

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