Model Question Paper

Mathematics (MTH2)

Class – XII

Semester – III

Full Marks: 40

Answer the following questions (MCQ Type) carrying 1 mark each.

Choose the correct option (single option correct) $(40 \times 1 = 40)$

1. Principal value of $\cot^{-1}\left(-\sqrt{3}\right)$ is

   (a) $-\frac{\pi}{6}$ (b) $\frac{5\pi}{6}$ (c) $-\frac{5\pi}{6}$ (d) $\frac{7\pi}{6}$

2. Domain of $f(x) = \sin^{-1}(2-x)$ is

   (a) $[1,3]$ (b) $(1,3)$ (c) $[0,3]$ (d) $[-3,-1]$

3. Value of $\cos^{-1}\left(\cos\left(\frac{5\pi}{4}\right)\right)$ is

   (a) $\frac{\pi}{4}$ (b) $-\frac{\pi}{4}$ (c) $\frac{3\pi}{4}$ (d) $-\frac{3\pi}{4}$

4. Value of $\tan^{-1} 1 + \tan^{-2} 2 + \tan^{-1} 3$ is

   (a) 0 (b) $\frac{3\pi}{2}$ (c) π (d) $\frac{3\pi}{4}$

5. Value of x satisfying the equation $\sin^{-1} x + \cos^{-1}(1-x) = \frac{\pi}{2}$ is

   (a) 0 (b) 1 (c) 2 (d) $\frac{1}{2}$

6. Let A be a matrix of order $4 \times m$ and B be a matrix of order $3 \times n$, such that AB and BA are defined. Then value of $(m+n)$ is

   (a) 4 (b) 6 (c) 7 (d) 8

7. If A be a matrix of order 3×3, with $|A| = 4$, then value of $|adj(A)|$ is

   (a) 9 (b) 16 (c) 27 (d) 64

8. If A be a matrix $A = [a_{ij}]_{2\times 3}$ such that $a_{ij} = (-1)^{i+j}$, then value of a_{23} is

   (a) 0 (b) 1 (c) -1 (d) 2

9. If A and B are matrices of order 3 such that $|B| = 5$ and $|AB| = 35$, then value of $|A^{-1}|$ is

(a) $\frac{1}{7}$ (b) $\frac{1}{5}$ (c) 7(d) 35

10. If A be a matrix of order 3, such that $|A^2| = 36$, then value of $|A|$ may be

(a) 6 (b) -6 (c) 36 (d) ± 6

11. If the matrix $\begin{bmatrix} -1 & 3 \\ 2 & k \end{bmatrix}$ is invertible then

(a) $k = 6$ (b) $k = -6$ (c) $k \neq 6$ (d) $k \neq -6$

12. If A and B are two symmetric matrices then $AB - BA$must be

(a) Symmetric (b) skew-symmetric

(c) diagonal matrix(d) neither symmetric nor skew-symmetric

13. Value of $\begin{vmatrix} -1 & 3 & 5 \\ 2 & 1 & 7 \\ 3 & -9 & -15 \end{vmatrix}$ is

(a) 0 (b) 30 (c) 84 (d) 35

14. If A and B matrices of order 3 such that $|\text{adj(A)}| = 9$, $|\text{AB}| = 24$, then value of $|\text{adj(B)}|$ is

(a) 9 (b) 64 (c) 3 (d) 8

15. If A be a matrix of order 3 and $|5A| = 1250$, then value of $|A|$ is

(a) 10 (b) 9 (c) 25 (d) 100

16. Value of $\begin{vmatrix} a & -b & c \\ -a & b & b \\ a & -b & a \end{vmatrix}$ is

(a) 1 (b) 0 (c) -1 (d) 1

17. Number of values of x satisfying the equation $\begin{vmatrix} 2\sin x & 1 \\ 1 & -1 \end{vmatrix} = 0$ in $[0, \pi]$ is

(a) 0 (b) 1 (c) 2 (d) 4

18.If $\begin{bmatrix} x-1 & 2 \\ 3 & 1-y \end{bmatrix} = \begin{bmatrix} 5 & 2 \\ 3 & 3 \end{bmatrix}$, then value of $(x - y)$ is

