C16–EE–301/C16–CHPP–301/C16–PET–**301**

6237

BOARD DIPLOMA EXAMINATION, (C–16)
MARCH/APRIL—2018
DEEE—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 $\int(\mathrm{cosec}^2 x + a^x + \cos x)dx$.

2. Evaluate $\int \sec^2(2x+3)dx$.

3. Evaluate $\int_{-1}^{1}\dfrac{1}{\sqrt{1-x^2}}\,dx$.

4. Find the RMS value of xe^{2x} over the interval $(0, 1)$.

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

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

7. Find a_0 in the Fourier series expansion of $F(x) = x$ in the interval $(0, 2\pi)$.

8. Solve $y^2 dx + x^2 dy = 0$.

9. Solve $(D^2 + 6D + 9)y = 0$.

10. Form differential equation for the family of curves $y = A\sin 2x + B\cos 2x$.

<center>**PART—B**</center>   10×5=50

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

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

11. *(a)* Evaluate $\int \sin^3 x. \cos^5 x. dx$.

     (b) Evaluate $\int \dfrac{1}{5 + 4\sin x} dx$.

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

     (b) Evaluate $\displaystyle\int_0^{\pi/2} \dfrac{1}{1 + \cot x} dx$.

13. *(a)* Find the area bounded by the parabola $y^2 = 4x$, Y-axis between $y = 2$ and $y = 5$.

     (b) Find the volume of the solid generated when the area bounded by the curve $y = x(1 - x)$ and X-axis is rotated about X-axis.

14. *(a)* Evaluate $\int_{4}^{8} \frac{1}{x}\,dx$ approximately by dividing the interval $[4, 8]$ into 4 equal parts using Trapezoidal rule.

(b) Find $L\{t\,e^{2t}\sin 3t\}$.

15. *(a)* Find $L^{-1}\left\{\dfrac{1}{s^2 + 4s + 20}\right\}$.

(b) Find $L^{-1}\left\{\dfrac{s}{(s-1)(s-2)}\right\}$.

16. Expand the function $f(x) = x^2$ as a Fourier series in the interval $(-\pi, \pi)$ and hence deduce $\dfrac{1}{1^2} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} + \cdots = \dfrac{\pi^2}{12}$.

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

(b) Solve $e^y\,dx + (xe^y + 2y)\,dy = 0$.

18. *(a)* Solve $(D^2 + D - 6)y = 1 + e^{-3x}$, where $D = \dfrac{d}{dx}$.

(b) Solve $(D^2 + 3D + 2)y = \sin 3x$, where $D = \dfrac{d}{dx}$.

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