23103

C23-A-AA-C-EE-EEVT-M-MRAC-MET-MNG-TT–101

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

★★★