# CBSE Class 12 Mathematics

# Model Question Paper

# (SET – 7)

**Time: 3 Hours | Maximum Marks: 80**

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**Section A (1×20 = 20 Marks) – MCQs**

1. If |A| = –1 for a 3×3 matrix A, then |adj A| =
   (a) 1
   (b) –1
   (c) 0
   (d) 3

2. If $f(x) = x^4 - 4x^3 + 6x^2$, then f''(1)=
   (a) 0
   (b) 4
   (c) 12
   (d) –4

3. Order of differential equation

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

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

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

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

(c) 2

(d) 1

6. If P(A)=0.7, P(B)=0.6 and P(A∩B)=0.5, then P(A∪B)=

(a) 0.8

(b) 0.6

(c) 0.7

(d) 0.5

7. $\lim_{x \to 0} \frac{\sin 5x}{x} =$

(a) 1

(b) 5

(c) 0

(d) ∞

8. If A is orthogonal matrix, then $A^{-1} =$

(a) A

(b) $A^T$

(c) –A

(d) 0

9. Distance of point (1,2,2) from origin is

(a) 3

(b) $\sqrt{9}$

(c) $\sqrt{9}$

(d) 9

10. If E(X)=3 and Var(X)=2, then $E(X^2)=$

(a) 11

(b) 9

(c) 5

(d) 6

11. Derivative of $\tan^{-1} x$ is

(a) $1/(1+x^2)$

(b) $1/(1-x^2)$

(c) $\sec^2 x$

(d) x

12. $\int e^{-x} dx =$

(a) e^{-x}+C

(b) -e^{-x}+C

(c) ln x

(d) 1/x

13. If events A and B are independent, 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)

14. If X~Bin(8,1/2), mean is
    (a) 8
    (b) 4
    (c) 2
    (d) 1/2

15. Determinant of identity matrix of order 4 is
    (a) 4
    (b) 1
    (c) 0
    (d) –1

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

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

18. If a=(1,0,0), b=(0,1,0), then |a×b| =
    (a) 0
    (b) 1
    (c) –1
    (d) 2

19. $\int_0^1 x^3 \, dx =$
    (a) 1/4
    (b) 1/3
    (c) 1
    (d) 0

20. Rank of zero matrix of order 4 is
    (a) 4

(b) 1

(c) 0

(d) 2

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## Section B (2×6 = 12 Marks)

21. Find determinant of

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

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

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

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

25. Find magnitude of vector 2i−3j+6k.

26. A die is thrown twice. Find probability of getting doublet.

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## Section C (3×8 = 24 Marks)

27. Using determinants, solve:

$$x + y = 3 2x + 3y = 8$$

28. Find dy/dx if $x^2 + y^2 = 25$.

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

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

31. A fair coin is tossed four times. Find probability of exactly three heads.

32. Solve differential equation:

$$\frac{dy}{dx} = 4x^3$$

33. Find area bounded by curve $y=x^2$ from x=0 to 3.

34. Find equation of plane passing through (1,0,0) and parallel to plane x+y+z=5.

**Section D (4×6 = 24 Marks)**

35. If

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

find |A| and comment on invertibility.

36. Verify Rolle's Theorem for f(x)=x³−3x on [−√3, √3].

37. Evaluate $\int xe^x dx$

38. Find shortest distance between lines:

$$\frac{x}{1} = \frac{y}{2} = \frac{z}{3}$$

and

$$\frac{x-1}{2} = \frac{y-1}{3} = \frac{z-1}{4}$$

39. Find mean and variance of Binomial distribution n=6, p=1/3.

40. Solve differential equation:

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