C16–C–301/C16–CM–301/C16–IT–**301**

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BOARD DIPLOMA EXAMINATION, (C–16)
OCT/NOV—2017
DCE—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.

(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Evaluate

$\int (x^5 \, 5^x \, 5x) \, dx$

2. Evaluate

$\int \dfrac{14x \quad 11}{7x^2 \quad 11x \quad 1} \, dx$

3. Evaluate

$\displaystyle\int_0^{\pi/2} \sin^2 x . dx$

4. Find the mean value of the ordinate of $y^2 \quad 8x$ from $x \quad 0$ and $x \quad 3$.

5. Find the Laplace transform of $t^2 \, e^{3t}$.

6. Find

$$L^{-1}\left[\frac{1}{(s-1)^3}\right]$$

7. Find the Fourier constant a_0 for $x.\sin x$ in $(-\pi, \pi)$.

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

9. Solve

$$\frac{dy}{dx} = e^{2x-y}$$

10. Solve

$$\frac{d^2y}{dx^2} - 10\frac{dy}{dx} + 25y = 0$$

PART—B $\qquad\qquad$ 10×5=50

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

$\qquad\qquad$ (2) Each question carries **ten** marks.

$\qquad\qquad$ (3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. *(a)* Evaluate

$$\int\cos^3 x\sin^5 x\,dx$$

(b) Evaluate

$$\int\frac{1}{x^2-4x+13}\,dx$$

12. *(a)* Evaluate

$$\int x^2\cos\left(\frac{5-x}{4}\right)dx$$

(b) Evaluate

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

13. *(a)* Find the area enclosed by the parabola $y = x^2$ and the line $y = 3x + 4$.

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

14. *(a)* Find

$$L^{-1}\left[\dfrac{s}{(s-1)(s-2)}\right]$$

(b) Evaluate

$$\int_{1}^{11} x^3 \, dx$$

using trapezoidal rule by taking $n = 10$.

15. *(a)* Find

$$L\{t^3 \, e^{2t}\}$$

(b) Find

$$L^{-1}\left[\dfrac{1}{s(s^2+4)}\right],$$

using convolution theorem.

16. Express $f(x) = x + x^2$ as Fourier series in $-x < x < $.

17. *(a)* Solve,

$$\dfrac{dy}{dx} + \dfrac{2y}{x} = \dfrac{1}{x^2}$$

(b) Solve

$$(D^2 - 5D + 6)\,y = e^{3x} + 3^{3x}$$

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18. *(a)* Solve,

$$(D^2 + D + 1)y = 2\sin 3x$$

(b) Solve,

$$(D^2 + D - 6)y = x$$

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