C20-C-CM–**401**

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BOARD DIPLOMA EXAMINATION, (C-20)

JUNE/JULY—2022

DACE – 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 $(D^2+4D+6)y=0$

3. Find the particular integral of differential equation $(D^2-4D+8)y=e^{-x}$.

4. Find the particular integral of differential equation $(D^2-16)y=\sin 2x$.

5. Find $L\{2e^{-7t}+5t^3+2\sinh 2t\}$.

6. Find $L\{e^{-t}\cos 2t\}$.

7. Find $L^{-1}\left\{\frac{1}{s^2+4s+20}\right\}$.

8. Write down the Fourier series expansion of a function $f(x)$ in the interval $(-1,1)$. Give the corresponding formulae for finding the coefficients.

9. Obtain the value of "b_n" in Fourier series expansion of $f(x) = \cos x$ in the interval $-\pi < x < \pi$.

10. Obtain the value of "a_0" in the half range cosine series expansion of $f(x) = 3x + 1$ in the interval $0 < x < 2$.

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 $\left(D^4 - D^3 - 9D^2 - 11D - 4\right)Y = 0$

(OR)

(b) Solve $\left(D^2 - 3D + 2\right)y = \left(e^x + 1\right)^2$

12. *(a)* Solve $\left(D^2 + 5D - 6\right)y = \sin 4x \sin x$

(OR)

(b) Solve $\left(D^2 + 4\right)y = x^2 + 3$

13. *(a)* Find $L\left(f(t)\right)$ if $f(t) = \begin{cases} 1, & 0 < t < 2 \\ 2, & t > 2 \end{cases}$

(OR)

(b) Evaluate $L\{t(\sin t + \cos t)\}$

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

(OR)

(b) Evaluate $L^{-1}\left\{\frac{s+1}{s^2+6s-7}\right\}$

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

(OR)

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

PART—C

10×1=10

Instructions : (1) Answer the following question.

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

16. Find the Fourier series for $f(x) = x^2$ in the interval $(0, 2\pi)$.

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