

6222

BOARD DIPLOMA EXAMINATIONS

COMMON-THIRD SEMISTER

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  $\int \left( \frac{1}{2\sqrt{x}} + 7\sec^2 x + \frac{1}{x} \right) dx$

2. Evaluate  $\int e^{5x-7} dx$

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

4. Find the mean value of  $f(x) = \log x$  over the interval  $[1, e]$

5. Find  $L\{ 3\cos 2t - 4 \sin 3t \}$

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

\* [Cont.,

7. Find the value\* of  $a_0$  in the Fourier series expansion of the function  $f(x) = e^{-x}$  in the interval  $[0, 2\pi]$

8. Find the order and degree of the Differential Equation

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

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

10. Solve  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = 0$

**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  $\int \sin^5\theta \cos^3\theta \, d\theta$

b) Evaluate  $\int \left( \frac{1}{3+4\cos x} \right) \, dx$

12. a) Evaluate  $\int x \sin x \, dx$

b) Evaluate  $\int_0^{\pi/2} \log \tan x \, dx$

13. (a) Find the area bounded by the curve  $y^2 = 16x$ ,  $y$ -axis and the line  $y = 2$  and  $y = 6$

(b) Using the method of integration find the volume of Cylinder with radius  $r$  units and height  $h$  units.

14. a) Calculate the approximate value of  $\int_{-3}^3 x^4 dx$  using Simpson's rule by dividing  $[-3, 3]$  into 6 equal parts. Verify the result with its exact value by integration techniques.

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

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

b) using Convolution theorem Find  $L^{-1} \left\{ \frac{1}{s(s^2 + 25)} \right\}$

16. Expand  $f(x) = e^{-x}$ ,  $-\pi < x < \pi$  in Fourier Series.

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

(b) solve  $\frac{d}{dx} + \frac{y}{1+x^2} = \frac{e^{\tan^{-1} x}}{1+x^2}$

18. a) Solve  $(D^2 + D - 6)y = e^{3x}$ , where  $D = \frac{dy}{dx}$

b) Solve  $(D^3 + D)y = \sin 2x$

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