



C16-C-301/C16-CM-301/C16-IT-301

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

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

2. Evaluate

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

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

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

10. Solve

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

**PART—B**

10×5=50

**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

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

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  $\int_0^1 \frac{1}{x^2} dx$  using Simpson's rule by dividing the interval  $[0, 1]$  into eight equal intervals.

(b) Find

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

15. (a) Find

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

(b) Using convolution theorem, find

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

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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