C16–C–**401**

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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 :

$$\frac{d^2y}{dx^2} \ 3\frac{dy}{dx} \ 54y \ 0$$

2. Solve :

$$(D^2 \ 4D \ 13)y \ 0$$

3. Solve :

$$(D^3 \ 3D^2 \ 3D \ 1)y \ 0$$

4. Find the particular integral of $(D^2 \ D \ 6)y \ 5e^{2x}$.

5. Find the particular integral of $(D^2 \ 36)y \ \sin 6x$.

6. Find the Laplace transform of $(e^t - e^{-3t})$.

7. Find the Laplace transform of $\{e^{2t} \cos 3t\}$.

8. Find

$$L^{-1}\left\{\frac{s^2 - 3s - 4}{s^3}\right\}$$

9. Find the Fourier series coefficient a_0 if $f(x) = e^x$, when $-\pi < x < \pi$.

10. Find a_n for $f(x) = x$ in $(0, 2\pi)$.

PART—B

$10 \times 5 = 50$

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

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

11. *(a)* Solve :

$$(D^2 - 6D + 5)y = e^{-x} + e^{5x}$$

  (b) Solve :

$$(D^2 - 4D + 4)y = e^x + \cos 2x$$

12. *(a)* Solve :

$$(D^2 - 2D)y = x^2$$

  (b) Solve :

$$(D^2 - 25D)y = \sin 5x$$

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

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

14. *(a)* Find

$$L \left[\int_0^t e^{-t} \sin t \, t \, dt \right]$$

(b) Find

$$L \left[\frac{\sin t}{t} \right]$$

15. *(a)* Evaluate

$$L^{-1} \left[\frac{3s+14}{s^2+4s+8} \right]$$

(b) Find

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

using convolution theorem.

16. Solve the differential equation using Laplace transform :

$$y'' + y = 6\cos 2t$$

if $y(0) = 3$, $y'(0) = 1$.

17. For a function $f(x) = x + x^2$, obtain the Fourier series in the interval $(-\pi, \pi)$.

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

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