CBSE Sample paper (2024-25)

Class XII - Maths

Time : 03 hrs | Marks -80

General instructions:-

1.This question paper contains Five sections A,B,C,D and E. Each question is compulsory.
2. Section A has 18 MCQ's and 02 Assertion –Reason based questions of 01 mark each
3. Section B has 5 very short answer questions of 2 marks each.
4. Section C has 6 short answer questions of 3 marks each.
5. Section D has 4 Long answer questions of 5marks each.
6. Section E has 3 source based/case study questions of 4 marks each with sub parts.

Section A (MCQ)

1. If A = {0,1} and N be the set of all natural numbers. f: N→A defined by f(2n-1) = 0, f(2n) – 1, for n ε N . i) f is 1-1 ii) f is onto iii) f is bijective iv) f is neither 1-1 nor onto

2. The maximum value of the determinant $\begin{vmatrix} 1 & 1 & 1 \\ 1 & 1+\sin\theta & 1 \\ 1 & 1 & 1+\cos\theta \end{vmatrix}$ is a)1/2 b)1 c)-1 d) 0

3. If $E(x) = \begin{pmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{pmatrix}$, then E(x)E(y) = a) E(xy) b) E(x-y) c) E(x+y) d) -E(x+y)

4. The principal value of $\cos^{-1}(\cos 2\pi/3) + \sin^{-1}(\sin(2\pi/3))$ = a) π/3 b)π/2 c) 4π/3 d) π

5. The value of k for which $f(x) = \frac{3x+4\tan x}{x}$, when $x \neq 0$; k, when x = 0 a) 3 b)4 c) 7 d) 1

6. If $x = t^2+1$, $y = 2at$, then d^2y/dx^2 at t = a is a) -1/a b) $-1/2a^2$ c) $1/2a^2$ d) 0

7. at x = 1, $f(x) = x^4-62x^2+ax+9$ attains its maximum value on the interval[0,2]. Then a =
a) 100 b) 120 c) 140 d) 160

8. Find the projection of the vector a = 2i+3j+2k on the vector b = i+2j+k
a) 10/√6 b)1/√6 c)5/√6 d)7/√6

9. Length of the perpendicular drawn from the point (4,-7,3) on the Y axis is
a) 3 units b) 4 units c) 5 units d) 7 units

10. In an LPP, if the objective function Z =ax+by has the same maximum value at two corner Points of the feasible region, then the mumber of points at which Z_{max} occurs is
a)0 b)2 c) finite d)infinite

11. If P(B) = 3/5, P(A/B)=1/2, P(AUB) = 4/5, then P(AUB)'+P(A'UB) =
a)1/5 b)4/5 c)1/2 d) 1

12. The product of order and degree of $x(d^2y/dx^2)^2+(dy/dx)^2 +y^2 = 0$ is
a)8 b) 4 c)3 d) 2

13 Solution of the differential equation dx/x + dy/y = 0 is
a)logx = logy b) xy =c c) -xy=c d)x-y = c

14. $_0\int^{1.5}[x]dx$ = a) 0 b) 1 c)0.5 d) 2

15. $\int \frac{2\cos 2x-1}{1+2\sin x}dx$ = a) x-2cosx+c b) x+2cosx+c d) –x-2cosx+c d) –x+2cosx+c

16. A relation R is defined on Z as aRb, if and only if $a^2-7ab+6b^2 = 0$. Then R is
a) reflexive and symmetric b) symmetricbut not reflexive c) transitive but not reflexive
d) reflexive but not symmetric

17. If A is a non singular 3x3 matrix , and B is its adjoint, such that $|B| = 64$, then $|A| =$
a) 64 b)$\pm$64 c) $\pm$ 8 d) 18 .

18. If (i+3j+9k) x (3i-λj+μk) = 0 , then a) 10 b) 18 c) 0 d) 1

In the following questions, a statement of Assertion (A) is followed by a statement of reason (R). Choose the correct answer out of the following choices.
a) Both (A) and (R) are true and(R) is the correct explanation of A.
b) Both (A) and (R) are true, but (R) is not the correct explanation of(A)
c) (A) is true (R) is false d) (A) is false but (R) is true.
Let R be a relation in the set A of human beings in a town at a particular time.

19. Assertion (A) : The absolute maximum value of the function $2x^3-24x$ in the interval [1,3] is 89.
Reason (R) : The absolute maximum value of the function can be obtained from the value of the function at critical points and at boundary points

20. Assertion (A) : Maximum value of Z =3x+2y, s.t x+2y≤2, x.y ≥0 will be obtained at the point (2,0)
Reason(R) : In a bounded feasible region, there exists always a maximum and minimum value.

