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BOARD DIPLOMA EXAMINATION, (C–16)
MARCH/APRIL—2018
DME—THIRD SEMESTER EXAMINATION

ENGINEERING MATHEMATICS—III

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

1. Integrate

$$(x^5 \quad 5^x \quad 5x)\, dx$$

2. Evaluate

$$\sqrt{1 \quad \sin} \quad d$$

3. Evaluate

$$\frac{1}{x \log x}\, dx$$

4. Evaluate

$$\frac{e^{m \tan^{-1} x}}{1 \quad x^2}\, dx$$

5. Evaluate

$$\int_{1}^{1}(3x^2 - 5)\,dx$$

6. Find the mean value of $y^2 = 4x$ from $x = 0$ to $x = 4$.

7. Solve $x^4\,dy + y^4\,dx = 0$.

8. Verify the differential equation is an exact

$$(x - y - 2)\,dx + (x - y - 4)\,dy = 0$$

9. Find the differential equation of the family of curve

$$y = A\cos 5x + B\sin 5x$$

by eliminating the arbitrary constants *A*, *B*.

10. Find the integrating factor of

$$\frac{dy}{dx} + \frac{2y}{x} = 3x$$

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PART—B   10×5=50

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Instructions : (1) Answer *any* **five** questions.

               (2) Each question carries **ten** marks.

11. *(a)* Evaluate

$$\int \frac{1}{x^2 + 2x + 5}\,dx$$

(b) Evaluate

$$\int \frac{x}{(x - 1)(2x - 1)}\,dx$$

12. *(a)* Integrate

$$x^2 e^{5x}$$

(b) Evaluate

$$\int \sin 6x \cos 2x\,dx$$

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13. *(a)* Evaluate

$$\int_{-1}^{1} \log \frac{3+x}{3-x}\, dx$$

(b) Show that

$$\int_{0}^{\pi/2} \frac{\sqrt{\tan x}}{\sqrt{\tan x} + \sqrt{\cot x}} = \frac{\pi}{4}$$

14. *(a)* Find the area enclosed by $4x^2 + 9y^2 = 36$.

(b) Find the volume of the solid obtained by revolving the area enclosed by the curve $y = x^3$ and the lines $y = 0$ to $y = 8$ about y-axis.

15. *(a)* Find the RMS value of $\sqrt{8 - 4x^2}$ between $x = 0$ and $x = 2$.

(b) Solve

$$\frac{dy}{dx} = (2x + y + 1)^2$$

16. Evaluate

$$\int_{0}^{1} x^3 dx$$

using Trapezoidal rule and Simpson's rule by taking $n = 5$.

17. Solve

$$x^2 y\, dx - (x^3 + y^3)\, dy = 0$$

18. *(a)* Solve

$$(e^y + 1)\cos x\, dx + e^y \sin x\, dy = 0$$

(b) Solve

$$\frac{dy}{dx} + y \cos x = \sin x \cos x$$

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