

**7369****Code : 15SC02M**Register  
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**II Semester Diploma Examination, February/March-2023****ENGINEERING MATHEMATICS – II****Time : 3 Hours ]****[ Max. Marks : 100**

- Instructions :**
- (i) Answer any **10** sub-divisions from Section – A. Each sub-division carries **3** marks.
  - (ii) Answer any **8** sub-divisions from Section – B. Each sub-division carries **5** marks.
  - (iii) Answer any **5** sub-divisions from Section – C. Each sub-division carries **6** marks.

**SECTION – A****(Answer any 10 sub-divisions)**

- (a) Find the slope of a line which makes an angle  $60^\circ$  with  $x$ -axis. **3**
- (b) Find the equation of the parabola with focus  $(6, 0)$  and vertex  $(0, 0)$ . **3**
- (a) If  $y = \cos x - e^x + 5$ , find  $\frac{dy}{dx}$ . **3**
- (b) If  $y = x^2 \cdot \log x$ , find  $\frac{dy}{dx}$ . **3**
- (c) If  $y = \sqrt{\tan x}$ , find  $\frac{dy}{dx}$ . **3**
- 3. (a) If  $x = at$  and  $y = b(1 + t^2)$ , find  $\frac{dy}{dx}$ . **3**
- (b) The equation of motion is given by  $S = 2t^2 - 3t$ , find the velocity after 3 seconds. **3**
- (c) Find the slope of the tangent to the curve  $y = 3x^2$  at the point  $(1, 2)$ . **3**

4. (a) Integrate  $\tan^2 x$  with respect to  $x$ .

(b) Evaluate  $\int \frac{1}{3-4x} dx$ .

(c) Evaluate  $\int \tan x \sec^2 x dx$ .

5. (a) Evaluate  $\int_0^{\pi/4} \sec^2 x dx$ .

(b) Evaluate  $\int_1^2 \frac{1}{x} dx$ .

(c) Write the order and degree of differential equation :

$$x^2 \left( \frac{dy}{dx} \right)^3 + y \left( \frac{dy}{dx} \right)^5 + y^3 = 0$$

### SECTION – B

(Answer any 8 sub-divisions)

6. (a) Find the equation of straight line passing through the point (2, 1) and having slope  $\frac{3}{4}$ . 5

(b) Find  $\frac{dy}{dx}$  if  $x^2 + y^2 = 25$ . 5

7. (a) If  $y = \tan^{-1} x - 6\sqrt{x} + \frac{3}{x} + e^{-x} + 5^x$ , find  $\frac{dy}{dx}$ . 5

(b) If  $y = \log (\cos x)$ , find  $\frac{d^2y}{dx^2}$ . 5

(c) The volume of a sphere is increasing at the rate of 6 cc/sec. Find the rate of change of radius when the radius is 3 cm. 5

- i) Integrate  $e^x - \frac{1}{x} - \operatorname{cosec}^2 x + \sec x \cdot \tan x + \frac{1}{1+x^2}$  with respect to  $x$ . 5
- ii) Integrate  $\sqrt{1 + \sin 2x}$  with respect to  $x$ . 5
- iii) Evaluate  $\int \log x \, dx$ . 5
- iv) Evaluate  $\int \cos^3 x \cdot dx$ . 5
- v) Evaluate  $\int_0^2 (x^2 - 5x + 6) \, dx$ . 5
- vi) Form a differential equation by eliminating the arbitrary constants in  $y = a \cos x + b \sin x$ . 5

### SECTION – C

(Answer any 5 sub-divisions)

- a) Find the equation of a straight line joining the points (2, 3) and (4, -6) and find its slope. 6
- b) Find the eccentricity and length of major and minor axes of the ellipse  $\frac{x^2}{25} + \frac{y^2}{9} = 1$ . 6
- c) If  $x = a \cos \theta$  and  $y = b \sin \theta$ , find  $\frac{dy}{dx}$ . 6
- d) Differentiate  $\cos x$  with respect to  $x$  from the first principle. 6
- e) Find the maximum value of the function  $y = x^3 - 12x + 1$ . 6

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12. (a) Evaluate  $\int_0^{\pi/2} \sin 2x \cos x \cdot dx$ .

(b) Find the area bounded by the curve  $y = \sin x + \cos x$ , the  $x$ -axis and the ordinates at  $x = 0$  and  $x = \frac{\pi}{4}$

(c) Solve  $\frac{dy}{dx} + y \tan x = \cos x$ .

1.

2.

3.

4.

5.

6.

7.

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9.

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