CBSE Class 12 Mathematics

Model Question Paper (Set-1)

(80 Marks | 3 Hours) **Total = 80 Marks**

Section A (1×20 = 20 Marks) – MCQs

1. If $A$is a 3×3 matrix and |A| = 5, then |2A| =
   (a) 10 (b) 20 (c) 40 (d) 8
2. If f(x) = $x^3 - 3x^2 + 2$, then f'(1) =
   (a) 0 (b) 1 (c) –1 (d) 2
3. The order of differential equation $\frac{d^2y}{dx^2} + y = 0$is
   (a) 1 (b) 2 (c) 3 (d) 0
4. If vectors **a** and **b** are perpendicular, then **a·b** =
   (a) 1 (b) 0 (c) –1 (d) |a||b|
5. The value of $\int_0^1 x dx$is
   (a) 1 (b) 1/2 (c) 2 (d) 0
6. Probability of getting a head when tossing a fair coin is
   (a) 1 (b) 0 (c) 1/2 (d) 2
7. If A and B are mutually exclusive events, then
   (a) P(A∩B)=0
   (b) P(A∪B)=1
   (c) P(A)=P(B)
   (d) None
8. If matrix A is skew-symmetric, then a_{ii} =
   (a) 1 (b) –1 (c) 0 (d) 2
9. Derivative of sin x is
   (a) cos x (b) –cos x (c) –sin x (d) tan x
10. $\int e^x dx =$
    (a) e^x + C
    (b) ln x
    (c) x e^x
    (d) None

11. If $f(x) = |x|$, then f is differentiable at
    (a) x = 0
    (b) x > 0
    (c) x < 0
    (d) x = 1

12. If $A = \begin{bmatrix} 2 & 1 \\ 3 & 4 \end{bmatrix}$, then |A| =
    (a) 5
    (b) 8
    (c) 7
    (d) 6

13. The solution of differential equation

$$\frac{dy}{dx} = ky$$

is
(a) y = kx
(b) y = Ce^{kx}
(c) y = C + kx
(d) y = Cx

14. The value of

$$\lim_{x \to 0} \frac{\sin x}{x}$$

is
(a) 0
(b) 1
(c) –1
(d) ∞

15. If A and B are independent events, then
    (a) P(A∩B)=P(A)+P(B)
    (b) P(A∩B)=P(A)P(B)
    (c) P(A∪B)=0
    (d) P(A)=P(B)

16. The distance between points (1,2,3) and (4,6,3) is
    (a) 5
    (b) 4

(c) 3
(d) 6

17. If vectors **a** = i + j and **b** = i – j, then **a·b** =
    (a) 2
    (b) –2
    (c) 0
    (d) 1

18. The integral

$$\int \frac{1}{x} dx$$

is
(a) x
(b) e^x
(c) ln|x| + C
(d) 1/x

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

20. The equation of line passing through (1,2,3) and parallel to vector (2,1,–1) is
    (a) $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{-1}$
    (b) $\frac{x+1}{2} = \frac{y+2}{1} = \frac{z+3}{-1}$
    (c) $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{-1}$
    (d) $x = 1 + 2t,\ y = 2 + t,\ z = 3 - t$

11. If $f(x) = |\ x\ |$, then f is differentiable at
    (a) x = 0
    (b) x > 0
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14. The value of

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is

(a) 0

(b) 1

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(d) ∞

15. If A and B are independent events, then

    (a) P(A∩B)=P(A)+P(B)

    (b) P(A∩B)=P(A)P(B)

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$$\int \frac{1}{x} dx$$

is

(a) x

(b) e^x

(c) ln|x| + C

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    (c) $\frac{x-1}{1} = \frac{y-2}{2} = \frac{z-3}{-1}$
    (d) $x = 1 + 2t,\ y = 2 + t,\ z = 3 - t$

Section B (2×6 = 12 Marks)

21. Find the inverse of matrix

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$

22. Differentiate $y = \ln(x^2 + 1)$

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

24. Evaluate $\int x^2 dx$

25. Find direction cosines of vector 2i – 3j + 6k.

26. Find probability of getting sum 8 when two dice are thrown.

Section C (3×8 = 24 Marks)

27. Using determinants, solve:

$$2x + y = 5x – y = 1$$

28. Find $\frac{dy}{dx}$ if $x^2 + y^2 = 25$

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

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

31. A bag has 3 red and 2 blue balls. Find probability of drawing 2 red balls.

32. Solve differential equation:

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

33. Find area bounded by curve y = x and x-axis between 0 and 2.

34. Find equation of plane passing through point (1,1,1) and normal to vector (1,2,3).

Section D (4×6 = 24 Marks)

35. Show that matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 4 \\ 5 & 6 & 0 \end{bmatrix}$$

is invertible and find A^{-1}.

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

37. Evaluate $\int xe^x dx$

38. Find shortest distance between two lines:

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

and

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

39. A random variable X has distribution:

X	**0**	**1**	**2**	**3**
P(X)	0.1	0.3	0.4	0.2

Find mean and variance.

40. Solve differential equation:

$$(x + y)dx + (x - y)dy = 0$$