

6242

BOARD DIPLOMA EXAMINATION, (C-16)

MARCH/APRIL—2021

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  $\int \left( e^x + \sin x + \frac{1}{x} \right) dx$

2. Evaluate  $\int \frac{\log x}{x} dx$

3. Evaluate  $\int_0^1 \frac{1}{1+x^2} dx$

4. Find the area bounded by the Parabola  $y = 2x^2$ ,  $x$ -axis between the lines  $x = 1$  and  $x = 2$ .

5. Find the Laplace Transform of  $(1 + \cos 2t)$ .

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6. Find  $L^{-1}\left[\frac{1}{(s-1)^2}\right]$
7. Write the Fourier series expansion for the function  $f(x)$  defined in the interval  $(c, c + 2\pi)$ .
8. Show that the differential equation corresponding to  $y = A\sin 3x + B\cos 3x$ , where  $A$  and  $B$  are arbitrary constants, is  $\frac{d^2y}{dx^2} + 9y = 0$ .
9. Solve  $\frac{dy}{dx} = \sqrt{\frac{1-y^2}{1-x^2}}$
10. Solve  $(D^2 - 5D + 6)y = 0$

### PART—B

10×5=50

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

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11. (a) Evaluate  $\int \sin 3x \cos 2x dx$   
(b) Evaluate  $\int \frac{1}{5 + 4 \cos x} dx$
12. (a) Evaluate  $\int e^x (\tan x + \sec^2 x) dx$   
(b) Evaluate  $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$

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13. (a) Find the RMS value of a function  $y = \sqrt{27 - 4x^2}$  over a range  $x = 0$  to  $x = 3$ .
- (b) Find the volume of the solid of revolution of the area between the curve  $y = 4x^2$ ,  $x = 0$  and  $x = 2$  about  $x$ -axis.

14. (a) Obtain the value of  $\int_1^{11} x^2 dx$  using Trapezoidal rule by taking  $n = 10$ .
- (b) Find  $L\{\cos 2t \cos t\}$ .

15. (a) Find  $L^{-1}\left[\frac{1}{(s-1)(s+3)}\right]$ .

(b) Find  $L^{-1}\left[\frac{s-2}{s^2-2s+5}\right]$ .

16. Find the Fourier series for  $f(x) = x^2$  in the interval  $(-\pi, \pi)$ .

17. (a) Solve  $\frac{dy}{dx} + \frac{y}{x} = 1$

(b) Solve  $(x^3 + 3xy^2)dx + (y^3 + 3x^2y)dy = 0$

18. (a) Solve  $(D^2 - 4D + 8)y = e^{-x}$

(b) Solve  $(D^2 + 1)y = \cos 2x$

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