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C16–EC–301/C16–CHPC–301/C16–PCT–**301**

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BOARD DIPLOMA EXAMINATION, (C–16)

JUNE—2019

DECE—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 :

$$\int (\sin x + e^x + \operatorname{cosec}^2 x)\, dx$$

2. Evaluate :

$$\int \frac{\sin(\log x)}{x}\, dx$$

3. Evaluate :

$$\int_0^{\pi} \sin 3x\, dx$$

4. Find the area bounded by the curve $y = \sin x$, the x-axis and the lines $x = 0$ and $x = \pi$.

5. Find $L\{3\sin 4t + 4\cos 3t\}$.

6. Find $L^{-1}\left\{\frac{s^2+4}{s^3}\right\}$.

7. Write the Fourier cosine series for a function $f(x)$ in $(-\pi, \pi)$.

8. Find the differential equation of the family of curves $y = Ae^{3x} + Be^{-3x}$, where A and B are arbitrary constants.

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

10. Solve $(D^2 - 18D + 77)y = 0$.

PART—B

10×5=50

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

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

11. *(a)* Evaluate :

$$\int \sin^7\theta \cos^2\theta \, d\theta$$

(b) Evaluate :

$$\int \frac{1}{x^2 + 8x + 20} \, dx$$

12. *(a)* Evaluate :

$$\int \frac{x}{(x+1)(x+2)} \, dx$$

(b) Show that

$$\int_0^{\pi/2} \frac{1}{1+\tan x} \, dx = \frac{\pi}{4}$$

13. *(a)* Find the volume of the solid obtained by revolving the ellipse $9x^2 + 25y^2 = 225$ about Y-axis.

(b) Find the RMS value of $f(x) = xe^{2x}$ from $x = 0$ to $x = 1$.

14. *(a)* Obtain the value of $\int_0^6 \frac{1}{1+x^2}\,dx$ by taking $n = 6$ using simpson's $\frac{1}{3}$ rule.

(b) Find $L\{e^{4t} \sin 2t \cos t\}$.

15. *(a)* Find $L^{-1}\left(\frac{4s+5}{(s-1)(s+2)}\right)$.

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

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

17. *(a)* Solve $(x + y - 2)dx + (x - y + 4)dy = 0$.

(b) Solve $\frac{dy}{dx} + \frac{y}{x} = 2x^3$.

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

(b) Solve $(D^2 + 4)y = \sin 3x$.

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