MODEL PAPER_CBSE-XII'20

According to the Syllabus & Guide Lines for CBSE'20

CLASS-XII (2019-2020)

QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Questions	Total Marks
VSA	1	20	20
SA	2	06	12
LA-I	4	06	24
LA-II	6	04	24
	Total	36	80

Q. No.	Blue Print of CBSE-XII'20 Sample Paper-03F Questions from Chapters	80 Marks
1	Inverse Trigonometric Functions	1
2	Matrices	1
3	Vector Algebra	1
4	PROBABILITY	1
5	LPP	1
6	Binary Fuction	1
7	PROBABILITY	1
8	Integrals_Indefinite	1
9	3D_PLANE	1
10	Integrals_Indefinite	1
OR	Integrals_Indefinite	
11	Matrices	1
12	Continuity & Differentiability	1
13	Differential Equations	1
14	AOD_Maxima and Minima	1
OR	AOD_Maxima and Minima	
15	Vector Algebra	1
OR	Vector Algebra	
16	Determinants	1
17	Integrals_Definite	1
18	Vector Algebra	1
19	Integrals_Indefinite	1
20	Matrices	1
21	Inverse Trigonometric Functions	2
OR	Inverse Trigonometric Functions	
22	Continuity & Differentiability	2
23	AOD_Approximation	2
OR	AOD_Approximation	
24	3D_PLANE	2
25	3D_PLANE	2
26	PROBABILITY	2
27	Relation & Function	4
28	1st Order Derivative	4
OR	2nd order Derivative	
29	Differential Equations	4
30	Integrals_Definite	4
31	PROBABILITY	4
OR	PROBABILITY	
32	LPP	4
33	Determinants	6
OR	Determinants	
34	AOI_Area Calculations	6
OR	AOI_Area Calculations	
35	AOD_Tangent and normal	6
36	3D_STRAIGHT LINE	6

Total Marks from Chapters	Actual	Expected
Relation & Function	4	8
Binary Fuction	1	
Inverse Trigonometric Functions	3	
Matrices	3	10
Determinants	7	
Continuity & Differentiability	3	35
1st Order Derivative	4	
2nd order Derivative	0	
AOD_Rate Change	0	
AOD_Approximation	2	
AOD_Tangent and normal	6	
AOD_Maxima and Minima	1	
AOD_Increasing-Decreasing Functions	0	
Integrals_Indefinite	3	
Integrals_Definite	5	
AOI_Area Calculations	6	
Differential Equations	5	
Vector Algebra	3	14
3D_STRAIGHT LINE	6	
3D_PLANE	5	
LPP	5	5
PROBABILITY	8	8

[Mp 03F Cbse XII'20 Q 191211] MODEL TEST [Pre CBSE-XII'20] [FM–80/Time–3 hrs.]

GENERAL INSTRUCTIONS:

(i) **All** questions are compulsory.
(ii) This question paper contains **36** questions.
(iii) Question **1- 20** in **Section A** are very short-answer type questions carrying **1** mark each.
(iv) Question **21-26** in **Section B** are short-answer type questions carrying **2** marks each.
(v) Question **27-32** in **Section C** are long-answer-**I** type questions carrying **4** marks each.
(vi) Question **33-36** in **Section D** are long-answer-**II** type questions carrying **6** marks each.

SECTIONS – A (Questions 01 to 20 carry 1 marks each)

1. If $x > 1$, then find $\tan^{-1}\left(\frac{1+x}{1-x}\right)$.
2. Write a 3×3 skew symmetric matrix.
3. If $\vec{a} = \hat{i} + \hat{j} + 4\hat{k}$, $\vec{b} = \hat{i} + \hat{j} + \hat{k}$, $\vec{c} = \hat{i} + \hat{k}$, find a vector of magnitude 9 units in the direction of the vector $\vec{a} + \vec{b} + \vec{c}$.
4. Father, mother and son stand at random in a line in a family picture. E : Son is on one end, F: Father is in middle. Then P(E / F) =
5. In a linear programming problem, the constraints are given by $x + y \geq 9,\ 3x + 5y \leq 15,\ x, y \geq 0$, Given objective function is $Z = 3x + 2y$. Can there exist any feasible solution of this problem.
6. Let * be a binary operation on the set of non-zero real numbers given by $a * b = \frac{ab}{5}\quad \forall a, b \in R - \{0\}$. Find x, given that $2 * (x * 5) = 10$.
7. Given $P(A) = \frac{3}{5}$, and $P(B) = \frac{1}{5}$. If A and B are two independent event, then find $P(A \cap B)$.
8. Evaluate : $\int \sec^2 (3 - 5x)\, dx$.
9. Find the ratio in which YZ-plane divides the line segment joining the points P(– 2, 5, 9) and Q(3, – 2, 4)
10. Evaluate : $\int \tan^{-1}\left(\frac{\tan x + \sqrt{3}}{1 - \sqrt{3}.\tan x}\right) dx \quad \left[Given\ \ 0 < x < \frac{\pi}{2}\right]$

OR, Evaluate : $\int \frac{dx}{x + x.\log_e x}$

11. If $\begin{bmatrix} x-y & z \\ 2x-y & w \end{bmatrix} = \begin{bmatrix} -1 & 4 \\ 0 & 5 \end{bmatrix}$, find $(x - y)$
12. A function is defined as follows:
$f(x) = x + 1$ when $x \leq 1$,
$= 3 - ax^2$ when $x > 1$.
Find the value of **a** for which f(x) will be continuous at x = 1 ?
13. Write the sum of the order and degree of the differential equation $1 + \left(\frac{dy}{dx}\right)^4 = 7\left(\frac{d^2y}{dx^2}\right)^3$.
14. Find the maximum value of $x^3 - 9x^2 + 24x - 12$.

