CLASS-XII (2014-2015)
QUESTION WISE BREAK UP

Type of Question	Mark per Question	Total No. of Questions	Total Marks
VSA	1	6	06
LA-I	4	13	52
LA-II	6	7	42
Total 26			100

1. *No chapter wise weightage*. *Care to be taken to cover all the chapters.*
2. ***The above template is only a sample. Suitable internal variations may be made for generating similar templates keeping the overall weightage to different form of questions and typology of questions same***

CHAPTERWISE MARKS in this Paper _Cl-XII (CBSE)

Sr. No	TOPICS	MARKS				
		V SA (1M)	LA-I (4M)	L A-II (6M)	Total Marks	
1 a	Relation & Function	1	OR	-	1	10
1 b	Binary operation		1		4	
1 c	Inverse Trig. Func	1	1 OR	-	5	
2.a	Matrices	1+1+		1	8	13
b	Determinant	1	1 OR	-	5	
3.a.	Continuity, Differentiability		1 + 1+ 1	-	12	44
b.	Applications Of Derivative		1	1 OR	10	
c.	Indefinite Integral		1	-	8	
	Definite Integral		1	-		
d	Applications Of Integrals		-	1	6	
e	Differential Equations		1+1		8	
4.a	Vectors	1	1	1	11	17
b	Three Dimensional Geometry			1 OR	6	
5.	Linear Programming		-	1	6	
6.	Probability		1 OR	1	10	
	TOTAL	6	13	7	100	

General Instructions :

i) All questions are compulsory.

ii) The question paper consists of **26** questions divided into three sections **A, B** and **C**. Section **A** comprises of **6** questions of **one** mark each, Section **B** comprises of **13** questions of **four** marks each and section **C** comprises of **07** questions of **six** marks each.

iii) All questions in Section **A** are to be answered in **one** word, **one** sentence or as per the exact requirement of the question.

iv) There is no overall choice. However, internal choice has been provided in **04** questions of **four** marks each and **02** questions of **six** marks each. You have to attempt only one of the alternatives in all such questions.

v) Use of calculators is **not** permitted. You may use logarithmic tables, if required.

Section-A (01 mark each)

1. Set A has 3 elements and the set B has 4 elements. Then the number of injective mappings that can be defined from A to B is

a) 144 b) 12 c) 24 d) 64

2. Evaluate: $\sec^2(\tan^{-1}2)+\operatorname{cosec}^2(\cot^{-1}3)$

3. If $A=\begin{bmatrix}3 & -4\\ 1 & -1\end{bmatrix}$, $B=\begin{bmatrix}1 & 3\\ -2 & 5\end{bmatrix}$, find $(BA)^T$.

4. If A is a square matrix of order 3, such that $|\text{adj } A| = 64$. Find $|A'|$.

5. Let $\begin{bmatrix}x+3 & 2x\\ 6 & 5y\end{bmatrix}=\begin{bmatrix}5 & 4\\ 6 & -15\end{bmatrix}$, then find the value of x and y.

6. Let G be the centroid of ΔABC. If $\overrightarrow{AB}=\vec{a}$ and $\overrightarrow{AC}=\vec{b}$, then $\overrightarrow{AG}$ is

i) $\dfrac{2(\vec{a}+\vec{b})}{3}$ ii) $\dfrac{(\vec{a}+\vec{b})}{6}$ iii) $\dfrac{(\vec{a}+\vec{b})}{3}$ iv) $\dfrac{(\vec{a}+\vec{b})}{2}$

Section-B (04 marks each)

7. Let * be a binary operation on Q, defined by $a*b=\frac{3ab}{5}$. Show that * is commutative as well as associative. Also find its identity, if it exists.

OR,

If the mappings *f* and *g* are given by *f* ={(1, 2), (3, 5), (4, 1)} and *g* ={(2, 3), (5, 1), (1, 3)}, write *f o g*.

8. Solve: $\tan^{-1}\left(\dfrac{x+1}{x-1}\right)+\tan^{-1}\left(\dfrac{x-1}{x}\right)=\tan^{-1}(-7)$

OR,

Prove that, $\cot^{-1}7+\cot^{-1}8+\cot^{-1}18=\cot^{-1}3$.

9. Using properties of determinants, prove that, $\begin{vmatrix} b+c & q+r & y+z \\ c+a & r+p & z+x \\ a+b & p+q & x+y \end{vmatrix} = 2\begin{vmatrix} a & p & x \\ b & q & y \\ c & r & z \end{vmatrix}$.

