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C20-M-CHOT–401

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BOARD DIPLOMA EXAMINATION, (C-20)

OCTOBER/NOVEMBER—2024

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 $(D^2 - 25)y = 0$

2. Solve $(D^2 + 1)y = 0$

3. Find the particular integral of the differential equation $(D^2 + 6D + 9)y = e^{2x}$.

4. Find the particular integral of the differential equation $(D^2 - 36)y = \sin 2x$.

5. Find $L\{2e^t - \sin t + 3\}$.

6. Find $L\{te^{5t}\}$.

7. Find $L^{-1}\left\{\frac{3}{s+4} - \frac{2}{s} + \frac{1}{s^2 - 1}\right\}$.

8. Find the value of a_0 in the Fourier series expansion of $f(x) = x^2$ in $(0, 2\pi)$.

9. Write the formulae for Fourier coefficients of $f(x)$ in the interval $(-\pi, \pi)$.

10. Write the value of b_n in the Fourier series expansion of $f(x) = k$ in the interval $-1 < x < 1$.

PART—B

8×5=40

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

11. *(a)* Solve $(D^3 + 2D^2 - D - 2)y = 0$, where $D \equiv \frac{d}{dx}$.

(OR)

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

12. *(a)* Solve $(D^2 + 5D + 4)y = \sin x$, where $D \equiv \frac{d}{dx}$.

(OR)

(b) Solve $(D^2 - 4D + 3)y = x$, where $D \equiv \frac{d}{dx}$.

13. *(a)* Evaluate $L\{e^{-t}(3\sin 2t - 5\cos 2t)\}$

(OR)

(b) Evaluate $L\{t^2 \cos 2t\}$

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

(OR)

(b) Using Laplace transform, evaluate $\int_0^\infty e^{-2t} t^2 dt$.

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

(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. Obtain the Fourier series expansion of $f(x)=\frac{\pi-x}{2}$ in the interval $[0, 2\pi]$.

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