OR, State the conditions for maxima and minima of a function y = f(x) at a point where $\frac{d^2y}{dx^2} \neq 0$.

15. Write the projection of $\left(2\hat{i}+3\hat{j}-\hat{k}\right)$ along the vector $\left(\hat{i}+\hat{j}\right)$.

OR, If $\vec{a}$ and $\vec{b}$ are unit vectors, then what is the angle between $\vec{a}$ and $\vec{b}$, so that $\left(\sqrt{2}\,\vec{a}-\vec{b}\right)$ is a unit vector?

16. A is a matrix of order 3× 3. Given |A| = 15, then find the value of |5A|. has a determinant 15. What is the value of |5A| ?

17. If $f(x)=\int_0^x \theta.\sin\theta\, d\theta$, then determine the value of $f'(x)$.

18. Given, $\left(2\hat{i}+6\hat{j}+13\hat{k}\right)\times\left(\hat{i}-\lambda\hat{j}+6\hat{k}\right)=\vec{0}$. Find λ.

19. Find the integrating factor of the differential equation $(x\log x)\dfrac{dy}{dx}+y=2\log x$.

20. Write the adjoint of the matrix $\begin{pmatrix}3 & -1\\ 4 & 2\end{pmatrix}$.

SECTIONS – B (Questions 21 to 26 carry 2 marks each.)

21. Solve for x : $\sin^{-1}\cos\sin^{-1}x=\dfrac{\pi}{3}$. $x\in\left(0,\dfrac{\pi}{2}\right)$

OR, Prove that, $\tan^{-1}\left(\dfrac{c_1x-y}{c_1y+x}\right)+\tan^{-1}\left(\dfrac{c_2-c_1}{c_2c_1+1}\right)+\tan^{-1}\left(\dfrac{c_3-c_2}{c_3c_2+1}\right)+\cdots+\tan^{-1}\left(\dfrac{1}{c_{20}}\right)=\tan^{-1}\left(\dfrac{x}{y}\right)$

22. Given, $f(x)=\begin{cases}3ax+b, & x>1\\ 11, & x=1\\ 5a-2b, & x<1\end{cases}$. If f(x) is continuous at x = 1, find the values of a and b.

23. Use differential to approximate $\sqrt{25.5}$.

OR, The radius of a sphere is measured as 9 cm with an error of 0.03 cm. Find the approximate error in calculating its volume.

24. Write the direction cosines of the normal to the plane 3x + 4y + 12z0 – 52 = 0.

25. Show that the line through the points (1, −1, 2) (3, 4, −2) is perpendicular to the line through the points (0, 3, 2) and (3, 5, 6).

26. If a leap year is selected at random, what is the chance that it will contain 53 Tuesdays ?

SECTIONS – C (Questions 27 to 32 carry 4 marks each.)

27. Let f: N →N be a function defined as $f(x)=4x^2+12x+15$. Show that f:N→S is invertible (where S is the range of f), Find the inverse of f. Find $f^{-1}(31)$.

28. Find the derivative of $(\sin x)^x+\sin^{-1}\sqrt{x}$ w.r.t x.

OR, If $y=\dfrac{1}{1+x+x^2+x^3}$ then prove that $\left(\dfrac{d^2y}{dx^2}\right)_{x=0}=0$

29. Find the particular solution of the differential equation $(1-y^2)(1+\log x)\,dx+2xy\,dy=0$, given y = 0 when x = 1.

30. Evaluate : $\displaystyle\int_{\pi/6}^{\pi/3}\frac{dx}{1+\sqrt{\cot x}}$.

31. Probability of solving specific problem independently by A and B are $\frac{1}{2}$ and $\frac{1}{3}$ respectively. They try to solve the problem independently, find the probability that, (i) the problem is solved, (ii) exactly one of them solve the problem.

OR, From a set of 100 cards numbered 1 to 100, one card is drawn at random. Find the probability that the number on the card is divisible by 6 or 8, but not by 24.

32. Find graphically the maximum value of Z = 2x + 5y, subject to constraints given by : $2x + 4y \le 8,\ 3x + y \le 6,\ x + y \le 4,\ x,\ y \ge 0$.

<u>SECTIONS</u> – D (Questions 33 to 36 carry 6 marks each)

33. Using properties of determinants, prove that, $\begin{vmatrix} (a+1)(a+2) & a+2 & 1 \\ (a+2)(a+3) & a+3 & 1 \\ (a+3)(a+4) & a+4 & 1 \end{vmatrix} = -2$

OR Prove that $\begin{vmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{vmatrix} = abc\left(1+\frac{1}{a}+\frac{1}{b}+\frac{1}{c}\right)$.

34. Using integration, prove that the curves $y^2 = 4x$ and $x^2 = 4y$ divide the area of square bounded by x = 0, x = 4, y = 4 and y = 0 into three equal parts.

OR, Using integration, find the area of the region : $\left\{(x,\ y) : 0 \le y \le x^2 + 1,\ \ 0 \le y \le x + 1,\ 0 \le x \le 2\right\}$

35. Using calculus, prove that, the straight line $x + y = 2 + \sqrt{2}$ touches the circle $x^2 + y^2 - 2x - 2y + 1 = 0$. Find the point of contact.

36. Find the Vector and Cartesian equation of the planes that passes through the point (1, 0, −2) and the normal to the plane is $\left(\hat{i} + \hat{j} - \hat{k}\right)$.

"The Mathematical experience of a student is incomplete, if he never had the opportunity to solve problems invented by himself ."

— G. POLYA.

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