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C16-M/CHOT/RAC–301

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BOARD DIPLOMA EXAMINATION, (C-16)

MARCH/APRIL—2021

DME - THIRD SEMESTER 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 $\int \left(e^x + \sin x + \frac{1}{x} \right) dx$

2. Evaluate $\int \frac{\log x}{x} dx$

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

4. Find the area bounded by the Parabola $y = 2x^2$, $x-$axis between the lines $x = 1$ and $x = 2$.

5. Find the Laplace Transform of $(1 + \cos 2t)$.

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

7. Write the Fourier series expansion for the function $f(x)$ defined in the interval $(c, c+2\pi)$.

8. Show that the differential equation corresponding to $y = A\sin 3x + B\cos 3x$, where A and B are arbitrary constants, is $\frac{d^2y}{dx^2} + 9y = 0$.

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

10. Solve $\left(D^2 - 5D + 6\right)y = 0$

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

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

11. *(a)* Evaluate $\int \sin 3x \cos 2x \, dx$

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

12. *(a)* Evaluate $\int e^x \left(\tan x + \sec^2 x\right) dx$

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

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

(b) Find the volume of the solid of revolution of the area between the curve $y = 4x^2$, $x = 0$ and $x = 2$ about $x-$axis.

14. *(a)* Obtain the value of $\int_1^{11} x^2 dx$ using Trapezoidal rule by taking $n = 10$.

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

15. *(a)* Find $L^{-1}\left[\frac{1}{(s-1)(s+3)}\right]$.

(b) Find $L^{-1}\left[\frac{s-2}{s^2-2s+5}\right]$.

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

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

(b) Solve $\left(x^3 + 3xy^2\right)dx + \left(y^3 + 3x^2y\right)dy = 0$

18. *(a)* Solve $\left(D^2 - 4D + 8\right)y = e^{-x}$

(b) Solve $\left(D^2 + 1\right)y = \cos 2x$

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