

**KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION**  
**SESSION ENDING EXAM SAMPLE PAPER 01 (2017-18)**

SUBJECT: MATHEMATICS(041)

**BLUE PRINT : CLASS XI**

Unit	Chapter	VSA (1 mark)	SA (2 marks)	LA – I (4 marks)	LA– II (6 marks)	Total
Sets & functions	Sets	--	--	4(1)	6(1)	<b>10(2)</b>
	Relations and Functions	1(1)	2(1)	4(1)	--	<b>07(3)</b>
	Trigonometric Functions	--	2(1)	4(1)	6(1)	<b>12(3)</b>
Algebra	Principle of Mathematical Induction	--	--	--	6(1)	<b>6(1)</b>
	Complex Numbers and Quadratic Equations	--	2(1)	4(1)	--	<b>6(2)</b>
	Linear Inequalities	--	--	4(1)	--	<b>4(1)</b>
	Permutations and Combinations	1(1)	2(1)	4(1)	--	<b>7(3)</b>
	Binomial Theorem	--	--	--	6(1)	<b>6(1)</b>
	Sequences and Series	--	2(1)	--	6(1)	<b>8(2)</b>
Coordinate geometry	Straight Lines	1(1)	--	4(1)	--	<b>5(2)</b>
	Conic Sections	--	--	4(1)	--	<b>4(1)</b>
	Introduction to Three Dimensional Geometry	--	--	4(1)	--	<b>4(1)</b>
Calculus	Limits and Derivatives	--	2(1)	4(1)	--	<b>6(2)</b>
Mathematical reasoning	Mathematical Reasoning	1(1)	2(1)	--	--	<b>3(2)</b>
Statistics & probability	Statistics	--	--	--	6(1)	<b>6(1)</b>
	Probability	--	2(1)	4(1)	--	<b>6(2)</b>
<b>Total</b>		<b>4(4)</b>	<b>16(8)</b>	<b>44(11)</b>	<b>36(6)</b>	<b>100(29)</b>

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**SUBJECT: MATHEMATICS**  
**CLASS : XI**

**MAX. MARKS : 100**  
**DURATION : 3 HRS**

**General Instruction:**

- (i) All questions are compulsory.
- (ii) This question paper contains 29 questions.
- (iii) Question 1- 4 in Section A are very short-answer type questions carrying 1 mark each.
- (iv) Question 5-12 in Section B are short-answer type questions carrying 2 marks each.
- (v) Question 13-23 in Section C are long-answer-I type questions carrying 4 marks each.
- (vi) Question 24-29 in Section D are long-answer-II type questions carrying 6 marks each.

**SECTION – A**

**Questions 1 to 4 carry 1 mark each.**

1. Write the negation of the statements “For every real number  $x$ ,  $x^2 > x$ ”.
2. Find the number of arrangements of the letters of the word INDEPENDENCE.
3. Let  $f = \{(1,1), (2,3), (0, -1), (-1, -3)\}$  be a linear function from  $Z$  into  $Z$ . Find  $f(x)$ .
4. Find the distance of the point  $(3, -5)$  from the line  $3x - 4y - 26 = 0$ .

**SECTION – B**

**Questions 5 to 12 carry 2 marks each.**

5. Find the multiplicative inverse of  $4 - 3i$ .
6. Find the number of 4-digit numbers that can be formed using the digits 1, 2, 3, 4, 5 if no digit is repeated.
7. Insert 6 numbers between 3 and 24 such that the resulting sequence is an A.P.
8. A coin is tossed thrice, what is the probability that atleast one tail occurs?
9. Given below are two statements:  
 $p : 25$  is a multiple of 5.       $q : 25$  is a multiple of 8.  
Write the compound statements connecting these two statements with “And” and “Or”. In both cases check the validity of the compound statement.
10. Prove that:  $\frac{\cos 7x + \cos 5x}{\sin 7x - \sin 5x} = \cot x$
11. Find the derivative of  $f(x) = \sin 2x$  w.r.t.  $x$ .
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) Find the domain of  $R$  (ii) Find the range of  $R$

