

6237

BOARD DIPLOMA EXAMINATIONS

DEE-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 $\int \tan^{-1} \left(\sqrt{\frac{1-\cos 2x}{1+\cos 2x}} \right) dx$

2. Evaluate $\int \frac{1}{x+\sqrt{x}} dx$

3. Evaluate $\int_1^2 \frac{1}{x\sqrt{x^2-1}} dx$

4. Find the mean value of $f(t) = \cos^2 t$ over the interval $[0, \pi]$

5. Find $L\{2e^{-7t} + 5t^3 + \sinh 2t\}$

6. Find $L^{-1} \left\{ \frac{2s+5}{4s^2+25} \right\}$

7. Find the value of a_0 in the Fourier series expansion of the function $f(x) = |\cos x|$ in the interval $[-\pi, \pi]$

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8. Find the differential equation of the family of circles with their centers at the origin.
9. Find the Integrating Factor of the differential equation $\frac{dy}{dx} + y = 2 \cos x$
10. Find the Particular Integral of $\frac{d^2y}{dx^2} + y = 17$

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 $\int \frac{1}{\sqrt{1+x-x^2}} dx$
- b) Evaluate $\int \left(\frac{x}{(x-1)(2x-1)} \right) dx$
12. a) Evaluate $\int e^x \left(\frac{x}{(x+1)^2} \right) dx$
- b) Evaluate $\int_0^1 x^2 e^{-2x} dx$

13. (a) Find the RMS value of $y = \sqrt{16 - 2x^2}$ over $[0, 1]$
- (b) Find the volume of the solid formed by revolving the area enclosed by the curve $y = x^3$, the y-axis and the lines $y = 0, y = 27$ about y-axis

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14. a) Evaluate $\int_1^2 \frac{1}{x} dx$ by dividing the interval [1, 2] into 10 equal parts using Simpson's rule.

b) Find $L \left\{ \int_0^t e^{-t} \cosh t dt \right\}$

15. a) Find $L^{-1} \left\{ \frac{s-7}{s(s+4)} \right\}$

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

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

17. (a) Solve $(2x + y + 1) dx + (2y + x + 8) dy = 0$

b) solve $\frac{dy}{dx} = 2y \tan x = y^2 \tan^2 x$

18. Solve $(D^2 - 6D + 9)y = \sin x$ given that $y = \frac{dy}{dx} = 0$ at $x = 0$ and

where $D = \frac{d}{dx}$