

# KENDRIYA VIDYALAYA SANGATHAN

## CLASS XI SUBJECT MATHEMATICS

### SESSION ENDING EXAMINATION BLUE PRINT

UNIT	SL NO	NAME OF CHAPTER	VSA	SA	LSA	TOTAL	TOTAL OF UNIT
I	1	SETS	1	-	1	7(2)	
	2	RELATION AND FUNCTION	-	2		8(2)	
	3	TRIGNOMETRIC FUNCTIONS	-	1+1*	1	14(3)	29(7)
II	4	PMI	-	1*	-	4(1)	
	5	COMPLEX NUMBERS AND QUADRATIC EQUATION	-	1*	-	4(1)	
	6	LINEAR INEQUALITIES	1	-	1	7(2)	
	7	PERMUTATION AND COMBINATION	-	2	-	8(2)	
	8	BINOMIAL THEOREM	1	-	1*	7(2)	
	9	SEQUENCE ANDS SERIES	1	-	1*	7(2)	37(10)
III	10	STRAIGHT LINES	-	1*	-	4(1)	
	11	CONIC SECTION	1	1	-	5(2)	
	12	INTRODUCTION OF 3D	-	1	-	4(1)	13(4)
IV	13	LIMITS AND DERIVATIVES	2	1	-	6(3)	6(3)
V	14	MATHEMATICAL REASONING	3	-	-	3(3)	3(3)
VI	15	STATISTICS	-	-	1	6(1)	6(1)
VII	16	PROBABILITY	-	-	1	6(1)	6(1)
		TOTAL	10	48(12)	42(7)	100(29)	100(29)

1. \* FOR INTERNAL CHOICE

2. NUMBER IN BRACKETS SHOWS THE NUMBER OF QUESTIONS

3. VSA (1) SA (4) LSA (6)

## Model Question Paper MATHEMATICS Class XI

**Time : 3 Hours  
100**

**Max. Marks :**

### General Instructions

1. All questions are compulsory.
2. The question paper consist of 29 questions divided into three sections A, B and C. Section A comprises of 10 questions of one mark each, section B comprises of 12 questions of four marks each and section C comprises of 07 questions of six marks each.
3. All questions in Section A are to be answered in one word, one sentence or as per the exact requirement of the question.
4. Use of calculators is not permitted. You may ask for logarithmic tables, if required.

### SECTION A

1. Write the set  $A = \{x : x \text{ is a prime number which is divisor of } 60\}$  in roster form.
2. Simplify and write the values of  $a$  and  $b$ , where  $a + bi = \left(\frac{1}{5} + i\frac{2}{5}\right) - \left(\frac{4}{5} + i\frac{8}{5}\right)$
3. A coin is tossed 3 times and the outcomes are recorded. How many possible outcomes are there?
4. Find the coefficient of  $x^5$  in  $(x + 3)^8$
5. Evaluate  $\lim_{x \rightarrow 1} \frac{4x+3}{2x-1}$ .
6. Evaluate  $\lim_{x \rightarrow 0} x \cdot \sec x$
7. Find the component statements of "All rational numbers are real and all real numbers are complex".
8. Write the negation of the statement: "Chennai is the capital of Tamil Nadu".
9. Write the contrapositive and converse of the statement: "If  $x$  is a prime number, then  $x$  is odd"
10. There are four men and six women on the city council. If one council member is selected for a committee at random, how likely is it that it is a woman?

### SECTION B

11. If  $A = \{1, 2, 3, 4\}$ ,  $B = \{3, 4, 5, 6\}$ ,  $C = \{5, 6, 7, 8\}$ , Prove that  

$$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$$
12. Let  $A = \{1, 2, 3, 4, 6\}$ . Let  $R$  be the relation on  $A$  defined by  $\{(a, b) : a, b \in A, b \text{ is exactly divisible by } a\}$ .  
 (i) Write  $R$  in roster form  
 (ii) Find the domain of  $R$   
 (iii) Find the range of  $R$ .
13. Find the domain and range of  $f(x) = \frac{x^2+2x+1}{x^2-8x+12}$ , also find  $f(3)$ .
14. Show that  $\tan 3x \tan 2x \tan x = \tan 3x - \tan 2x - \tan x$ .

