1880

Code : 15SC02M

Register Number

II Semester Diploma Examination, Oct./Nov.-2019

ENGINEERING MATHEMATICS-II

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **10** sub-division in Section-**A**, each sub-division carries **3** marks.

(ii) Answer any **8** sub-division in section-**B**, each sub-division carries **5** marks.

(iii) Answer any **5** sub-division in Section-**C**, each sub-division carries **6** marks.

SECTION – A

(Answer any 10)

1. (a) Find the equation of the line passing through the point (2, –3) with slope 3. **1 + 1 + 1**

(b) Find the equation of parabola with focus at (2, 0) and X-axis is the axis of the parabola. **1 + 1 + 1**

2. (a) Differentiate $15x^4 + 3e^{2x}$ w.r.t. x. **1½ + 1½**

(b) If $y = x \log x$, find $\frac{dy}{dx}$. **1 + 1 + 1**

(c) If $y = \sin h\, 2x$, find $\frac{d^2y}{dx^2}$. **1½ + 1½**

3. (a) If $x = at$, $y = t^2$ find $\frac{dy}{dx}$. **1 + 1 + 1**

(b) Find the slope of tangent to the curve $y = x^2 - 3x + 4$ at (2, 2) **1 + 1 + 1**

(c) The equation of motion of the particle is $S = t^3 + 5t^2 + 4$ in motor. Find the velocity when t = 2 seconds. **1 + 2**

4. (a) Integrate w.r.t. x, $x + \sin x$. **1½ + 1½**

(b) Integrate $\cot^2 x$ w.r.t. x. **1 + 2**

(c) Integrate $\sin 2x \cos 4x$ w.r.t. x. **1 + 2**

5. (a) Evaluate $\int_0^1 (3x + 2)dx$. 2 + 1

(b) Evaluate $\int_0^1 e^{2x}.dx$ 1 + 1 + 1

(c) Find the order & degree of differential equation

$$\left(\frac{d^2y}{dx^2}\right)^3 = \left[1 + \left(\frac{dy}{dx}\right)^2\right]^{2/3}$$ 1 + 2

SECTION – B

(Answer any 8)

6. (a) Find the equation of line passing through the point (3, 4) and parallel to the line $3x + 4y = 8$. 2 + 2 + 1

(b) Differentiate $\sin x$ w.r.t. 'x' by first principle. 1 + 2 + 2

7. (a) If $y = x^{\sin x}$ find $\frac{dy}{dx}$. 1 + 3 + 1

(b) Find $\frac{dy}{dx}$ if $y = \frac{3\sin x - 2\cos x}{x}$. 1 + 3 + 1

(c) The volume of sphere is increasing at the rate of 36 π cc/s. Find the rate of increase of radius, when the radius is 2 cm. 2 + 1 + 2

8. (a) Evaluate $\int \frac{1}{1 + \sin x} dx$. 1 + 2 + 2

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

(c) Evaluate $\int x \log x \, dx$ 1 + 2 + 2

9. (a) Evaluate $\int_0^5 \frac{1}{25+x^2}\,dx$. **2+2+1**

(b) Find the area bounded by the curve $y = 3x^2 - x$, the X – axis & the ordinates $x = 0, x = 2$. **1+2+2**

(c) Form the differential equations by eliminating arbitrary constants a & b from the equation $y = a \cos m\,x + b \sin m\,x$. **2+2+1**

SECTION – C

(Answer any 5)

10. (a) Find the equation to the line passing through (3, –2) and perpendicular to the line joining points (5, 2) & (7, –6). **3+2+1**

(b) Find the equation of hyperbola in the form $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ whose eccentricity is 8 & distance between foci is 12. **1+2+2+1**

11. (a) If $x = a\cos^3\theta$, $y = a\sin^3\theta$, find $\frac{dy}{dx}$ as $\theta = \frac{\pi}{4}$. **2+2+2**

(b) If $y = e^{\tan^{-1}(x)}$, then prove that $(1+x^2)\,y_2 + (2x-1)\,y_1 = 0$. **2+2+2**

(c) Evaluate $\int \tan^{-1}(x)dx$. **2+3+1**

12. (a) Evaluate $\int_0^{\pi/2} \frac{\cos x}{1+\sin^2 x}\,dx$ **2+2+2**

(b) Solve $x\frac{dy}{dx} + y = x^3$ **1+2+1+2**

(c) Find the maximum & minimum values of the function $x^3 - 12x^2 - 27x + 16$ **1+3+2**