CBSE Class 12 Mathematics

Model Question Paper

(SET – 10)

Time: 3 Hours | Maximum Marks: 80

Section A (1×20 = 20 Marks) – MCQs

1. If |A| = 2 for a 3×3 matrix A, then |4A| =
   (a) 8
   (b) 16
   (c) 128
   (d) 64

2. If $f(x) = x^3 + 3x^2 + 1$, then f'(1)=
   (a) 9
   (b) 6
   (c) 3
   (d) 12

3. Order and degree of

$$\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^3 = 0$$

are
(a) 2,2
(b) 2,3
(c) 3,2
(d) 1,3

4. If a·b = |a||b| cosθ and a·b=0, then θ=
   (a) 0°
   (b) 60°
   (c) 90°
   (d) 180°

5. $\int_0^2 x^3\,dx =$
   (a) 4
   (b) 8

(c) 2
(d) 1

6. If P(A)=0.5, P(B)=0.2 and P(A∩B)=0.1, then P(A∪B)=
   (a) 0.6
   (b) 0.7
   (c) 0.5
   (d) 0.1

7. $\lim_{x\to 0} \frac{\sin 4x}{x} =$
   (a) 1
   (b) 4
   (c) 0
   (d) ∞

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

9. Distance between (1,2,2) and (4,6,2) is
   (a) 5
   (b) $\sqrt{25}$
   (c) 4
   (d) 3

10. If E(X)=3 and Var(X)=4, then $E(X^2)$=
    (a) 13
    (b) 9
    (c) 7
    (d) 12

11. Derivative of $\ln x$is
    (a) 1/x
    (b) −1/x
    (c) x
    (d) ln x

12. $\int e^{3x} dx =$
    (a) e^{3x}
    (b) e^{3x}/3 + C
    (c) 3e^{3x}
    (d) ln x

13. If A and B are mutually exclusive, then
    (a) $P(A \cap B)=0$
    (b) $P(A \cap B)=P(A)$
    (c) $P(A)=P(B)$
    (d) $P(A \cup B)=0$

14. If $X \sim Bin(4,1/2)$, then variance is
    (a) 1
    (b) 2
    (c) 4
    (d) 1/2

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

16. If A is non-singular matrix, then
    (a) $|A|=0$
    (b) $|A| \neq 0$
    (c) $|A|=1$
    (d) $|A|=-1$

17. If $dy/dx = 2x$, then y =
    (a) $x^2 + C$
    (b) $x^2 + C$
    (c) $2x^2 + C$
    (d) $x + C$

18. If $a=(1,1,0)$, $b=(1,-1,0)$, then $a \cdot b=$
    (a) 0
    (b) 1
    (c) −1
    (d) 2

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

20. Rank of identity matrix of order 3 is
    (a) 1

(b) 2
(c) 3
(d) 0

Section B (2×6 = 12 Marks)

21. Find determinant of

$$\begin{bmatrix} 1 & 2 \\ 4 & 5 \end{bmatrix}$$

22. Differentiate $y = x^2 \sin\ x$

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

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

25. Find unit vector in direction of vector 3i+4j.

26. A card is drawn from pack of 52 cards. Find probability of getting a heart.

Section C (3×8 = 24 Marks)

27. Using determinants, solve:

$$x + y = 62x + 3y = 13$$

28. Find dy/dx if $x^2 + y^2 = 13$.

29. Evaluate $\int_0^2 (x^2 + 3)dx$

30. Show that vectors (2,3,4) and (4,6,8) are parallel.

31. A die is thrown twice. Find probability of getting sum 8.

32. Solve differential equation:

$$\frac{dy}{dx} = 6x^2$$

33. Find area bounded by curve $y=4x-x^2$ and x-axis.

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

Section D (4×6 = 24 Marks)

35. If

$$A = \begin{bmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 1 & 1 & 2 \end{bmatrix}$$

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

36. Verify Lagrange's Mean Value Theorem for $f(x)=x^2$ on [1,3].

37. Evaluate $\int xe^x dx$

38. Find shortest distance between skew lines:

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

and

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

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

40. Solve differential equation:

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