



23103

BOARD DIPLOMA EXAMINATION, (C-23)

OCTOBER/NOVEMBER—2025

THIRD SEMESTER (COMMON) EXAMINATION

ENGINEERING MATHEMATICS – II

Time : 3 Hours]

[Total Marks : 80

PART—A

3×10=30

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **three** marks.

1. Evaluate $\int \left(3^x + \frac{3}{x} + 3x \right) dx$

2. Evaluate $\int \frac{1}{7-5x} dx$

3. Evaluate $\int \frac{e^{\tan^{-1}x}}{1+x^2} dx$

4. Evaluate $\int_0^1 \frac{1}{\sqrt{1-x^2}} dx$

5. Evaluate $\int_0^n \sin x dx$

6. Find area of the curve $y = x^2 - 1$, X - axis and the lines $x = 1$, $x = 3$.

7. Find the mean value of the function $f(x) = x^3 + x$ over the interval $[0,1]$.

8. Find the order and the degree of the differential equation

$$\left(\frac{dy}{dx}\right)^4 + 2y \frac{d^2y}{dx^2} = 0$$

9. Form the differential equation by eliminating the arbitrary constants A, B from the equation $y = A \cos 2x + B \sin 2x$.

10. Solve $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$.

PART—B

10×5=50

Instructions : (1) Answer *any five* questions.
(2) Each question carries **ten** marks.

11. (a) Evaluate $\int \left(\sin 3x + 5 \operatorname{cosec}^2 x - \frac{6}{1+x^2} + 7 \right) dx$

(b) Evaluate $\int \cos^6 x \cdot \sin^3 x \, dx$

12. (a) Evaluate $\int \frac{1}{x^2 + 8x + 20} dx$

(b) Evaluate $\int \frac{2x+5}{(x+2)(x+3)} dx$

13. (a) Evaluate $\int x^3 e^{4x} dx$

(b) Evaluate $\int_0^{\pi/2} \sin 5x \cdot \cos 3x \, dx$

14. (a) Evaluate $\int_0^{\pi/2} \frac{\sin^3 x}{\sin^3 x + \cos^3 x} dx$

(b) Find R.M.S. value of $f(x) = \sqrt{27 - x^2}$ in the interval $[0, 3]$.

15. Evaluate $\int_0^1 \frac{1}{1+x^2} dx$ using trapezoidal rule by taking $n = 5$ and hence deduce the approximate value of π .
16. Solve $\frac{dy}{dx} + y \sec x = \tan x$
17. (a) Solve $(D^2 - 5D + 6)y = 0$
(b) Solve $(D^2 + 9)y = 0$
18. Solve $(D^2 - 25)y = e^{3x} + \sin 4x$

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