6222

BOARD DIPLOMA EXAMINATION, (C–16)

MARCH/APRIL—2018

DCE—THIRD SEMESTER EXAMINATION

ENGINEERING MATHEMATICS—II

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

PART—A   3×10=30

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

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

1. Evaluate

$$\sqrt{1 - \sin 2x}\, dx$$

2. Evaluate

$$\frac{e^{m\tan^{-1}x}}{1 + x^2}\, dx$$

3. Evaluate

$$\int_0^1 (x^3 - 1)\, dx$$

4. Find the area bounded by the parabola $y^2 = x^2$ and the line $x = 2$.

5. Find $L\{t^3 - 3t + 5\}$.

6. Find

$$L^{-1}\left[\frac{6}{s^4}+\frac{1}{s+6}+\frac{1}{s^2}\right]$$

7. Find the value of a_1, in Fourier series expansion of $f(x)=x$ in the interval of $(0, 2\pi)$.

8. Find the differential equation of the family of curves $y=A\cos^3 x+B\sin^3 x$, where A, B are arbitrary constants.

9. Solve

$$\frac{dy}{dx}=e^y+x^2e^y$$

10. Solve

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

<p align="center">PART—B   10×5=50</p>

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

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

11. *(a)* Evaluate

$$\int\frac{1}{5+3\cos x}\,dx$$

(b) Evaluate

$$\int\frac{3x+1}{(x+1)(x+2)}\,dx$$

12. *(a)* Evaluate

$$\int x^2\cos 3x\,dx$$

(b) Evaluate

$$\int_0^{\pi/2}\frac{\sin^8 x}{\cos^8 x+\sin^8 x}\,dx$$

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13. *(a)* Find the RMS value of $\sqrt{8 - 4x^2}$ between $x = 0$ and $x = 2$.

(b) Find the volume generated when the area bounded by $y^2 = x^3$ and $x = 4$ revolves about X-axis.

14. *(a)* Evaluate $\int_0^1 \dfrac{1}{1 + x^2}\, dx$ using Simpson's rule by dividing the interval $[0, 1]$ into eight equal intervals.

(b) Find

$$L\left\{\frac{e^{at} - \cos bt}{t}\right\}$$

15. *(a)* Find

$$L^{-1}\left\{\frac{1}{s(s^2 - 9)}\right\}$$

(b) Using convolution theorem, find

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

16. Find the Fourier series of $f(x) = x + x^2$ in the interval $(-\pi, \pi)$.

17. *(a)* Solve

$$(e^y + 1)\cos x\, dx + e^y \sin x\, dy = 0$$

(b) Solve

$$\frac{dy}{dx} - \frac{y}{x} = \frac{y^2}{x^2}$$

18. *(a)* Solve

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

(b) Solve

$$(D^2 - 1)y = x$$

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