CBSE Class 12 Mathematics

Model Question Paper

(SET – 6)

Time: 3 Hours | Maximum Marks: 80

Section A (1×20 = 20 Marks) – MCQs

1. If |A| = 3 for a 3×3 matrix A, then |4A| =
   (a) 12 (b) 48 (c) 192 (d) 64

2. If $f(x) = x^3 - 6x^2 + 9x$, then f'(3) =
   (a) 0 (b) 9 (c) –9 (d) 3

3. Degree of differential equation

$$\left(\frac{d^2y}{dx^2}\right)^4 + y = 0$$

is
(a) 2 (b) 4 (c) 1 (d) 8

4. If vectors **a** and **b** are perpendicular, then
   (a) a×b = 0
   (b) a·b = 0
   (c) |a| = |b|
   (d) a+b = 0

5. $\int_0^1 3\,x^2 dx =$
   (a) 1
   (b) 3
   (c) 0
   (d) 1/3

6. If P(A)=0.6, P(B)=0.5 and P(A∩B)=0.3, then P(A∪B)=
   (a) 0.8
   (b) 0.6
   (c) 0.3
   (d) 1

7. $\lim_{x\to 0} \frac{\tan 2x}{x} =$
   (a) 0
   (b) 1
   (c) 2
   (d) ∞

8. If A is a symmetric matrix, then
   (a) $A^T = A$
   (b) $A^T = -A$
   (c) $|A| = 0$
   (d) $A^{-1} = 0$

9. Distance of point (2,−1,2) from origin is
   (a) 3
   (b) √9
   (c) √9
   (d) 9

10. If E(X)=4, then E(3X−2)=
   (a) 10
   (b) 12
   (c) 8
   (d) 14

11. Derivative of $\cos^{-1} x$ is
   (a) $\frac{1}{\sqrt{1-x^2}}$
   (b) $\frac{-1}{\sqrt{1-x^2}}$
   (c) –sin x
   (d) sin x

12. $\int \frac{1}{x} dx =$
   (a) ln|x| + C
   (b) x
   (c) 1/x
   (d) e^x

13. If events A and B are mutually exclusive, then
   (a) P(A∩B)=1
   (b) P(A∩B)=0
   (c) P(A∪B)=0
   (d) P(A)=P(B)

14. If X~Bin(6,1/2), then mean is
    (a) 6
    (b) 3
    (c) 1/2
    (d) 12

15. Determinant of upper triangular matrix equals
    (a) Sum of elements
    (b) Product of diagonal elements
    (c) 0
    (d) 1

16. If A is singular matrix, then
    (a) |A|=0
    (b) |A|=1
    (c) |A|=−1
    (d) None

17. If dy/dx = 5x^4, then y =
    (a) x^5 + C
    (b) x^5
    (c) x^4 + C
    (d) x^6 + C

18. If a=(1,2,2), then |a| =
    (a) 3
    (b) $\sqrt{9}$
    (c) 5
    (d) $\sqrt{5}$

19. $\int_0^1 x\, e^x dx =$
    (a) 1
    (b) e−1
    (c) e
    (d) 0

20. Rank of identity matrix of order n is
    (a) 0
    (b) 1
    (c) n
    (d) n^2

Section B (2×6 = 12 Marks)

21. Find inverse of matrix

$$\begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$$

22. Differentiate $y = \ln(x^2)$

23. Find equation of tangent to curve $y = x^3$ at x=2.

24. Evaluate $\int (4x^3 - 2x)dx$

25. Find angle between vectors i+2j+3k and 2i+j+k.

26. A card is drawn from 52 cards. Find probability of getting an ace.

Section C (3×8 = 24 Marks)

27. Using determinants, solve:

$$2x + y = 73x + 2y = 11$$

28. Find dy/dx if $x^2 + xy + y^2 = 7$.

29. Evaluate $\int_0^2 (2x + 1)dx$

30. Show that vectors (2,4,6) and (1,2,3) are collinear.

31. Two dice are thrown. Find probability of getting sum 10.

32. Solve differential equation:

$$\frac{dy}{dx} = x^3$$

33. Find area bounded by curve y=3x and x-axis from 0 to 2.

34. Find equation of sphere with centre (2,1,3) and radius 5.

Section D (4×6 = 24 Marks)

35. If

$$A = \begin{bmatrix} 3 & 1 & 1 \\ 1 & 3 & 1 \\ 1 & 1 & 3 \end{bmatrix}$$

find |A| and A^{-1}.

36. Verify Lagrange's Mean Value Theorem for $f(x)=x^2$ on [0,2].

37. Evaluate $\int x^2 \cos\ x dx$

38. Find shortest distance between skew lines:

$$\frac{x}{1} = \frac{y-2}{1} = \frac{z}{-1}$$

and

$$\frac{x-1}{2} = \frac{y}{-1} = \frac{z+1}{2}$$

39. Find mean and variance of Binomial distribution n=5, p=1/2.

40. Solve differential equation:

$$x\frac{dy}{dx} + y = x^2$$