(a) 4 (b) -4 (c) -8 (d) 8

19. Number of points of discontinuity of the function $f(x) = \frac{1}{2-x^2}$ is

(a) 0 (b) 1 (c) 2 (d) infinite

20. If $f(x) = 3x + 5,\ x < 2,$

$= x - 3k,\quad x \geq 2,$ is continuous at $x = 2$, then value of k is

(a) 3 (b) -3 (c) 6 (d) -6

21. The function $f(x) = |x|$ is not differentiable at

(a) $x = 1$ (b) $x = -1$ (c) $x = 2$ (d) $x = 0$

22. If $f(x) = \log\left(x + \sqrt{x^2 + 1}\right)$, then $f'(1)$ is equal to

(a) $\frac{1}{2}$ (b) $1 + \frac{1}{\sqrt{2}}$ (c) $\frac{1}{\sqrt{2}}$ (d) $\sqrt{2}$

23. If $x = 2t^2$ and $y = 4t$, then $\left[\frac{dy}{dx}\right]_{t=3}$ is

(a) $\frac{1}{3}$ (b) 3 (c) 1 (d) $\frac{1}{2}$

24. If $x^2.y^3 = (x + y)^5$, then value of $\frac{d^2y}{dx^2}$ is

(a) $\frac{y}{x}$ (b) $\frac{x}{y}$ (c) 1 (d) 0

25. If $y = a\log x + b$ satisfies $f(x)\frac{d^2y}{dx^2} + \frac{dy}{dx} = 0$, then value of $f'(2)$ is

(a) 2 (b) -2 (c) 1 (d) -1

26. Derivative of $\cos^{-1}(1 - 2x^2)$ w.r.t $\sin^{-1} x$, $0 \leq x \leq \frac{1}{2}$, is

(a) 2 (b) -2 (c) $\frac{1}{2}$ (d) $-\frac{1}{2}$

27. The point on the graph of the function $6y = 3x^2 + 9$, where rate of change of abscissa and ordinate are same is

(a) (2, 1) (b) $(-2, 1)$ (c) (1, 2) (d) $(-1, 2)$

28. If V and S are volume and surface area of a sphere such that $\frac{dV}{dt} = \frac{dS}{dt}$, then its radius is equal to

(a) 2 (b) $\frac{1}{2}$ (c) 4 (d) $\frac{1}{4}$

29. Slope of the normal to the curve $y = 3t^2, x = 6t$, at any arbitrary point with parameter t is

(a) t (b) $\frac{1}{t}$ (c) $-t$ (d) $-\frac{1}{t}$

30. The equation of the tangent to the curve $xy + 1 = 0$ at the point $(1, -1)$ is

(a) $x + y + 2 = 0$ (b) $x - y - 2 = 0$ (c) $x + y = 0$ (d) $x - y + 2 = 0$

31. The interval at which the function $f(x) = 3 + x\, e^{-x}$ is strictly increasing is

(a) $(1, \infty)$ (b) $(-\infty, \infty)$ (c) $(-\infty, 1)$ (d) $(-\infty, -1)$

32. Local minimum value of the function $f(x) = x + \frac{4}{x}$ is attained at the point

(a) $x = -2$ (b) $x = 2$ (c) $x = -4$ (d) $x = 4$

33. Maximum value of the function $3 - |x - 2|$ is

(a) 2 (b) 1 (c) 5 (d) 3

34. Number of critical points of the function

$f(x) = x^4 - 8x^3 + 22x^2 - 24x + 8$ is

(a) 1 (b) 2 (c) 3 (d) 4

35. If probability of an event is $P(A) = 1 - k$, then k lies in

(a) $[-1, 0]$ (b) $[-1, 1]$ (c) $(0, 1)$ (d) $[0, 1]$

36. If $P\left(\frac{A}{B}\right) = 0.4$, $P(A \cap B) = 0.2$, then value of $P(B)$ is

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{6}$ (d) 1

37. A problem could be solved by A and B independently with probabilities $\frac{1}{2}$ and $\frac{1}{3}$ respectively. The probability that the problem could be solved is

(a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

38. Two coins are tossed. The probability of getting two heads if it is known that at least one head comes up is

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$

39. A speaks truth in 60% cases and B speaks truth in 70% cases. The probability that they will say the same thing while describing a single event is

(a) 0.56 (b) 0.54 (c) 0.38 (d) 0.94

40. A bag contains 5 white and 6 black balls. Another bag B contains 4 white and 3 black balls. A ball is transferred from bag A to the bag B and then a ball is taken out from the second bag. The probability of this ball being black is

(a) $\frac{35}{88}$ (b) $\frac{37}{88}$ (c) $\frac{39}{88}$ (d) $\frac{39}{89}$

***** END *****

Answer Key to Model Question Paper

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