

6232

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  $\int (x + \frac{1}{x})^2 dx$
2. Evaluate  $\int \sin^2 x dx$
3. Evaluate  $\int_{-2}^2 (x^{99} + x^2 + 5) dx$
4. Find the mean value of  $f(t) = x^2 - 3x + 2$  between the values of x where the expression vanishes.
5. Find  $L\{ \cos^2 t \}$
6. Find  $L^{-1}\{ \frac{1}{s(s-3)} \}$
7. Obtain the value of  $a_0$  in the half range cosine series expansion of  $f(x) = 3x + 1$  in  $0 < x < 2$

[Cont.,

8. Find the order and degree of the Differential Equation

$$\log\left(\frac{dy}{dx}\right) = ax + by \text{ where } a \text{ and } b \text{ are constants.}$$

9.

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

10.

$$\text{Solve } \frac{d^2y}{dx^2} + y = 0$$

### 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  $\int \sin^7 x \cos^5 x \, dx$

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

12.

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

b) Evaluate  $\int_0^1 \frac{\cos^{-1} x}{\sqrt{1-x^2}} dx$

13.

(a) Find the area bounded by the curve  $y = x^2 + 3x$  and  $x$ -axis

(b) Find the volume generated by revolving the Ellipse  $\frac{x^2}{9} + \frac{y^2}{4} = 1$  about its minor axis.

[Cont.,

14. a) Calculate the approximate value of  $\pi$  from  $\int_0^1 \frac{1}{1+x^2} dx$

using Trapezoidal's rule by dividing  $[0,1]$  into 4 equal parts.

b) Find  $L\{t \cos 2t\}$

15. a) Find  $L^{-1} \left\{ \frac{s-3}{s^2-6s+5} \right\}$

b) using Convolution theorem Find  $L^{-1} \left\{ \frac{1}{s(s^2+1)} \right\}$

16. Find the Fourier series for  $f(x) = e^x$  in  $0 < x < 2\pi$

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

(b) solve  $\frac{dy}{dx} + y \sec x = \tan x$

18. Solve the following differential equations

a)  $\frac{d^3y}{dx^3} + \frac{d^2y}{dx^2} - \frac{dy}{dx} - y = 0$

b)  $(D^2 - 1)y = \cosh 2x$ , where  $D = \frac{d}{dx}$