

# CBSE Class 12 Mathematics

## Model Question Paper

(SET – 3)

Time: 3 Hours | Maximum Marks: 80

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

1. If  $|A| = 4$  for a  $3 \times 3$  matrix  $A$ , then  $|A^T| =$   
(a) 4 (b)  $-4$  (c) 0 (d) 8
2. If  $f(x) = \sqrt{x}$ , then  $f'(4) =$   
(a)  $1/2$  (b)  $1/4$  (c)  $1/8$  (d) 2
3. Degree of differential equation

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

is

- (a) 2 (b) 3 (c) 1 (d) 6

4. If vectors  $\mathbf{a}$  and  $\mathbf{b}$  satisfy  $\mathbf{a} \cdot \mathbf{b} = 0$ , then they are  
(a) Parallel  
(b) Perpendicular  
(c) Equal  
(d) Collinear
5.  $\int_0^2 x dx =$   
(a) 2 (b) 1 (c) 4 (d) 0
6. If  $P(A)=0.3$ ,  $P(B)=0.6$  and  $A, B$  independent, then  $P(A \cup B) =$   
(a) 0.9  
(b) 0.72  
(c) 0.78  
(d) 0.18
7. Derivative of  $\ln x$  is  
(a)  $1/x$  (b)  $x$  (c)  $\ln x$  (d)  $e^x$
8. If  $A$  is skew-symmetric matrix, then  $a_{ii} =$   
(a) 1 (b)  $-1$  (c) 0 (d) 2

9.  $\lim_{x \rightarrow 0} \frac{\tan x}{x} =$   
(a) 0 (b) 1 (c)  $\infty$  (d) -1
10. Equation of plane through point (1,0,0) and normal to vector (2,3,4) is  
(a)  $2x+3y+4z=1$   
(b)  $2(x-1)+3y+4z=0$   
(c)  $x+y+z=1$   
(d)  $2x-3y+4z=0$
11. If  $f(x)=\cos x$ , then  $f''(x)=$   
(a)  $-\cos x$   
(b)  $\cos x$   
(c)  $-\sin x$   
(d)  $\sin x$
12.  $\int e^{3x} dx =$   
(a)  $e^{3x}+C$   
(b)  $3e^{3x}+C$   
(c)  $e^{3x}/3 + C$   
(d)  $1/e^{3x}$
13. If A and B are mutually exclusive events, then  $P(A \cap B)=$   
(a) 1  
(b) 0  
(c)  $P(A)$   
(d)  $P(B)$
14. Distance between points (0,0,0) and (1,2,2) is  
(a) 3  
(b)  $\sqrt{9}$   
(c)  $\sqrt{5}$   
(d) 5
15. If X is binomial with  $n=2$ ,  $p=1/2$ , then  $P(X=1)=$   
(a)  $1/4$   
(b)  $1/2$   
(c)  $3/4$   
(d) 1
16. Determinant of triangular matrix is  
(a) 0  
(b) Product of diagonal elements  
(c) 1  
(d) Sum of elements

17. If  $dy/dx = 4x^3$ , then  $y =$
- (a)  $x^4 + C$
  - (b)  $x^4/1 + C$
  - (c)  $x^4 + C$
  - (d)  $x^3 + C$
18. If  $a=(1,2,3)$ ,  $b=(2,4,6)$ , then  $a \times b =$
- (a) 0
  - (b) 1
  - (c) 2
  - (d) 6
19.  $\int \sec^2 x dx =$
- (a)  $\sec x$
  - (b)  $\tan x + C$
  - (c)  $\cot x$
  - (d)  $\cos x$
20. Rank of identity matrix of order 3 is
- (a) 1
  - (b) 2
  - (c) 3
  - (d) 0

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**Section B (2×6 = 12 Marks)**

21. Find determinant of matrix

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

22. Differentiate  $y = x^2 \cos x$
23. Find equation of tangent to curve  $y = \sin x$  at  $x=0$ .
24. Evaluate  $\int (2x + 3) dx$
25. Find magnitude of vector  $3i - 4j + 12k$ .
26. A die is thrown once. Find probability of getting prime number.

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**Section C (3×8 = 24 Marks)**

27. Using determinants, solve:

$$3x + 2y = 112x + y = 7$$

28. Find  $dy/dx$  if  $x^3 + y^3 = 9xy$ .

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

30. Show that vectors (1,2,3) and (3,6,9) are collinear.

31. Two coins are tossed. Find probability of getting exactly one head.

32. Solve differential equation:

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

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

34. Find equation of plane passing through points (1,0,0), (0,1,0), (0,0,1).

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**Section D (4×6 = 24 Marks)**

35. If

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

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

36. Verify Mean Value Theorem for  $f(x)=x^3$  on  $[0,1]$ .

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

38. Find shortest distance between 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 variance of random variable:

**X** 0 1 2

P(X) 0.3 0.4 0.3

40. Solve differential equation:

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