C14–M–301/C14–CHOT–301/C14–RAC–**301**

4249

BOARD DIPLOMA EXAMINATION, (C–14)
MARCH/APRIL—2016
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 :

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

2. Evaluate :

$$\int \frac{1}{1 + \cos x}\, dx$$

3. Evaluate :

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

4. Evaluate :

$$\int_{1}^{1} \frac{1}{x+2}\, dx$$

5. Find the mean value of $\dfrac{1}{1+x^2}$ in the interval (0, 1).

6. Find the differential equation of the family of curves $y = A\cos 3x + B\sin 3x$.

7. Solve :

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

8. Solve :

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

9. Find out the range and coefficient of dispersion of the following data :

60, 50, 85, 90, 70, 40, 110, 130, 120, 100

10. Find the standard deviation of 16, 13, 17, 12.

PART—B   10×5=50

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

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

11. *(a)* Evaluate :

$$\int \sin 6x \cos 2x\ dx$$

(b) Evaluate :

$$\int \frac{1}{5+4\cos x}dx$$

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12. (a) Evaluate :

$$\int \frac{1}{x^2 - 2x + 5}\,dx$$

(b) Evaluate :

$$\int \frac{1}{(x^2 - 36)(x^2 - 25)}\,dx$$

13. (a) Evaluate :

$$\int \sin^{-1} x \cdot dx$$

(b) Evaluate :

$$\int_0^{\pi/2} \sqrt{1 - \cos 2x}\,dx$$

14. (a) Find the area bounded by the ellipse $4x^2 + 9y^2 = 36$ using the method of integration.

(b) Prove

$$\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}}\,dx = \frac{\pi}{4}$$

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

(b) Find the volume of solid formed by revolving the area enclosed by the circle $x^2 + y^2 = a^2$.

16. (a) Solve :

$$\frac{dy}{dx} + 2y \cot x = 3x^2 \operatorname{cosec}^2 x$$

(b) Solve :

$$(2x + y + 1)\,dx + (2y + x + 1)\,dy = 0$$

17. *(a)* Solve :

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

(b) Solve :

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

18. From the marks obtained by 8 students in mathematics and statistics, compute the rank correlation coefficient and interpret the result :

Student No.	1	2	3	4	5	6	7	8
Marks in Mathematics	60	15	20	28	12	40	80	20
Marks in Statistics	10	40	30	50	30	20	60	30

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