

6242

BOARD DIPLOMA EXAMINATIONS

COMMON-THIRD SEMESTER

OCT/NOV-2019

ENGINEERING MATHEMATICS - II

Time: 3 hours

Max. Marks: 80

PART – A

3 X 10 = 30

- Instructions:**
1. Answer *all* questions.
  2. Each question carries **Three** Marks.
  3. Answer should be brief and straight to the point and should not exceed Five simple sentences.

1. Evaluate  $\int (\sec x \tan x - 5 \operatorname{cosec}^2 x) dx$

2. Evaluate  $\int \frac{e^{\sin^{-1} x}}{\sqrt{1-x^2}} dx$

3. Evaluate  $\int_0^1 \frac{x^2-1}{x^4-1} dx$

4. Find the mean value of  $f(x) = x^3 + x$  over the interval  $[0, 1]$

\* 5. Find  $L\{\sin^2 2t\}$

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

7. Find the value of  $a_0$  in the Fourier Series expansion of function

$$f(x) = \frac{x}{2} \text{ in the interval } (-\pi, \pi)$$

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[Cont.,

8. Find the order and degree of the Differential Equation

$$x^2 \left( \frac{d^2y}{dx^2} \right)^3 + 2y \left( \frac{dy}{dx} \right)^4 + y^4 = 0$$

9. Find the Integrating Factor of the differential equation

$$\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^5}$$

10. Find the complementary function of the differential equation

$$(D^2 - 2D + 1) y = 4e^{3x}$$

**PART – B**

**5 X 10 = 50**

- Instructions:**
1. Answer any **Five** questions
  2. Each question carries **TEN** Marks.
  3. Answer should be comprehensive and a criterion for valuation is the content but not the length of the answer.

11. a) Evaluate  $\int \left( \frac{1}{3x^2 + 2x + 5} \right) dx$

b) Evaluate  $\int \left( \frac{3x+1}{x^5 + 2x - 3} \right) dx$

12. a) Evaluate  $\int e^x \left( \frac{1+x \log x}{x} \right) dx$

b) Evaluate  $\int_0^1 x \left( \frac{1-x^2}{1+x^2} \right) dx$

13. (a) Find the RMS value of  $y = \sqrt{8 - 3x^2}$  between  $x = 0$  to  $x = 2$

(b) Find the volume of the solid of revolution formed by rotating one arch of the curve  $y = \sin x$  about  $x$ -axis between  $x = 0$  and  $x = \pi$ .

14. a) Apply Simpson's rule to find the approximate area bounded by  $x$ -axis, between the lines  $x = 1$  and  $x = 4$  and the curve through the points

$x =$	1	1.5	2	2.5	3	3.5	4
$y =$	2	2.4	2.7	2.8	3	2.6	2.1

b) Find  $L\left\{\frac{e^t - e^{-2t}}{t}\right\}$

15. a) Find  $L^{-1}\left\{\frac{s-5}{s(s+3)}\right\}$

b) using Convolution theorem Find  $L^{-1}\left\{\frac{1}{(s+1)(1-s)}\right\}$

16. Expand  $f(x) = 2 - x$ ,  $0 < x < 2\pi$  in Fourier series

17. (a) Solve  $\frac{dy}{dx} = \frac{y}{x} + \sin\left(\frac{y}{x}\right)$

(b) solve  $\frac{dy}{dx} - y \tan x = e^x$

18. Solve the following differential equations

(a)  $(D^3 - 1)y = 0$ , where  $D = \frac{d}{dx}$

(b)  $(D^2 + 36)y = \sin^2 x$ , where  $D = \frac{d}{dx}$

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