7444

BOARD DIPLOMA EXAMINATION, (C-20)

JUNE/JULY—2022

DEEE – 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 $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} - 4y = 0$

2. Solve $(D^2 + 4D + 13)y = 0,$ where $D \equiv \frac{d}{dx}$.

3. Find the particular integral of $(D^2 + 1)y = 1,$ where $D \equiv \frac{d}{dx}$.

4. Find the particular integral of $\frac{d^2y}{dx^2} + y = \sin x$.

5. Find $L\{\sin 2t \cos t\}$

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

7. Find $L^{-1}\left\{\frac{1}{s^2}-\frac{9}{s^2+9}+\frac{2s}{s^2-4}\right\}$

8. Find the value of a_0 in the Fourier series expansion of $f(x)=e^{-x}$ in the interval $(-1,1)$.

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

10. Expand $f(x)=1(0<x<\pi)$ in half-range Fourier Sine series.

PART—B

8×5=40

Instructions : (1) Answer either *(a)* **or** *(b)* from *each* questions from part-B.
(2) Each question carries **eight** marks.

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

(OR)

(b) Solve $\left(D^4+8D^2+16\right)y=0,$ where $D\equiv\frac{d}{dx}$.

12. *(a)* Solve $\left(D^2+6D+5\right)y=\cos x,$ where $D\equiv\frac{d}{dx}$.

(OR)

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

13. *(a)* Find the Laplace transform of $f(t) = \cos t \cos 2t \cos 3t$.

(OR)

(b) Find $L\left\{t^2 e^t \sin 4t\right\}$.

14. *(a)* Find $L\left\{\dfrac{e^{2t} - e^{3t}}{t}\right\}$.

(OR)

(b) Using Laplace transforms, evaluate $\int_0^\infty e^{-t} \dfrac{\sin t}{t} dt$

15. *(a)* Find $L^{-1}\left\{\dfrac{3s+13}{s^2+4s+3}\right\}$.

(OR)

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

PART—C

10×1=10

InsInstructions : (1) Answer the following question.

(2) The question carries **ten** marks.

16. Find the Fourier series for $f(x) = x^2$ in the interval $(0, 2\pi)$ and hence deduce that $\dfrac{1}{1^2} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} + \ldots = \dfrac{\pi^2}{12}$.

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