



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

6222

BOARD DIPLOMA EXAMINATION, (C-16)

JUNE—2019

DCE—THIRD SEMESTER EXAMINATION

ENGINEERING MATHEMATICS—II

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

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

1. Evaluate :

$$\int (x^5 + 5^x + 5x) dx$$

2. Evaluate :

$$\int \frac{1}{\sqrt{4-x^2}} dx$$

3. Evaluate:

$$\int_0^1 \frac{1}{1+x^2} dx$$

4. State the formula to find the area bounded by the curve  $y = f(x)$ ,  $x$ -axis between the lines  $x = a$  and  $x = b$ .

\* 5. Find  $L\{(t+2)^2\}$ .

6. Find  $L^{-1}\left(\frac{2}{s-4} + \frac{1}{s^2+9}\right)$ .

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

8. Find the differential equation of the family of parabolas  $y^2 = 4ax$ , where  $a$  is arbitrary constant.

9. Solve  $\frac{dy}{dx} = \frac{1+y^2}{1+x^2}$ .

10. Solve  $(D^2 + 4D + 13)y = 0$ .

**PART—B**

10×5=50

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

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

11. (a) Evaluate

$$\int \sin 5x \cos 4x \, dx$$

(b) Evaluate :

$$\int \frac{1}{5 + 4 \cos x} \, dx$$

12. (a) Evaluate :

$$\int x \tan^{-1} x \, dx$$

- (b) Evaluate :

$$\int_0^{\pi/2} \frac{\sqrt{\tan x}}{\sqrt{\tan x} + \sqrt{\cot x}} \, dx$$

13. (a) Find the volume of the solid obtained by revolving the curve  $x^2 = y - 3$  about x-axis from  $x = 1$  to  $x = 3$ .

- (b) Find the RMS value of  $\sqrt{8 - 4x^2}$  between  $x = 0$  to  $x = 2$ .

14. (a) Obtain the value of  $\int_0^1 \frac{1}{1+x^2} \, dx$  using Simpson's rule by dividing (0, 1) into four equal parts and hence find the approximate value of  $\pi$ .

- (b) Find  $L \{e^{2t} \cos 3t\}$ .

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

- (b) Define convolution theorem, find  $L^{-1} \left\{ \frac{1}{(s+a)(s+b)} \right\}$ .

16. Obtain the Fourier series for the function  $f(x) = \frac{\pi - x}{2}$  in the interval (0,  $2\pi$ ).

17. (a) Solve  $(x^3 + 3xy^2) \, dx + (3x^2y + y^3) \, dy = 0$ .

- (b) Solve  $\frac{dy}{dx} + \frac{3y}{x} = \frac{1}{x^4}$ .

18. (a) Solve  $(D^2 - 7D + 6)y = e^{2x}$ .

- (b) Solve  $(D^2 + 2D + 1)y = x + \sin x$ .

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