312301

24225

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 : $\int \sqrt{1+\cos 2x}\ dx$

b) Evaluate : $\int \left(\frac{1}{\sqrt{1-x^2}} - \cos x\right) dx$

c) Evaluate : $\int_2^4 \frac{dx}{2x+3}$

d) Find the order and degree of differential equation

$$\sqrt[3]{\frac{d^2y}{dx^2}} = \sqrt{\frac{dy}{dx}}$$

e) Find the approximate root of $x^3 - x - 1 = 0$ by using Bisection method. (One Iteration only)

P.T.O.

Marks

f) Show that the root of $x^3 - 4x - 9 = 0$ lies in the interval (2, 3)

g) An unbiased coin tossed 5 times. Find the probability of getting three heads.

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

a) Evaluate : $\int \frac{e^x(x+1)}{\cos(x.e^x)}\,dx$

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

c) Evaluate : $\int \frac{dx}{5-4\cos x}$

d) Evaluate : $\int \frac{e^x}{(e^x-1)(e^x+1)}\,dx$

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

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

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

c) Form a differential equation if $y = Ae^{2x} + Be^{-2x}$.

d) Using Newton Raphson Method. Find approximate root of the equation $x^3 - 4x + 1 = 0$ (Three iterations only)

Marks

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

a) Find the root of the equation $x^3 - 6x + 3 = 0$ using Bisection Method (Three iterations only)

b) Solve the following equation by Jacobi's iteration Method $10x + y + 2z = 13,\ 3x + 10y + z = 14,\ 2x + 3y + 10z = 15$

c) Solve the following system of equation by Gauss-seidal Method $20x - y + 2z = 17,\ 3x + 20y - z = -18,\ 2x - 3y + 20z = 25.$

d) If 20% of the bolts produced by a machine are defective. Find the probability that out of 4 bolts drawn

i) One is defective

ii) At most two are defective

e) If a random variable has a poisson distribution such that $P(2) = P(3)$ Find $P(5)$.

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

a) i) Evaluate : $\int \frac{dx}{3 - 2\sin^2 x}$

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

b) i) Evaluate : $\int_2^5 \frac{\sqrt{x}}{\sqrt{7-x} + \sqrt{x}}\ dx$

ii) Evaluate : $\int_0^4 \frac{\sqrt[3]{x+5}}{\sqrt[3]{x+5} + \sqrt[3]{9-x}}\ dx$

c) i) Evaluate : $\int_0^{\pi/2} \log(\tan x)\, dx$

ii) Evaluate : $\int_0^{\pi/2} \sin x \,.\, \cos x\, dx$

Marks

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

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

ii) Solve : $(x^2 + 6xy - y^2)\,dx + (3x^2 - 2xy + y^2)\,dy = 0$

b) i) Solve : $\frac{dy}{dx} + y \tan x = \cos^2 x$

ii) Verify that $y = \cos x$ is a solution of $\frac{d^2y}{dx^2} + y = 0$

c) A factory manufactured 2000 electric bulbs with average life 2040 hours and S.D. of 60 hours. Assuming normal distribution find number of bulbs having life.

i) more than 2150 hours.

ii) less than 1960 hours.

Given $A(1.83) = 0.4667$

$A(1.33) = 0.4082$
