C20-A-AA-AEI-BM-CHST-MNG-CH-MET-TT-AMT-AMG-WD-CAI–**401**

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BOARD DIPLOMA EXAMINATION, (C-20)

NOVEMBER/DECEMBER—2022

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 $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 6y = 0$.

2. Solve $\left(D^2 + 25\right)y = 0$, where $D \equiv \frac{d}{dx}$.

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

4. Find the particular integral of $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = 5e^{3x}$.

5. Find $L\left\{5 + 2t - t^2\right\}$.

6. Using Laplace transforms, evaluate $\int_0^\infty e^{-4t} \sin 3t \, dt$.

7. Find $L^{-1}\left\{\frac{2}{s-4}+\frac{3}{s^2-9}\right\}$.

8. Write the Euler's formulae for the Fourier series expansion of $f(x)$ in the interval $(0, 2\pi)$.

9. Find the value of a_0 in the Fourier series expansion of x^2 in the interval $(-\pi, \pi)$.

10. Find the value of a_n in the half-range Fourier Cosine series of $f(x)=1$ in the interval of $(0, \pi)$.

PART—B

8×5=40

Instructions : (1) Answer **all** questions.

(2) Each question carries **eight** marks.

11. *(a)* Solve $\frac{d^3y}{dx^3}-4\frac{d^2y}{dx^2}+5\frac{dy}{dx}-2y=0$

(OR)

(b) Solve $\left(D^3+2D^2+9D+18\right)y=0$, where $D\equiv\frac{d}{dx}$.

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

(OR)

(b) Solve $\left(D^2-2D+1\right)y=x^3$, where $D\equiv\frac{d}{dx}$.

13. *(a)* Find $L\left\{e^{-2t}(3\sin 4t - 4\cos 4t)\right\}$.

(OR)

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

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

(OR)

(b) Find $L\left\{\int_0^t e^t \cosh t \, dt\right\}$.

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

(OR)

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

PART—C

10×1=10

Instructions : (1) Answer the following question.

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

16. Find the Fourier series of $f(x) = 4 - x^2$ in the interval $(0, 2)$.

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