



23103

BOARD DIPLOMA EXAMINATION, (C-23)

OCTOBER/NOVEMBER—2024

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.
(3) Marks will be awarded only for the desired and accurate language/grammatical expressions.

1. Evaluate : $\int (3x^2 + 2x + 5) dx$

2. Evaluate : $\int \left(\frac{2x + 7}{x^2 + 7x + 10} \right) x$

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

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

5. Evaluate : $\int_{-1}^1 x dx$

6. Find the area of the region bounded by the curve $y = x^2 - 5x + 6$, the x -axis between the lines $x = 2$ and $x = 3$.

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

8. Find the order and degree of $\left(\frac{dy}{dx} \right)^2 + y = e^x$.

9. Find the differential equation by eliminating the arbitrary constants A , B from the equation $y = Ae^{2x} + Be^{3x}$.

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

PART—B

10×5=50

- Instructions :** (1) Answer *any five* questions.
(2) Each question carries **ten** marks.
(3) The criterion for the award of marks is the appropriate content, quality and clarity of expression but not the length of your answer.

11. (a) Evaluate $\int \left(\frac{1}{1 + \cos x} \right) dx$

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

12. (a) Evaluate $\int \left(\frac{1}{x^2 - 4x + 9} \right) dx$

(b) Evaluate $\int \frac{x}{(x-1)(x-3)} dx$

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

(b) Evaluate $\int_0^1 \left(\frac{x^3}{1+x^8} \right) dx$

14. (a) $\int_0^{\frac{\pi}{2}} \left(\frac{\sqrt{\cos x}}{\sqrt{\sin x + \sqrt{\cos x}}} \right) dx$

(b) Find the RMS value of $\sqrt{27-4x^2}$ over the range of the interval $[0, 2]$

15. Evaluate $\int_1^{11} x^3 dx$ using Simpson's rule by taking $n=10$.

16. Solve $\frac{dy}{dx} + y \cot x = \sin x$

17. (a) Solve $(D^2 + 16)y = 0$

(b) Solve $(D^2 + D - 2)y = 0$

18. Solve $(4D^2 + 4D + 1)y = e^{-x} + \cos x + x$

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