312301

23242

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

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) Evaluate : $\int \left(\frac{1}{1+x^2} + 5^x\right) dx$

b) Evaluate : $\int \tan^2 x \; dx$

c) Evaluate : $\int_1^2 \frac{dx}{2x+11}$

d) Find the order and degree of the following differential equation.

$$\frac{d^2y}{dx^2} = \sqrt{1+\left(\frac{dy}{dx}\right)^3}$$

e) Show that there exist a root of the equation $x^2 - 2x - 1 = 0$ in $(-1, 0)$

P.T.O.

Marks

f) Find the approximate value of $\sqrt{26}$ by using Bakhshali iteratative method.

g) If ten fair coins are tossed. What is the probability that there are exactly 3 heads?

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

a) Evaluate : $\int \frac{dx}{2x + x\log x}$

b) Evaluate : $\int \frac{\sec^2 x}{(1+\tan x)(2+\tan x)}$

c) Evaluate : $\int x.\ \tan^{-1}x\ dx$

d) Evaluate : $\int \frac{dx}{2x^2 + 3x + 1}$

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

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

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

c) Solve :

$(3x^2 + 6xy^2)dx + (6x^2y + 4y^2)dy = 0$

d) Find real root of the equation $x^3 - 2x - 5 = 0$ by bisection method (Three iterations only).

Marks

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

a) Using Newton Raphson Method, find the approximate value of $\sqrt[3]{100}$ (3 iterations)

b) Find the root of equation $x^3 - 9x + 1 = 0$ which lies between 2 and 3 using Regular Falsi Method.

c) Solve the following equations by Gauss Seidal method.

$10x + y + z = 12, \quad 2x + 10y + z = 13, \quad 2x + 2y + 10z = 14$

d) The probability that a pen manufactured by a company will be defective is $1/10$. If 12 such pens are manufactured. Find the probability that.

i) Exactly two will be defective

ii) At least two will be defective

e) If 5% of the electric bulbs manufactured by a company are defective. Use Poisson's distribution to find the probability that in a sample of 100 bulbs.

i) None is defective.

ii) Five bulbs are defective. (Given $e^{-5} = 0.007$)

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

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

ii) Evaluate : $\int \frac{x \sin^{-1} x}{\sqrt{1 - x^2}} dx$

b) i) Evaluate : $\int_0^{\pi/2} \frac{\sin x}{(1 + \cos x)^2} dx$

ii) Evaluate : $\int_0^4 \frac{dx}{\sqrt{4x - x^2}}$

Marks

c) i) Evaluate : $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}}\,dx$

ii) Evaluate : $\int_4^5 \frac{\sqrt{5-x}}{\sqrt{x-4}+\sqrt{5-x}}\,dx$

6. Solve any <u>TWO</u> of the following: **12**

a) i) Form a differential equation

$y = Ae^{x} + Be^{-x}$

ii) Solve :

$\frac{dy}{dx} = e^{3x-2y} + x^2 e^{-2y}$

b) i) Solve : $\frac{dy}{dx} + y\cot x = \operatorname{cosec} x$

ii) Find particular solution of D.E

$\frac{dy}{dx} = 6 - 3x$, given at $x = 0$, $y = 0$

c) In a certain examination 500 students appeared. Mean score is 68 and S.D. is 8 Assuming data are normally distributed find the number of student scoring.

i) less than 50

ii) more than 60

[Given : A (2.25) = 0.4878

A (1) = 0.3413]