**OR**

Find  $\sin \frac{x}{2}$ ,  $\cos \frac{x}{2}$ ,  $\tan \frac{x}{2}$  where it is given that  $\tan x = -\frac{4}{3}$ , and  $x$  is in second quadrant.

15. Express the expression in the form of  $a + ib$  :  $\frac{(3+i\sqrt{5})(3-i\sqrt{5})}{(\sqrt{3}+i\sqrt{2})-(\sqrt{3}+i\sqrt{2})}$ .

**OR**

Find the modulus and argument of the complex number  $\frac{1}{1+i}$

16. Find the number of arrangements of the letters of the word INDEPENDENCE. In how many of these arrangements,

- (i) do the words start with P
- (ii) do all the vowels always occur together
- (iii) do the vowels never occur together
- (iv) do the words begin with I and end in P?

17. Find  $a$  if the coefficients of  $x^2$  and  $x^3$  in the expansion of  $(3 + ax)^9$  are equal.

18. Find the sum of the sequence 7, 77, 777, 7777, ... to  $n$  terms.

19. Find the coordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the length of the latusrectum of the ellipse  $\frac{x^2}{16} + \frac{y^2}{36} = 1$ .

20. The vertices of  $\Delta PQR$  are P (2, 1), Q (-2, 3) and R (4, 5). Find equation of the altitude through the vertex R.

**OR**

Find the equation of the line parallel to y-axis and drawn through the point of intersection of the lines  $x - 7y + 5 = 0$  and  $3x + y = 0$ .

21. Find the derivative of  $f(x) = \frac{1}{x}$ .

**OR**

Find the derivative of  $\sin x$

22. Two students Anil and Ashima appeared in an examination. The probability that Anil will qualify the examination is 0.05 and that Ashima will qualify the examination is 0.10. The probability that both will qualify the examination is 0.02. Find the probability that

- (a) Both Anil and Ashima will not qualify the examination.
- (b) At least one of them will not qualify the examination and
- (c) Only one of them will qualify the examination.

### SECTION C

23. Show that the following four conditions are equivalent : (i)  $A \subset B$  (ii)  $A - B = \phi$  (iii)  $A \cup B = B$  (iv)  $A \cap B = A$

**OR**

In a survey of 60 people, it was found that 25 people read newspaper H, 26 read newspaper T, 26 read newspaper I, 9 read both H and I, 11 read both H and T, 8 read both T and I, 3 read all three newspapers. Draw a venn diagram describing above sets and Find:

- (i) The number of people who read at least one of the newspapers.
- (ii) The number of people who read exactly one newspaper.
- (iii) Who read H but neither T nor I.
- (iv) Who read T and H but not I.

24. Find the general and particular solutions of  $\sin x + \sin 3x + \sin 5x = 0$ .

25. Prove by using mathematical induction rule :  $\frac{1}{2.5} + \frac{1}{5.8} + \frac{1}{8.11} + \dots +$

$$\frac{1}{(3n-1)(3n+2)} = \frac{n}{(6n+4)}$$

26. Solve the system of inequalities graphically  $2x + y \geq 4$ ,  $x + y \leq 3$ ,  $2x - 3y \leq 6$ , and  $x \geq 0$ ,  $y \geq 0$

27. The coefficients of the  $(r-1)^{\text{th}}$ ,  $r^{\text{th}}$  and  $(r+1)^{\text{th}}$  terms in the expansion of  $(x+1)^n$ , are in the ratio 1 : 3 : 5. Find  $n$  and  $r$ .

OR

Find the sum to  $n$  terms of the series  $1^2 + (1^2 + 2^2) + (1^2 + 2^2 + 3^2) + \dots$

28. Find the coordinates of the foot of perpendicular from the point  $(-1, 3)$  to the line  $3x - 4y - 16 = 0$ .

29. Find the mean, variance and standard deviation for the data given below.

Class	0 – 30	30-60	60-90	90-120	120-150	150-180	180-210
Frequency	2	3	5	10	3	5	2

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