Section B (VSA) :-

21. Let R be the equivalence relation in the set A = {0,1,2,3,4,5} given by R = {(a,b): 2 divides a-b} write the equivalence class [0] (or) f: R→R, such that $f(x) = 1+x^2$ Is f 1-1 ? Find the Range of f

22. If r = 3i-2j+6k, then find the value of (rxj).(rxk)-12

23. If the angle between the lines $\frac{x-5}{\alpha} = \frac{y+2}{-5} = \frac{z+24/5}{\beta}$; $\frac{x}{1} = \frac{y}{0} = \frac{z}{1}$ = π/4, then find the relation between α and β

24. Solve for x :- $2\tan^{-1}(\sin x) = \tan^{-1}(2\sec x)$

25. Three cards are drawn successively without replacement from a pack of 52 well shuffled cards. What is the probability that first two cards are king and the third card is an ace

Section C (SA) :-

26. Evlauate $\int \frac{\sin x - x\cos x}{x(x+\cos x)}$ (or) Evaluate $_0\int^{\pi/2}(\sqrt{\tan x} + \sqrt{\cot x})\,dx$

27. Solve the following graphically Maximize z =20x+10y s.t x+2y≤28,3x+y≤24, x ≥ 2 and x,y ≥0

28 Solve the initial value problem $2xy+y^2-2x^2dy/dx = 0$, y(1) = 2 (or) Solve the D.E $dx/dy+x\cot y = 2y+y^2\cot y$ (y≠0), given that x =0 when y = π/2

29. A man is known to speak the the truth 3 out of 5 times. He throws a die and reports that it is a number greater than 4. Find the probability that it is actually a number greater than 4.

30. Find the value of k for which the function $f(x) = \begin{cases} \frac{\sin x - \cos x}{4x - \pi}, & x \neq \pi/4 \\ k, & x = \pi.4 \end{cases}$ is continuous at x = π/4

(or) If $y = \cos^{-1}\left(\frac{3x + 4\sqrt{(1-x^2)}}{5}\right)$, Find dy/dx

31. u,v, w are three vectors such that $|u| = 1$, $|v| = 2$, $|w| = 3$. If the projection of v along u is equal to that of w along u.Also v,w are perpendicular to each other. Then find the value of $|u-v+w|$

Section D : (LA)

32. Find the area of the region bounded $\{ (x.y) : \frac{x^2}{a^2} + \frac{y^2}{b^2} \leq 1 \leq \frac{x}{a} + \frac{y}{b} \}$ (or)

Find the area of the region enclosed by the parabola $y^2 = x$ and the line $x + y = 2$.

33. Evaluate Evaluate $\int_{-1}^{2} |x^3 - x| \, dx$

34. Two cards are drawn without replacement from a well shuffled pack of 52 cards without Replacement. Find the probability distribution of red cards? Also find the probability distribution of red cards?

35. Vertices B and C of Δ ABC lie along the line $\frac{x+2}{2} = \frac{y-1}{1} = \frac{z-0}{4}$. Find the area of the triangle Given A has coordintes (1,-1,2) and line segment BC has length 5 units. (or)

If a,b and c are mutually vectors of equal magnitudes, find the angles which the vector 2a+b+c with the vectors a,b and c

Section E (Case study)

36. Read the following passage and answer the questions given below:

On a holiday , a father gave a puzzle from a news paper to his son Ravi and daughter Priya.The probability of solving this specific puzzle independently by Ravi and Priya are ¼ and 1/5 respectively.

i)Find the chance that both Ravi and Priya solve the puzzle ii) Find the probability that puzzle is solved by Ravi and not by Priya. Iii) Find the probability that the puzzle is solved iv) Find the probability that exactly one of them solves the puzzle?

37. On children's day class teacher of class XII Sh. Vinod Kumar, decided to distribute some chocolates to students of class XII. If there were 8 students less everyone would have got 10 chocolates more compared to original number of chocolates. received. However, if there were 16 students more, everyone would have got 10 chocolates. less compared to the original number of chocolates received. Based on the above information answer the following. I) If number of students in class be 'x' and Sh. Vinod Kumar has decided to distribute 'y' chocolates to each student, then identify the system of linear equations for the given problem ii) Express the equations in terms of matrix equations AX = B iii) Find A^{-1} **iv)** The number of students in Class XII and also number of chocolates distributed to them

38. As we know good planning can save energy, time, and money. A farmer wants to construct a circular well and square garden in his field. He wants to keep the sum of their perimeters 600 m

i) If the radius of the circular garden be r m and the side of the square garden be x m then write the sum of area S in terms of x and r

ii)Find the Radius of circular well ?

iii) Find the relationship between the side of the square garden and the radius of the circular garden

iv) Find the number which exceeds its square by the greatest possible number.

"Success is the sum of small efforts, repeated."

MCQ answers

1)b	2) a	3) c	4) d	5) c	6) b	7) b	8) a	9) c	10) d
11) d	12) b	13) b	14) c	15) b	16) d	17) c	18) b	19) d	20)b