1210

Code : 15SC-02M

Register Number

ENGINEERING MATHEMATICS – II

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

Note : (i)   Answer any **10** question in Section-A. Each question carries **3** marks.

(ii)   Answer any **8** questions in Section –B. Each question carries **5** marks.

(iii) Answer any **5** questions in Section-C. Each question carries **6** marks.

SECTION – A
(Answer any 10)

1. Find the equation of straight line passing through the point (-3, 9) and having the slope e -1   **3**

2. Find the equation of parabola with focus at (3, 0) and x-axis is the axis of the parabola.   **3**

3. Differentiate $10x^4 + 3e^{2x} - \cos^{-1}(x)$ w.r.t. x.   **3**

4. If $y = \dfrac{\log x}{(1 + \sin x)}$ find $\dfrac{dy}{dx}$.   **3**

5. If $y = e^{m\sin^{-1}x}$, Show that $\dfrac{dy}{dx} = \dfrac{my}{\sqrt{1-x^2}}$.   **3**

6. If $x = 2\sin^3\theta$ and $y = 2\cos^3\theta$. Find $\dfrac{dy}{dx}$.   **3**

7. If the slope of the tangent to the curve $\dfrac{1+x^3}{3}$ is 4. Then find the value of x.   **3**

8. The equation of motion of the particle is $S = t^3 - 2t^2 + 4$ in meter. Find the velocity when t = 2 seconds.   **3**

9. Integrate w.r.t. x $\dfrac{1}{x} + \dfrac{1}{1 + x^2} + \cos 2x$.   **3**

10. Evaluate $\displaystyle\int \sqrt{1 + \sin 2x}\ dx$.   **3**

11. Integrate $\tan^2 x$ w.r.t 'x'.   **3**

12. Evaluate $\displaystyle\int_0^1 \left(\dfrac{1}{1 + x^2} + \dfrac{1}{\sqrt{1 - x^2}} \right) dx$.   **3**

13. Evaluate $\displaystyle\int_0^{\pi/2} \sin x\ dx$.   **3**

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

SECTION –B

(Answer any 8)

15. Find the equation of straight line, which is perpendicular to the line $3x + 4y - 8 = 0$ and passing through the point (3, 4).   **5**

16. Differentiate $\cos x$ from first principle.   **5**

17. If $x^y = y^x$ find $\dfrac{dy}{dx}$.   **5**

18. If $y = e^{ax} + e^{-ax}$. Show that $\dfrac{d^2y}{dx^2} = a^2 y$.   **5**

19. If area of circular plate is increasing at the rate of $2cm^2$/sec. Find the rate of increase of radius when radius is 14 cm.   **5**

20. Evaluate $\int \dfrac{\cos x}{1 + \sin x}\,dx$.   **5**

21. Integrate $\cos^3 x$ w.r.t x.   **5**

22. Evaluate $\int \dfrac{e^{m.\tan^{-1}x}}{1 + x^2}\,dx$.   **5**

23. Simplify $\displaystyle\int_0^{\pi/2} \sin 3x \cdot \cos x\,dx$.   **5**

24. Find the area bounded by the curve $y = x^2 + 1$, x-axis, and the ordinates $x = 1$, $x = 3$.   **5**

25. Eliminate the arbitrary constants a and b from the equation $y = a\cos mx + b\sin mx$.   **5**

SECTION – C

(Answer any **5**)

26. Find the equation of median through 'A' of the triangle ABC where A = (–1, 3), B(–3, 5) & C = (7, –9).   **6**

27. Find the co-ordinate of foci, the vertices, the length of Latus rectum, eccentricity of the ellipse $\dfrac{x^2}{36} + \dfrac{y^2}{16} = 1$.   **6**

28. If $y = e^{\tan^{-1}x}$, then prove that $(1 + x^2)\,y_2 + (2x - 1)\,y_1 = 0$ where y_1 and y_2 are first and second derivatives.   **6**

29. If $y = (\sin x)^{\cos x}$ find $\dfrac{dy}{dx}$.   **6**

30. Find the maximum and minimum values of the function

    $f(x) = x^3 + 6x^2 - 15x + 5$ **6**

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

32. Evaluate $\int_0^1 x^2 e^x \, dx$.   **6**

33. Solve the differential equation $x(y^2 + 1) \, dx + y(x^2 + 1) \, dy = 0$.   **6**