



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 :

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

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5. Find the mean value of $\frac{1}{1-x^2}$ 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.

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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 :

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

(b) Evaluate :

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

13. (a) Evaluate :

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

(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 :

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