C16–EC–**401**

5648

BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—2018

DCE—FOURTH SEMESTER EXAMINATION

ENGINEERING MATHEMATICS—IV

Time : 3 hours]   [*Total Marks* : 80

PART—A   3×10=30

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

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

1. Solve :

$$\frac{d^2y}{dx^2} \, 8\frac{dy}{dx} \, 12y \, 0$$

2. Solve :

$$\frac{d^3y}{dx^3} \, 7\frac{d^2y}{dx^2} \, 16\frac{dy}{dx} \, 12y \, 0$$

3. Solve :

$$(D^3 \, 1)y \, 0$$

4. Find the particular integral of $(D^2 \, 1)y \, e^{\,x}$.

5. Find the particular integral of $(D^2 - 25)y = \sin 5x$.

6. Find the Laplace transform of $\cos^2 2t$.

7. Evaluate : $L(t \sin at)$

8. Solve :

$$L^{-1} \frac{1}{(s-a)^3}$$

9. Write the Fourier series of $f(x)$ in the interval $(C, C + 2\pi)$.

10. If $f(x) = x^2$ in $(0, 2\pi)$, then what is the value of a_0 in the Fourier series of $f(x)$?

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PART—B   10×5=50

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Instructions : (1) Answer *any* **five** questions.

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

11. Solve the following :

(a) $(D^2 - 1)y = \sin x + e^{2x}$

(b) $(D^2 - D - 1)y = 2 \sin 3x$

12. Solve the following :

(a) $(D^2 - 4)y = x^2 + 7x + 9$

(b) $(D^2 - 2D + 1)y = x + \cos x$

13. *(a)* Find the Laplace transform of
$$e^{2t}(\cos 4t + 3\sin 4t)$$

(b) Evaluate :
$$L\left[\frac{\sin t}{t}\right]$$

14. *(a)* Solve :
$$L^{-1}\left[\frac{1}{s^2 + 6s + 5}\right]$$

(b) Evaluate :
$$L^{-1}\left[\frac{20 + 4s}{s^2 + 4s + 20}\right]$$

15. *(a)* Using convolution theorem, find
$$L^{-1}\left[\frac{1}{s(s+1)}\right]$$

(b) Find
$$L^{-1}\left[\frac{1}{s(s^2 + 4)}\right]$$

16. Solve $y'' + 4y' + 3y = e^{-t}$, when $y(0) = y'(0) = 1$ using Laplace transform method.

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

18. Obtain the Fourier series for $f(x) = e^x$ in the interval $(0, 2\pi)$.

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