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BOARD DIPLOMA EXAMINATION, (C-20)

MAY—2023

DCE - 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 $(D^2 - 1)y = 0$
2. Solve $(D^2 - 6D + 9)y = 0$
3. Find the particular integral of differential equation $(D^2 + 4D + 4)y = e^{3x}$.
4. Find the particular integral of differential equation $(D^2 + 16)y = \sin 3x$.
5. Find $L\{e^{2t} + t^4 + 2 \sin 2t\}$
6. Find $L\{e^{2t} \sin 3t\}$
7. Find $L^{-1}\left\{\frac{1}{s-5} + \frac{5}{s^2+4} + \frac{3}{s^2-4}\right\}$
8. Find the value of a_0 in the Fourier expansion of $f(x) = e^x$ in the interval $(0, 2\pi)$.
9. Write the Euler's formula for Fourier series expansion of $f(x)$ in the interval $(c, c + 2\pi)$
10. Find the half-range sine series of $f(x) = 1$ in the interval $0 < x < \pi$.

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PART—B

8×5=40

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

11. (a) Solve $(D^3 - D^2 - D + 1)y = 0$

(OR)

(b) Solve $(D^2 - D - 6)y = e^{3x} + e^{-3x}$

12. (a) Solve $(D^2 + D + 1)y = 2 \sin 3x$

(OR)

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

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

(OR)

(b) Evaluate $L\{te^{-2t} \sin 3t\}$

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

(OR)

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(b) Evaluate $L^{-1}\left\{\frac{s+3}{s^2+2s+9}\right\}$

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

(OR)

(b) Find $L^{-1}\left\{\frac{1}{s(s^2+4)}\right\}$ by using convolution theorem.

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PART—C

10×1=10

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

- 16.** Find the half range Fourier cosine and sine series for $f(x) = x$ in the interval $(0, \pi)$.

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