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C16–M–301/C16–CHOT–301/C16–RAC–**301**

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BOARD DIPLOMA EXAMINATION, (C–16)

OCT/NOV—2018

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 $\int_{1}^{1} \frac{\sin x}{x^2} e^x \, dx$.

2. Evaluate $\int \frac{\cos^{-1} x}{\sqrt{1 - x^2}} dx$.

3. Evaluate $\int_{0}^{\pi/4} \sec^2 x dx$.

4. Find the area bounded by the parabola $y = x^2$, X-axis, between the lines $x = 2$ and $x = 3$.

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

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

7. Find the value of a_0 in Fourier series expansion of $f(x) = x^2$ in the interval $(0, 2)$.

8. Find the differential equation corresponding to the family of curve $y = Ae^{5x} + Be^{-5x}$, where A, B are arbitrary constants.

9. Solve $\frac{dy}{dx} + \sqrt{\frac{1-y^2}{1-x^2}} = 0$.

10. Solve $(D^2 - 6D + 4)y = 0$

PART—B 10×5=50

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

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

11. *(a)* Evaluate $\int \frac{1}{\sqrt{x-2}+\sqrt{x-3}}\,dx$.

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

12. *(a)* Evaluate $\int x^3 e^{2x}\,dx$.

(b) Evaluate $\int_0^{\pi/2} \frac{1}{1+\tan x}\,dx$.

13. *(a)* Find the RMS value of $\sqrt{8-4x^2}$ over the range between $x = 0$ to $x = 3$.

(b) Find the volume generated by revolving the ellipse $\frac{x^2}{9} + \frac{y^2}{4} = 1$ about y-axis.

14. *(a)* Evaluate $\int_0^1 \frac{1}{1+x^2}\,dx$ using trapezoidal rule by taking $n = 4$.

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

15. *(a)* Find $L^{-1}\left\{\frac{s}{(s-3)^5}\right\}$

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

16. Expand the function $f(x) = x^2$ as a Fourier series in $(-\pi, \pi)$.

17. *(a)* Solve $\frac{dy}{dx} - \frac{y}{x} = 8$.

(b) Solve $(e^y + 1)\cos x\,dx + e^y \sin x\,dy = 0$.

18. *(a)* Solve $(D^2 - D - 6)y = e^{3x} + e^{-3x}$.

(b) Solve $(D^2 + 25)y = \sin 5x$.

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