



C20-COMMON-401

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BOARD DIPLOMA EXAMINATION, (C-20)
OCTOBER/NOVEMBER—2023
FOURTH SEMESTER (COMMON) 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 $(D^2 - 1)y = 0$.
2. Solve $(D^2 + 6D + 9)y = 0$.
3. Find the particular integral of differential equation $(D^2 + D + 4)y = e^{5x}$.
4. Find the particular integral of $(D^2 + 15)y = \cos 4x$.
5. Find the Laplace transform of $4t^3 - 2 \cosh 2t + 2e^{-7t}$.
6. Find $L(t^3 e^{-2t})$.
7. Find $L^{-1} \left\{ \frac{1}{s^2} + \frac{2}{(s-4)} + \frac{3}{s^2 + 9} \right\}$.
8. Find the value of a_0 in the Fourier series expansion of $f(x) = x$ in the interval $(0, 2\pi)$.
9. Write the Euler's formula for the Fourier series expansion of $f(x)$ in the interval $(0, 2\pi)$.
10. Find the value of b_1 in the half range sine series of $f(x) = \pi$ in the interval $(0, \pi)$.

PART—B

8×5=40

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

11. (a) Solve $(D^3 - 6D^2 + 11D - 6)y = 0$

(OR)

(b) Solve $(D^2 - 4D + 3)y = e^{5x} + e^{2x}$

12. (a) Solve $(D^2 - D - 2)y = \sin 2x$

(OR)

(b) Solve $(D^2 + 3D + 2)y = x^2$

13. (a) Find $L(te^{3t} \sin 2t)$

(OR)

(b) Find $L(\sin 2t \cos t)$

14. (a) Find $L\left(\frac{e^{-at} - e^{-bt}}{t}\right)$

(OR)

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

15. (a) Find $L^{-1}\left\{\frac{1}{s^2 + 4s + 20}\right\}$

(OR)

(b) Using convolution theorem find $L^{-1}\left\{\frac{1}{(s+2)(s+3)}\right\}$.

PART—C

10×1=10

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

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

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