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**

CHAPTERWISE MARKS in Class-XII (CBSE)

Sr. No	TOPICS	MARKS					
		VSA(1M)	SA(2M)	S A (4M)	L A (6M)	Total Marks	
1 a	Relation & Function	1		1		6	
1 b	Binary operation	1					
1 c	Inverse Trig. Func	1	1 OR (Rel &Func)			3	08
2.a	Matrices	1				1	
b	Determinant	1+1			1 OR (Matrix)	8	10
3.a.	Continuity, Differentiability, DERIVATIVE_1st Order _2nd Order	1	1	1 OR (2nd Order)		7	
b.	Applications Of Derivative	1 OR	1 OR(AOD)		1	9	
c.	Integrals_Indefinite …. _Definite …..	1+1+1 OR (Definite) 1+		1		7	35
d	Applications Of Integrals				1 OR(AOI)	6	
e	Differential Equations	1		1		5	
4.a	Vectors	1+1 OR(3D)	1			4	14
b	Three Dimensional Geometry	1+1	1		1	10	
5.	Linear Programming	1		1		05	
6.	Probability	1+1	1	1 OR (Prob)		08	
	TOTAL	20	12	24	24	80	

[Mp 02F Cbse XII'20 Q 191203] MODEL TEST [FM–80/Time–3 hrs.]

[Pre CBSE-XII'20]

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 $\tan^{-1}x + \tan^{-1}y = \frac{\pi}{4}$, then find the value of $(x + xy + y)$.

2. If ω is the imaginary cube root of 1, then the value of $\begin{vmatrix} 1 & \omega^4 & \omega^2 \\ \omega^4 & 1 & \omega^2 \\ \omega^2 & \omega & 1 \end{vmatrix}$,

   i) 1 ii) 0 iii) 3ω iv) $2\omega^2$

3. Are the vectors $2\hat{i} - 3\hat{j} + 4\hat{k}$ and $-4\hat{i} + 6\hat{j} - 8\hat{k}$ collinear or not.

4. Does the following table represent a probability distribution ? give reason.

X	0	1	2
P(X)	$\frac{1}{3}$	$\frac{1}{3}$	$\frac{1}{6}$

5. Define constraints of a LPP.

6. Let * be a binary operation on N, given by a*b = LCM (a, b) . Find (2*5)*12.

7. If $P(A) = \frac{6}{11}$, $P(B) = \frac{5}{11}$ and $P(A \cup B) = \frac{7}{11}$, then find $P(A \cap B)$.

8. Evaluate: $\int \frac{\cos 2x}{(\sin x + \cos x)^2} dx$

9. Find the distance between the parallel planes x+y+2z =1 and 2x + 2y+4z – 3 = 0. [mtd–feb'11_P–70]

10. Evaluate : $\int \frac{\sin\left(\tan^{-1} x\right)}{1 + x^2} dx$

OR, Evaluate : $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \log\left(\frac{a - \sin x}{a + \sin x}\right) dx$

11. A is a given matrix of order 3×2. If the order of matrix AB be 3×3 which will be the order of B ?

   i) 1×3 ii) 2×3 iii) 3×3 iv) 2×2

12. Examine the continuity of the function $f(x) = x^2 + 2020$ at $x = -1$

13. Find the integrating factor of the differential equation $\frac{dy}{dx} = \frac{3x^2 + y}{x}$.

14. Determine the point on the curve $y = x^2 - 4x + 5$, where normal to the curve is parallel to the Y-axis.

OR, Determine whether the function $f(x) = x^3 - 3x^2 + 3x + 30$ is increasing or decreasing on R.

15. Given two vectors $\vec{a}$ and $\vec{b}$, $\vec{a}.\vec{b} = 0$ *and* $\vec{a} \times \vec{b} = 0$. Give your comments about the vectors.

OR, 3D : Find the angle between the line $\frac{2-x}{3} = \frac{y+1}{1} = \frac{3-z}{2}$ and the plane 3x + 4y + z = 0.

16. If A_{ij} is the cofactor of the element a_{ij} of $\begin{vmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{vmatrix}$, then write the value of $a_{32}.A_{32}$.

17. Write the value of $\int_{-\pi}^{\pi} x^4 \sin^5 x \, dx$.

18. Given that the vectors $\left(2\hat{i} - \lambda\hat{j} + \hat{k}\right)$ and $\left(\hat{i} - 2\hat{j} + 3\hat{k}\right)$ are perpendicular to each other. Find λ.

19. Evaluate : $\int \frac{e^{2x} - e^{-2x}}{e^{2x} + e^{-2x}} dx$

20. If $A = \begin{pmatrix} 0 & 0 \\ 14 & 0 \end{pmatrix}$, then |7A| = |14A| - State whether the statement is true or false.

