

7454

BOARD DIPLOMA EXAMINATION, (C-20)

MAY—2023

DME - FOURTH 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. Solve  $(D^2 + 4D + 4)y = 0$
2. Solve  $(D^2 + 6D + 8)y = 0$
3. Find the particular integral of the differential equation  $(D^2 + 3D + 2)y = e^{2x}$ .
4. Find the particular integral of the differential equation  $(D^2 - 4)y = e^{3x}$ .
5. Find  $L\{t^3 + \cos 3t\}$
6. Find  $L\{3 \sin 2t + 2 \cos 2t\}$
7. Find  $L^{-1}\left\{\frac{4}{s^2 - 4} + \frac{3}{s^2 + 4}\right\}$
8. Write Euler's formulae for Fourier coefficients of  $f(x)$  in  $(-\pi, \pi)$ .
9. Find the value of  $a_0$  in the Fourier expansion of  $f(x) = \cos x$  in  $(0, 2\pi)$ .
10. Find the value of  $b_1$  in the Fourier expansion of  $f(x) = k$  in  $(-1, 1)$ .

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**PART—B**

8×5=40

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

11. (a) Solve  $(D^3 - 7D + 6)y = 0$ , where  $D \equiv \frac{d}{dx}$ .

**(OR)**

(b) Solve  $(D^2 + D - 2)y = 3e^{2x}$ , where  $D \equiv \frac{d}{dx}$ .

12. (a) Solve  $(D^2 + 6D + 9)y = 2 \cos 3x$ , where  $D \equiv \frac{d}{dx}$ .

**(OR)**

(b) Solve  $(D^2 + 9)y = x^2$  where  $D \equiv \frac{d}{dx}$ .

13. (a) Evaluate  $L\{e^{-t}(2 \cos 3t - 3 \sin 2t)\}$

**(OR)**

(b) Evaluate  $L\{t \cos 3t\}$

14. (a) Evaluate  $L\left\{\frac{1 - e^t}{t}\right\}$

**(OR)**

(b) Using Laplace transform, evaluate  $\int_0^{\infty} t e^{-3t} dt$ .

15. (a) Find  $L^{-1}\left\{\frac{s}{(s+3)^2 + 9}\right\}$

**(OR)**

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

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**PART—C**

10×1=10

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

**16.** Expand the function  $f(x) = x^2$  as Fourier series in the interval  $(-1, 1)$ .

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