbs will be defective

c) In a sample of 1000 cases the mean of a certain test is 14 and standard deviation is 2.5. Assuming distribution to be normal. Find,

i) How many student score bet^n 12 and 15.

ii) How many student score above 18.

[Given : A(0.8) = 0.2881, A(0.4) = 0.1554, A(1.6) = 0.4452]

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

a) Solve the following system of equation by Gause-elimination method.

$6x - y - z = 19$

$3x + 4y + z = 26$

$x + 2y + 6z = 22$

b) Using Regula falsi method find approximate root of $x^3 - 4x + 1 = 0$ (four iterations only)

c) Attempt the following:

i) Solve the following system of equation by Jacobi-Iteration method. (Two iterations)

$5x - y + z = 10$

$2x + 4y = 12$

$x + y + 5z = -1$

ii) Solve the following system of equation by using Gauss-seidal method. (Two iterations)

$10x + y + z = 12$

$2x + 10y + z = 13$

$2x + 2y + 10z = 14$