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

21. Prove that, $\cot^{-1}\left[\frac{\sqrt{1+\sin x} + \sqrt{1-\sin x}}{\sqrt{1+\sin x} - \sqrt{1-\sin x}}\right] = \frac{x}{2}, \quad x \in \left(0, \frac{\pi}{4}\right)$

OR, Let A = **N** × **N** and ∗ be the binary operation on A defined by $(a, b) * (c, d) = (a + c, b + d)$. Show that ∗ is commutative and associative.

22. If $y = \tan^{-1}\left(\frac{7x}{1-12x^2}\right)$, $-\frac{1}{2\sqrt{3}} < x < \frac{1}{2\sqrt{3}}$, then prove that, $\frac{dy}{dx} = \frac{4}{1+16x^2} + \frac{3}{1+9x^2}$

23. Find the intervals on which the function $f(x) = \frac{x}{1+x^2}$ is decreasing.

OR, Find the value of k, for which the curves $y^2 = 4x$ *and* $4xy = k$ cut at right angle.

24. Find the equation of the plane, which is parallel to x-axis and passes through the line of intersection of the planes $\vec{r}\left(\hat{i} + \hat{j} + \hat{k}\right) - 1 = 0$ and $\vec{r}.\left(2\hat{i} + 3\hat{j} - \hat{k}\right) + 4 = 0$.

25. Find the equation of the plane through the intersection of the planes 3x – y + 2z = 4 and x + y + z = 2 and passing through the point (2, 2, 1). Also find the distance of the plane from the origin.

26. In a meeting 80% of the members support a certain proposal, 20% opposed. A member is selected at random and let X = 0 if he opposed and X = 1 if he supported. Find Var(X).

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

27. Consider $f : R^+ \to [-5, \infty)$ given by $f(x) = 9x^2 + 6x - 5$. Show that f is invertible.

28. If x = a.sin2t.(1+ cos2t) and y bcos2t.(1– cos2t), then prove that, $\left(\frac{dy}{dx}\right)_{at\ t=\frac{\pi}{4}} = \frac{b}{a}$.

OR, If $y = \sin(\log_e x)$, prove that $x^2\frac{d^2y}{dx^2} + x.\frac{dy}{dx} + y = 0$

29. Solve the following differential equation: $(1+x^2)\frac{dy}{dx} - 2xy = (x^2+2)(x^2+1)$.

30. Evaluate $\int_2^5 x^3\, dx$ as the limit of a sum.

31. In an examination, 10 questions of true–false type are asked. A student tosses a fair coin to determine his answers to each question. If the coin falls heads, he answers 'true' and if it falls tails, he answers 'false'. Show that the probability that he answers at most 7 questions correctly is $\frac{121}{128}$.

OR, Two cards are drawn without replacement from a well shuffled pack of 52 cards. Find the probability that one is a spade and other is a queen of red colour. [mtd–feb'11_P–71]

32. A factory owner wants to purchase two types of machines M_1 and M_2 for his new factory. The requirements for machine M_1 are : 1000 m^2 area for installation, 12 skilled worker for running it and its daily output is 50 units. The requirements for machine M_2 are : 1200 m^2 area for installation, 8 skilled worker for running it and its daily output is 40 units. If the area of 7600 m^2 is available for installation of the machines and 72 skilled workers are available to operate the machines, then how many machines should be purchased to maximize the daily output ?

SECTIONS – D (Questions 33 to 36 carry 6 marks each)

33. Prove that $\begin{vmatrix} 1+a^2 & ab & ac \\ ab & 1+b^2 & bc \\ ca & cb & 1+c^2 \end{vmatrix} = (1+a^2+b^2+c^2)$

OR, If $A = \begin{bmatrix} 2 & -3 & 5 \\ 3 & 2 & -4 \\ 1 & 1 & -2 \end{bmatrix}$, find A^{-1}. Use it to solve the following system of equations 2x – 3y+ 5z = 16; 3x + 2y – 4z = –4; x+y – 2z = –3.

34. Using integration, find the area of the circle $x^2 + y^2 = 16$, which is exterior to the parabola $y^2 = 6x$.

OR, Using integration, prove that the area enclosed by $y^2 = 12ax$ and $x^2 = 12ay$ is $48a^2$ square units.

35. Show that of all the rectangles with a given perimeter, the square has the largest area.

36. Prove that the lines $\frac{x+1}{3} = \frac{y+3}{5} = \frac{z+5}{7}$ and $\frac{x-2}{1} = \frac{y-4}{3} = \frac{z-6}{5}$ intersect each other. If the lines intersect each other, then find the point of intersection.

"The only way to learn MATHEMATICS is to do MATHEMATICS."

– Paul Halmos.

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