6201

C16- COMMON–301

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BOARD DIPLOMA EXAMINATION, (C-16)

OCTOBER/NOVEMBER—2023

THIRD SEMESTER (COMMON) EXAMINATION

ENGINEERING MATHEMATICS—II

Time : 3 Hours] [*Total Marks* : 80

PART—A 3×10=30

Instructions : (1) Answer **all** questions.

(2) Each question carries **three** marks.

1. Evaluate $\int \frac{1}{1+\sin x}\,dx$

2. Evaluate $\int \frac{(1+\log x)^5}{x}\,dx$

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

4. Find the area enclosed by the parabola $y = x^2$ with x-axis between $x = 0$ and $x = 1$.

5. Find $L(t^3 + e^{-t} + 3\cos 3t)$

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

7. Define Fourier series of a function $f(x)$ in $(c, c+2\pi)$.

8. Find the differential equation of the family of parabolas $y^2 = 4ax$.

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

10. Solve $(D^2 + 4)y = 0$

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PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each question carries **ten** marks.

11. *(a)* Evaluate $\int \sin^9 x.\cos^3 x \; dx$

(b) Evaluate $\int \frac{1}{5+4\cos x} dx$

12. *(a)* Evaluate $\int x^3 \cos 3x \; dx$

(b) Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x}+\sqrt{\cos x}} dx$

13. *(a)* Find the RMS value of $\sqrt{27-4x^2}$ over the range $x = 0$ to $x = 3$.

(b) Find the volume of the solid obtained by revolving the ellipse $25x^2 + 16y^2 = 400$ about x-axis.

14. *(a)* Find the value of $\int_0^3 \frac{1}{1+x} dx$ using Simpson's rule by dividing the range into 6 equal parts.

(b) Find $L\{te^{2t} \cos 3t\}$

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

(b) Using Convolution theorem, evaluate $L^{-1}\left\{\frac{1}{(s-1)(s-2)}\right\}$.

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16. Find the Fourier series for the function $f(x) = x^2$ in the interval $[-\pi, \pi]$.

17. *(a)* Solve $\frac{dy}{dx} + \frac{y}{x} = \frac{1}{x^2}$

(b) Solve $\{x^2 + 2xy)dx + (x^2 + e^y)dy = 0$

18. *(a)* Solve $(D^2 + D - 6)y = x^2$

(b) Solve $(D^2 + 9)y = \cos 2x$

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