C16–A–301/C16–AA–301/C16–CH–301/
C16–CHST–301/C16–EI–301/C16–MET–301/
C16–MNG–301/C16–IT–301/C16–TT–301/

C16–PKG–**301**

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BOARD DIPLOMA EXAMINATION, (C–16)
MARCH/APRIL—2018
THIRD SEMESTER (COMMON) EXAMINATION

ENGINEERING MATHEMATICS—III

Time : 3 hours]   [*Total Marks* : 80

PART—A   3×10=30

Instructions : (1) Answer **all** questions.

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

1. Evaluate :

$$\int (2\sec^2 x - 2e^x - 4\sin x)\,dx$$

2. Evaluate :

$$\int \sqrt{1 - \sin 2\theta}\; d\theta$$

3. Integrate

$$\frac{e^{\tan^{-1} x}}{1 + x^2}$$

with respect to *x*.

4. Evaluate :

$$\int x \sin x \, dx$$

5. Evaluate :

$$\int_0^1 (2x-3)^2 \, dx$$

6. Evaluate

$$\int_0^{\pi/4} \tan^4 x \sec^2 x \, dx$$

7. Find the differential equation for $y = Ae^x + Be^{-x}$, where A, B are constants.

8. Solve :

$$\frac{dy}{dx} = e^{2x-3y}$$

9. Solve

$$\frac{dy}{dx} + \frac{y}{x} = 3$$

10. Verify that the differential equation $(x^2 - 2xy)dx + (\sin y - x^2)dy = 0$ is an exact equation.

<center>**PART—B**   10×5=50</center>

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

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

11. *(a)* Evaluate :

$$\int \frac{2x-10}{x^2-x-2} \, dx$$

   (b) Using Bernoulli's rule evaluate :

$$\int x^3 \sin 2x \, dx$$

12. *(a)* Evaluate :

$$\int \sin 4x \, \sin 6x \, dx$$

   (b) Integrate :

$$\frac{1}{5-4\sin x}$$

   with respect to *x*.

13. *(a)* Evaluate :

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

(b) Find the area of the region bounded by the line $2x + y = 8$, x-axis and the lines $x = 2$ and $x = 4$.

14. *(a)* Find the volume of the solid generated by revolving the ellipse $\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$ about the x-axis.

(b) Evaluate

$$\int_0^{\pi/2} \frac{\sin x}{1 + \cos x} dx$$

15. *(a)* Find the root mean square value of $\sqrt{\log x}$ over the range $x = 1$ to $x = e$.

(b) Solve

$$\frac{dy}{dx} = (4x + y + 1)^2$$

16. Evaluate $\int_1^5 x^2 dx$ using Simpson's 1/3 rule by taking $n = 8$.

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

(b) Solve :

$$\frac{dy}{dx} = \frac{y}{x} + \tan \frac{y}{x}$$

18. Solve :

$$\frac{dy}{dx} + \frac{y}{x} = xy^2 \sin x$$

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