OR

If a, b and c are in A.P, then show that, $\begin{vmatrix} x+1 & x+2 & x+a \\ x+2 & x+3 & x+b \\ x+3 & x+4 & x+c \end{vmatrix} = 0$.

10. If $f(x) = \begin{cases} 2x+3, & for\ x \le 1 \\ ax^2 + bx, & for\ x > 1 \end{cases}$ & *f(x)* is everywhere differentiable, then prove that $f'(2) = -4$.

11. If x = a(A + sinA), y = a(1 – cosA), find $\frac{d^2y}{dx^2}$ at $A = \frac{\pi}{2}$.

12. Sand is pouring from a pipe at the rate of 12 cm^3/s. The falling sand forms a cone on the ground in such a way that the height of the cone is always one-sixth of the radius of the base. How fast is the height of the sand cone increasing when the height is 4 cm?

13. Find the equation of the tangent to $y^2 = 4x + 5$ which is parallel to $y = 2x + 7$.

14. Evaluate : $\int \frac{dx}{1 + 2a\cos x + a^2}$, $a > 1$

15. Evaluate: $\int_0^{\frac{\pi}{2}} \frac{\cos^2 x}{\sin x + \cos x} dx$.

16. Find the integrating factor for the linear differential equation $\frac{dy}{dx}\left(\frac{2}{1-y^2}\right) + y^2 - 1 = -2xy\frac{dy}{dx}$.

17. Solve the differential equation $(x^2 - y^2)dx + 2xy\ dy = 0$ given that y = 1 when x = 1

18. If the vectors $\vec{a}, \vec{b}$ and $\vec{c}$ are coplanar vectors, then prove that, $(\vec{a}+\vec{b}), (\vec{b}+\vec{c})$ and $(\vec{c}+\vec{a})$ are also coplanar vectors.

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

OR, A committee of 4 students is selected at random from a group consisting 8 boys and 4 girls. Given that there is at least one girl on the committee, calculate the probability that there are exactly 2 girls on the committee.

Section-C (06 marks each)

20. Solve the system of equation by matrix method,

$$\frac{2}{x} - \frac{3}{y} + \frac{3}{z} = 10$$
$$\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 10$$
$$\frac{3}{x} - \frac{1}{y} - \frac{2}{z} = 13$$

$(Given\ x, y, z \ne 0)$

21. Using integration, find the area of the region: $\{(x,y): 0 \le y \le x^2;\ 0 \le y \le x+2;\ 0 \le x \le 3\}$

22. Find the maximum area of an isosceles triangle inscribed in the ellipse $\frac{x^2}{36}+\frac{y^2}{16}=1$ with its vertex at one end of major axis.

OR

A point on the hypotenuse of a triangle is at distance a and b from the sides of the triangle. Show that the maximum length of the hypotenuse is $\left(a^{\frac{2}{3}}+b^{\frac{2}{3}}\right)^{\frac{3}{2}}$.

23. Given $\vec{a}=\hat{i}+4\hat{j}+2\hat{k},\ \vec{b}=3\hat{i}-2\hat{j}+7\hat{k}$ and $\vec{c}=2\hat{i}-\hat{j}+4\hat{k}$. Find a vector $\vec{p}$ which is perpendicular to both $\vec{a}$ a and $\vec{b}$ and $\vec{p}.\vec{c}=18$.

24. Find the image of the line $\frac{x-2}{2}=\frac{y-3}{2}=\frac{z-4}{-5}$ in the plane x + 4y + 2z + 3 = 0.

OR

Prove that the lines $\frac{x-2}{1}=\frac{y-4}{4}=\frac{z-6}{7}$ and $\frac{x+1}{3}=\frac{y+3}{5}=\frac{z+5}{7}$ are coplanar. Also find the equation of the plane containing the lines.

25. A toy company manufacturers two type of dolls, A and B. Market tests and available resources have indicated that the combined production level should not exceed 12000 dolls per week and the demand of type B is at most half of that for dolls of type A. Further, the production level of dolls of type A can exceed three times the production of doll of other type by at most 6000 units. If the company makes profit of Rs120 and Rs.160 per doll respectively on doll A and B, how many of each should be produced weekly in order to maximize the profit?

26. In a group of 200 people, 50% believe that anger and violence will ruin the country, 30% do not believe that anger and violence will ruin the country and 20% are not sure about anything. If 3 people are selected at random, find the probability that 2 people believe and 1 does not believe that anger and violence will ruin the country. How do you consider that anger and violence will ruin the country?

WHEN WE THINK WE KNOW, WE CEASE TO LEARN

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