

**1502****Code : 15SC02M**Register  
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**II Semester Diploma Examination, April/May-2016****ENGINEERING MATHEMATICS - II****Time : 3 Hours ]****[ Max. Marks : 100**

- Note :** (i) Answer any 10 questions in Section – A, 8 questions from Section – B and 5 questions from Section – C.
- (ii) Each question carries 3 marks in Section – A, 5 marks in Section – B and 6 marks in Section – C.

**SECTION - A**

- Find the value of k, if the lines  $(14 + 1)x + 4y - 3 = 0$  and  $8x - 3y + 1 = 0$  are perpendicular. **3**
- Find the focus and equation to directrix of the parabola  $y^2 = 16x$ . **3**
- If  $y = \sin^{-1}x + 2e^{3x} - 4\sqrt{x}$ , find  $\frac{dy}{dx}$ . **3**
- If  $y = (4x^2 - 3 \cos x)^{10}$ , find  $\frac{dy}{dx}$ . **3**
- If  $y = (3 + 2 \sin hx) \cos x$ , find  $\frac{dy}{dx}$ . **3**
- If  $y = x^x$ , find  $\frac{dy}{dx}$ . **3**
- Find the equation to the tangent to the curve  $y = 2x^2 - 3$  at  $(1, 3)$ . **3**
- The displacement of a particle moving along a straight line is  $S = t^3 - 2t^2 - 4t + 20$  mts. Find the velocity when  $t = 2$  secs. **3**
- Evaluate **3**

$$\int (x^4 + 5/x + 3 \operatorname{cosec}^2 x) dx.$$

10. Evaluate

$$\int \cos^2 x \, dx. \quad 3$$

11. Evaluate  $\int (3 + 4 \tan x)^6 \sec^2 x \, dx. \quad 3$

12. Evaluate  $\int_0^1 (2x + 1)(x - 3) \, dx. \quad 3$

13. Find the area bounded by the curve  $y = x - 5$ , the  $x$ -axis, the ordinates between  $x = 0$  and  $x = 5$ .  $3$

14. Form the differential equation from  $y^2 = 4ax$  by eliminating  $a$ .  $3$

BETA CONSOLE!

## SECTION – B

1. Find the equation to the straight line passing through the point  $(5, 2)$  and parallel to  $4x - 3y + 1 = 0$ .  $5$

2. If  $y = \frac{1+x^2}{1-x^2}$ , find  $\frac{dy}{dx}$ .  $5$

3. If  $y = \sin(\log x)$ , show that  $x^2 y_2 + x y_1 + y = 0$   $5$

4. If  $x = a \cos^3 \theta$ ,  $y = a \sin^3 \theta$ , Find  $\frac{dy}{dx}$  at  $\theta = \frac{\pi}{4}$ .  $5$

5. The radius of a sphere is increasing at the rate of 4 cm/sec. Find the rate of increase of the volume when the radius is 10 cm.  $5$

6. Evaluate  $\int \cos(e^x) e^x \, dx. \quad 5$

7. Evaluate  $\int \frac{\cos x}{1 + \sin^2 x} \, dx. \quad 5$

8. Evaluate  $\int x \log x \, dx. \quad 5$

9.  $\int_0^{\pi/2} \cos 4x \sin 2x \, dx.$

5

10. Find the volume generated by rotating the curve  $y = \sqrt{x^2 + 5x}$  between  $x = 1$  and  $x = 2$  about  $x$ -axis.

5

11. Solve the differential equation  $\frac{dy}{dx} = \frac{1 + y^2}{1 + x^2}.$

5

### SECTION – C

1. Find the equation to the straight line passing through the points (5, 2) and (–3, 3) and also find the slope and  $y$ -intercept of the line.

6

2. Find the eccentricity, distance between the foci, and equation to directrix for the hyperbola  $\frac{x^2}{25} - \frac{y^2}{16} = 1.$

6

3. Differentiate  $\sin x$  w.r.t.  $x$  from first principles.

6

4. Find  $\frac{dy}{dx}$  if  $x^3 + y^3 + 3x^2y - 3x = 25$

6

5. Find the maximum and minimum value of the function  $2x^3 - 3x^2 - 36x + 10.$

6

6. Evaluate  $\int \tan^{-1}x \, dx.$

6

7. Evaluate  $\int_0^{\pi/2} \sin^3x \, dx.$

6

8. Solve the differential equation  $\sec^2x \tan y \, dx + \sec^2y \tan x \, dx = 0.$

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