312301

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

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

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

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

(6) 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 $\int (a^x + x^a + a^a)\,dx$

b) Evaluate $\int \dfrac{dx}{1 + \cos 2x}$

c) Evaluate $\int_{0}^{1} \dfrac{1}{4 + x^2}\,dx$

d) Form the differential equation, if $y = \mathrm{A}e^{2x} + \mathrm{B}e^{-2x}$

e) Show that the root of the equation $x^3 - 6x + 3 = 0$ lies between 0 and 1.

f) Using Newton Raphson method find the root of the equation $x^3 - x - 1 = 0$ by taking initial root is 1 (perform two iteration only)

g) Find the probability of getting 4 heads in 6 tosses

P.T.O.

Marks

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

a) Evaluate $\int \dfrac{(\tan^{-1}x)^3}{1+x^2}\,dx$

b) Evaluate $\int \dfrac{\sec^2x\,dx}{(1+\tan x)(2+\tan x)}$

c) Evaluate $\int x^2\log x\,dx$

d) Evaluate $\int \dfrac{dx}{\sqrt{x^2+4x+13}}$

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

a) Evaluate $\displaystyle\int_{0}^{\pi/2} \dfrac{dx}{5+4\cos x}$

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

c) Solve the following D.E.

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

d) Find the real root of the equation

$x^3 - x - 1 = 0$ in the interval (1, 2) by Regular Falsi method (Three iteration only)

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

a) Find the root of the equation $x^3 - x - 4 = 0$ by using Bisection method in three iterations

b) Solve the following equation by Jacobi Method
$20x + y - 2z = 17;\ 2x - 3y + 20z = 25,\ 3x + 20y - z = -18$

c) Solve the following system of equation by Gauss Seidal Method

$10x + y + z = 12;\ x + 10y + z = 12;\ x + y + 10z = 12$

d) If 2% of the electric bulbs manufactured by a company are defective. Find the probability that in a sample of 100 bulbs.

    i)   Three are defective

    ii)   at least two are defective

e) The probability that a man aged 65 will live to 75 is 0.65 What is the probability that out of 10 men which are now 65, 7 will live to 75?

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

a) i)   Evaluate $\int \dfrac{e^x dx}{4 + e^{2x}}$

    ii)   Evaluate $\int \dfrac{dx}{x(x+1)}$

b) i)   Evaluate $\displaystyle\int_{2}^{11} \dfrac{\sqrt{13-x}}{\sqrt{x} + \sqrt{13-x}}\,dx$

    ii)   Evaluate $\displaystyle\int_{\pi/6}^{\pi/3} \dfrac{\sqrt{\cos x}}{\sqrt{\cos x} + \sqrt{\sin x}}\,dx$

c) i)   Evaluate $\displaystyle\int_{0}^{\pi/2} \cos x \sqrt{\sin x}\,dx$

    ii)   Evaluate $\displaystyle\int_{1}^{e} \log_e x\,dx$

Marks

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

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

ii) Find the order and degree of the following differential equation

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

b) i) Solve $\frac{dy}{dx} + \frac{y}{x} = x^3$

ii) Solve the differential equation :

$(2xy + y^2)\ dx + (x^2 + 2xy + \sin y)\ dy = 0$

c) The weight of 4000 students are found to be normally distributed with mean 50 kgs and S.D. 5kgs Find the number of students with weight

i) less than 45 kgs

ii) Between 45 kgs and 60 kgs

Given A (1) = 0.3413

A (2) = 0.4772

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