



C09-A-302/C09-AA-302/C09-AEI-302/C09-CH-302/  
C09-CHST-302/C09-IT-302/C09-MET-302/  
C09-MNG-302/C09-PKG-302/C09-TT-**302**

**3202**

**BOARD DIPLOMA EXAMINATION, (C-09)**  
**OCT/NOV—2014**  
**THIRD SEMESTER (COMMON) 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  $\int \left( \frac{1}{x} - 3 \sin x \right) dx$ .

2. Evaluate  $\int \frac{1}{1 + \cos x} dx$ .

3. Evaluate  $\int \frac{e^{\sin^{-1} x}}{\sqrt{1-x^2}} dx$ .

4. Write the formulae of  $\int \frac{1}{\sqrt{a^2-x^2}} dx$ ,  $\int \frac{1}{\sqrt{a^2+x^2}} dx$ ,  $\int \frac{1}{\sqrt{x^2+a^2}} dx$ .

5. Evaluate  $\int \frac{dx}{x^2 + 36}$ .

6. Find the mean value of the function  $f(x) = \frac{1}{x^2 + 1}$  in  $[0, 1]$ .

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7. Find the volume of the solid obtained by revolving the parabola  $y = x^2$  about  $x$ -axis between  $x = 0$  and  $x = 3$ .

8. Solve  $(D^2 - 4D - 7)y = 0$ .

9. Form the differential equation of family of curves  $y = A \cos 3x + B \sin 3x$ , where  $A, B$  are arbitrary constants.

10. Solve  $x dy - y dx = 0$ .

**PART—B**

10×5=50

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

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

11. (a) Evaluate  $\int \frac{1}{\sqrt{x^2 - x + 1}} dx$ .

(b) Evaluate  $\int x^2 e^{7x} dx$ .

12. (a) Evaluate  $\int \frac{\sec^2 x}{\sqrt{1 - \tan^2 x}} dx$ .

(b) Evaluate  $\int \frac{1}{5 - 4 \cos x} dx$ .

13. (a) Evaluate  $\int_0^{\pi/2} \frac{\sin^4 x}{\sin^4 x + \cos^4 x} dx$

(b) Find the area enclosed by the circle  $x^2 + y^2 = a^2$  using the method of integration.

14. (a) Find the volume of the solid obtained by revolving the ellipse  $\frac{x^2}{9} + \frac{y^2}{4} = 1$  about its major axis.

(b) Find the RMS value of  $\sqrt{\log x}$  between  $x = 1$  and  $x = e$ .

15. (a) Solve  $\frac{dy}{dx} = y \cot x - \operatorname{cosec} x$ .

(b) Solve  $(D^2 - 5D - 6)y = 3e^{5x}$

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16. (a) Solve  $(D^2 - 6D - 5)y = \cos x$ .

(b) Solve  $(D^2 - D - 2)y = 4x$ .

17. Solve  $y(x - y)dx - x(x - y)dy = 0$ .

18. (a) Obtain the value of  $\int_0^1 \frac{dx}{x^2}$  using Simpson's rule by dividing the interval  $(0, 1)$  into 4 equal parts.

(b) Solve  $(x^2 - y)dx - (y^2 - x)dy = 0$ .

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