CBSE Class 12 Mathematics

Model Question Paper

(SET – 8)

Time: 3 Hours | Maximum Marks: 80

Section A (1×20 = 20 Marks) – MCQs

1. If |A| = 5 for a 3×3 matrix A, then |2A| =
   (a) 10
   (b) 20
   (c) 40
   (d) 8

2. If $f(x) = e^{x^2}$, then f'(x) =
   (a) $2xe^{x^2}$
   (b) e^{2x}
   (c) xe^{x^2}
   (d) $2e^{x}$

3. Order and degree of

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

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

4. If a·b = |a||b|, then angle between vectors is
   (a) 0°
   (b) 90°
   (c) 180°
   (d) 45°

5. $\int_0^1 (3x + 1)dx =$
   (a) 5/2
   (b) 3

(c) 2
(d) 1

6. If P(A)=0.5, P(B)=0.3 and A,B independent, then P(A∪B)=
   (a) 0.65
   (b) 0.8
   (c) 0.15
   (d) 0.5

7. $\lim_{x\to 0} \frac{1-\cos x}{x^2} =$
   (a) 1
   (b) 1/2
   (c) 0
   (d) 2

8. If A is skew-symmetric matrix, then A^T =
   (a) A
   (b) –A
   (c) 0
   (d) I

9. Distance of point (3,4,12) from origin is
   (a) 13
   (b) √169
   (c) √169
   (d) 12

10. If E(X)=6 and Var(X)=4, then $E(X^2)$=
    (a) 40
    (b) 36
    (c) 10
    (d) 16

11. Derivative of $\sec x$ is
    (a) sec x tan x
    (b) tan x
    (c) $\sec^2 x$
    (d) cosec x

12. $\int \frac{dx}{1+x^2} =$
    (a) $\tan^{-1} x + C$
    (b) ln x
    (c) sec x
    (d) $\sin^{-1} x$

13. If events A and B are mutually exclusive, then
    (a) P(A∪B)=P(A)+P(B)
    (b) P(A∩B)=P(A)P(B)
    (c) P(A∩B)=1
    (d) None

14. If X~Bin(10,1/2), mean is
    (a) 10
    (b) 5
    (c) 2
    (d) 1/2

15. Determinant of 2I (order 3) is
    (a) 2
    (b) 8
    (c) 6
    (d) 4

16. If A is orthogonal matrix, then |A| =
    (a) 0
    (b) 1
    (c) ±1
    (d) 2

17. If dy/dx = 6x^5, then y =
    (a) x^6 + C
    (b) x^6/1 + C
    (c) x^5 + C
    (d) 6x^6 + C

18. If a=(1,1,1), b=(1,−1,0), then a·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 5 is
    (a) 1

(b) 0
(c) 5
(d) 25

Section B (2×6 = 12 Marks)

21. Find inverse of matrix

$$\begin{bmatrix} 1 & 3 \\ 2 & 5 \end{bmatrix}$$

22. Differentiate $y = \tan^{-1} x$

23. Find equation of normal to curve $y = x^2$ at x=1.

24. Evaluate $\int (5x^4 - 3x^2)dx$

25. Find unit vector in direction of vector 2i + 2j + k.

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

Section C (3×8 = 24 Marks)

27. Using determinants, solve:

$$x + y + z = 6x + 2y + 3z = 142x + 3y + z = 13$$

28. Find dy/dx if $x^2 + xy + y^2 = 9$.

29. Evaluate $\int_0^2 x\, e^x dx$

30. Show that points (1,2,3), (2,4,6), (4,8,12) are collinear.

31. A die is thrown three times. Find probability of getting exactly one 5.

32. Solve differential equation:

$$\frac{dy}{dx} + 3y = 0$$

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

34. Find equation of sphere passing through origin and having centre (1,2,2).

Section D (4×6 = 24 Marks)

35. If

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

find adj(A) and A^{-1}.

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

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

38. Find shortest distance between skew lines:

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

and

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

39. Find mean and variance of Binomial distribution n=7, p=1/2.

40. Solve differential equation:

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