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BOARD DIPLOMA EXAMINATION, (C-20)  
NOVEMBER/DECEMBER—2022  
DME – THIRD SEMESTER 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  $\int (x^5 + 5^x + 5x) dx$ .

2. Evaluate  $\int e^{5x-7} dx$ .

3. Evaluate  $\int \frac{1}{x^2 - 36} dx$ .

\* 4. Evaluate  $\int \frac{e^{\tan^{-1} x}}{1+x^2} dx$ .

5. Evaluate  $\int_{-1}^1 x^2 dx$ .

6. Find the mean value of  $y = x^2$  between  $x = 2$  and  $x = 3$ .

7. Find the area of the region bounded by the curve  $y = x^2 + 3$ , the  $x$ -axis and the lines  $x = 1$  and  $x = 2$ .

8. Find the differential equation for  $y = Ae^x + Be^{-x}$ , where  $A$  and  $B$  are constants. \*

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

10. Solve :  $(x^2 + y) dx + (y^2 + x) dy = 0$ .

**PART—B**

8×5=40

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

11. (a) Find  $\int \frac{1}{x[1+(\log x)^2]} dx$ .

**(OR)**

(b) Evaluate  $\int \sin 6x \cos 2x dx$ .

12. (a) Evaluate  $\int \frac{dx}{4+5 \cos x}$ .

**(OR)**

\* (b) Evaluate  $\int \frac{x}{(x-1)(2x-1)} dx$ .

13. (a) Evaluate  $\int_0^{\frac{\pi}{4}} \tan^2 x dx$ .

**(OR)**

(b) Show that  $\int_0^{\frac{\pi}{2}} \frac{1}{1+\tan x} dx = \frac{\pi}{4}$ .

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14. (a) Find the area enclosed by the curve  $y = a \sin x$ ,  $x$ -axis over a complete cycle.

(OR)

- (b) Find the RMS value of  $y = x^2 + 2$  over the range  $x = 0$  to  $x = 2$ .

15. (a) Find the volume of the solid of revolution generated by revolving the area between the curve  $y = x^4 - 4$ .

(OR)

- (b) Evaluate  $\int_1^{11} x^2 dx$  using Trapezoidal rule by taking  $n = 10$ .

**PART—C**

10×1=10

- Instructions :** (1) Answer the following question.  
(2) The question carries **ten** marks.

16. Solve :  $\frac{dy}{dx} + \frac{y}{x} = xy^2$ .

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