**SECTION – C**

**Questions 13 to 23 carry 4 marks each.**

13. Draw appropriate Venn diagram for each of the following :  
(i)  $(A \cup B)'$ , (ii)  $A' \cap B'$  (iii)  $(A \cap B)'$ , (iv)  $A' \cup B'$

14. A committee of 7 has to be formed from 9 boys and 4 girls. In how many ways can this be done when the committee consists of: (i) exactly 3 girls ? (ii) at least 3 girls ? (iii) at most 3 girls ?
15. The vertices of a triangle PQR are P(2, 1), Q(-2, 3) and R(4, 5). Find the equation of the median through the vertices R.
16. Find the domain and range of the function (i)  $f(x) = \sqrt{x-1}$  (ii)  $f(x) = |x-1|$
17. Find the equation of the ellipse, with major axis along the  $x$ -axis and passing through the points (4, 3) and (-1, 4).
18. Find the ratio in which the line segment joining the points (4, 8, 10) and (6, 10, -8) is divided by the YZ-plane.
19. Differentiate  $\frac{\sin x + \cos x}{\sin x - \cos x}$  w.r.t.  $x$

**OR**

Find the derivative of  $\tan x$  from the first principle.

20. Solve the system of inequalities graphically:  $3x + 2y \leq 150$ ,  $x + 4y \leq 80$ ,  $x \leq 15$ ,  $y \geq 0$

21. Find the modulus and argument of the complex number  $\frac{1+2i}{1-3i}$

**OR**

Find the square root of  $-5 + 12i$ .

22. Find the probability that when a hand of 7 cards is drawn from a well shuffled deck of 52 cards, it contains (i) all Kings (ii) 3 Kings (iii) atleast 3 Kings.

23. Prove that  $\sin 3x + \sin 2x - \sin x = 4 \sin x \cos \frac{x}{2} \cos \frac{3x}{2}$

**OR**

Solve  $\sin 3x + \sin 2x - \sin x = 0$

## SECTION – D

**Questions 24 to 29 carry 6 marks each.**

24. Find  $\sin \frac{x}{2}$ ,  $\cos \frac{x}{2}$  and  $\tan \frac{x}{2}$  in each of the following :

(i)  $\tan x = -\frac{4}{3}$ ,  $x$  in quadrant II      (ii)  $\cos x = -\frac{1}{3}$ ,  $x$  in quadrant III

**OR**

In any triangle ABC, prove that  $\frac{b^2 - c^2}{a^2} \sin 2A + \frac{c^2 - a^2}{b^2} \sin 2B + \frac{a^2 - b^2}{c^2} \sin 2C = 0$

25. The sum of two numbers is 6 times their geometric mean, show that numbers are in the ratio  $(3 + 2\sqrt{2}) : (3 - 2\sqrt{2})$

**OR**

If  $p, q, r$  are in G.P. and the equations,  $px^2 + 2qx + r = 0$  and  $dx^2 + 2ex + f = 0$  have a common root, then show that  $\frac{d}{p}, \frac{e}{q}, \frac{f}{r}$  are in A.P.

26. Prove by using Mathematical Induction for all  $n \in N$  that

$$1^3 + 2^3 + 3^3 + \dots + n^3 = \left[ \frac{n(n+1)}{2} \right]^2.$$

27. Calculate mean, Variance and Standard Deviation for the following distribution.

<b>Classes</b>	30-40	40-50	50-60	60-70	70-80	80-90	90-100
<b>Frequency</b>	3	7	12	15	8	3	2

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

**OR**

Find the coefficient of  $a^4$  in the product  $(1 + 2a)^4 (2 - a)^5$  using binomial theorem.

29. In a class, 36 students offered physics, 48 students offered chemistry and 50 students offered mathematics. Of these, 13 are in both chemistry and mathematics; 26 in physics and chemistry; 11 in mathematics and physics and 6 in all the subjects.

Find (i) how many students are there in the class (ii) how many students offered only mathematics and (iii) how many students are taking exactly two of the three subjects. (iv) how will you analyse the motive of parents ?

