CBSE Class 12 Mathematics

Model Question Paper

(SET – 2)

Time: 3 Hours | Maximum Marks: 80

Section A (1×20 = 20 Marks) – MCQs

1. If |A| = 3 for a 3×3 matrix A, then |3A| =
   (a) 9 (b) 27 (c) 81 (d) 3
2. If $f(x) = x^4$, then f'(2) =
   (a) 8 (b) 16 (c) 32 (d) 4
3. The order of differential equation

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

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

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. $\int_0^1 x^2\,dx =$
   (a) 1/3 (b) 1/2 (c) 1 (d) 2
6. If P(A)=0.4, P(B)=0.5 and A, B independent, then P(A∩B)=
   (a) 0.9 (b) 0.2 (c) 0.1 (d) 0.5
7. Derivative of $e^{2x}$is
   (a) e^{2x} (b) 2e^{2x} (c) 2xe^{2x} (d) e^x
8. If A is symmetric matrix, then
   (a) $A^T = A$
   (b) $A^T = -A$
   (c) |A|=0
   (d) $A^{-1} = A$

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

10. Equation of plane passing through (0,0,0) and normal to vector (1,2,3) is
   (a) x+y+z=0
   (b) x+2y+3z=0
   (c) x=0
   (d) y=0

11. If f(x)=sin x, then f''(x)=
   (a) –sin x
   (b) cos x
   (c) –cos x
   (d) sin x

12. The value of $\int \cos x dx$is
   (a) –sin x
   (b) sin x + C
   (c) cos x + C
   (d) tan x

13. If A and B are mutually exclusive, then
   (a) P(A∩B)=0
   (b) P(A∪B)=0
   (c) P(A)=P(B)
   (d) None

14. The distance of point (2,3,4) from origin is
   (a) $\sqrt{29}$
   (b) $\sqrt{25}$
   (c) $\sqrt{30}$
   (d) 29

15. If X is binomial with n=1, then distribution is
   (a) Poisson
   (b) Bernoulli
   (c) Normal
   (d) Uniform

16. Determinant of identity matrix of order 3 is
   (a) 3 (b) 1 (c) 0 (d) –1

17. If $dy/dx = 3x^2$, then y =
   (a) $x^3 + C$
   (b) $3x^3 + C$

(c) $x^2 + C$

(d) $9x + C$

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

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

20. The rank of zero matrix is
(a) 0 (b) 1 (c) 2 (d) 3

Section B (2×6 = 12 Marks)

21. Find inverse of matrix

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

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

23. Find equation of normal to curve $y = x^3$ at x=1.

24. Evaluate $\int x\sqrt{x}dx$

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 queen.

Section C (3×8 = 24 Marks)

27. Using determinants, solve:

$$x + y = 42x–y = 1$$

28. Find dy/dx if $x^2 – xy + y^2 = 7$.

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

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

31. A die is thrown twice. Find probability of getting sum 9.

32. Solve differential equation:

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

33. Find area bounded by curve $y = x^2$ and x-axis from 0 to 1.

34. Find equation of sphere with centre (1,2,3) and radius 4.

Section D (4×6 = 24 Marks)

35. If

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix}$$

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

36. Verify Rolle's Theorem for $f(x)=x^3-3x^2+2$ on [0,2].

37. Evaluate $\int x \ln x \, dx$

38. Find shortest distance between two skew lines:

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

and

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

39. Find mean of random variable:

X	1	2	3
P(X)	0.2	0.5	0.3

40. Solve differential equation:

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