1313

Code : 15SC02M

Register Number | | | | | | | |

II Semester Diploma Examination, Nov./Dec. 2017

ENGINEERING MATHEMATICS – II

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

Note : (i) Answer any **10** questions from 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** & **6** marks in section – **C**.

SECTION – A

1. Find the equation to the straight line cutting off y – intercept 5 units and making inclination 135°. **3**

2. Find the focus and equation to directrix of the parabola $y^2 = 40x$. **3**

3. If $y = (x^2 + 5x) \cdot \log x$. Find $\frac{dy}{dx}$. **3**

4. If $y = (3x^3 - 4x + 5)^6$. Find $\frac{dy}{dx}$. **3**

5. Find $\frac{dy}{dx}$, if $x^2 + y^2 = a^2$. **3**

6. If $x = a \tan \theta$, $y = a \sec \theta$. Find $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$. **3**

7. Find the equation to the tangent to the curve $y = x^2 + 1$ at (1, 2). **3**

8. The displacement of a particle S meters, moving along a straight line is $S = 4t^3 - 2t^2 + t$. Find velocity when t = 2 secs. 3

9. Evaluate $\int (x^5 + 3e^{2x} + 4\sin 3x)dx$. 3

10. Evaluate $\int \frac{1}{1+\sin x} dx$. 3

11. Evaluate $\int (x^2 + 5x + 7)^5 (2x + 5)dx$. 3

12. Evaluate $\int_0^1 (x+2)(x-5)\,dx$. 3

13. Find the area bounded by the curve y = 3x, the x-axis and the ordinates between x = 1 & x = 2. 3

14. Form the differential equation from $y = ae^x + be^{-x}$ by eliminating a & b. 3

SECTION – B

15. Find the equation to the straight line passing through the point (4, 5) and parallel to the line 3x + 5y – 3 = 0. 5

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

17. If $y = \tan^{-1}x$, show that $(1 + x^2)\, y_2 + 2xy_1 = 0$. 5

18. If $y = (\sec x)^x$ find $\frac{dy}{dx}$. 5

19. The radius of a sphere is increasing at the rate of 2 cm/sec. Find the rate of increase of the volume when the radius is 6 cm. **5**

20. Evaluate $\int \sin^3 x \, dx$. **5**

21. Evaluate $\int \frac{(\tan^{-1} x)^{10}}{1+x^2} dx$. **5**

22. Evaluate $\int x \cos 2x \, dx$. **5**

23. Evaluate $\int_{-\pi/4}^{\pi/4} \cot^2 x \, dx$. **5**

24. Find the volume generated by rotating the curve $y = x + 2$ about x-axis between $x = 0$ & $x = 2$. **5**

25. Solve the differential equation $\frac{dy}{dx} = 3x^2 - 2x + 5$.

when $x = 1$, $y = 2$. **5**

SECTION – C

26. Find the equation to the straight line passing through the point (4, –3) & (2, 1). Also find the slope and the y-intercept of the line. **6**

27. Find the eccentricity foci and equation to directrix for the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$. **6**

28. Differentiate $\sin x$ w.r.t. x from first principles. **6**

29. If $y = e^{m \sin^{-1} x}$ prove that $(1 - x^2)\, y_2 - x y_1 - m^2 y = 0$. **6**

30. Find the maximum and minimum value of the function

$x^3 - 6x^2 - 15x + 5$. **6**

31. Evaluate

$$\int \left(\frac{4}{x} - \frac{3}{\sqrt{1-x^2}} + 3\tan x - 3\,\mathrm{cosec}^2 x + \frac{1}{\sqrt{x}} - 5 \right) dx. \quad \textbf{6}$$

32. Evaluate :

$$\int_0^{\frac{\pi}{2}} \sin 4x \cos 2x \; dx. \quad \textbf{6}$$

33. Solve the differential equation

$$\frac{dy}{dx} + y \tan x = \sec x. \quad \textbf{6}$$