

**KENDRIYA VIDYALAYA GACHIBOWLI, GPRA CAMPUS, HYD-32**  
**SAMPLE PAPER 05 FOR SESSION ENDING EXAM (2018-19)**

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	1(1)	--	4(1)	6(1)	11(3)
	Relations and Functions	--	2(1)*	4(1)	--	06(2)
	Trigonometric Functions	--	2(1)	4(1)*	6(1)*	12(3)
Algebra	Principle of Mathematical Induction	--	--	--	6(1)	6(1)
	Complex Numbers and Quadratic Equations	--	2(1)	4(1)*	--	6(2)
	Linear Inequalities	--	--	4(1)	--	4(1)
	Permutations and Combinations	--	2(1)	4(1)*	--	6(2)
	Binomial Theorem	1(1)	--	--	6(1)*	7(2)
	Sequences and Series	--	2(1)	--	6(1)*	8(2)
Coordinate geometry	Straight Lines	1(1)*	--	4(1)	--	5(2)
	Conic Sections	--	--	4(1)	--	4(1)
	Introduction to Three Dimensional Geometry	--	--	4(1)	--	4(1)
Calculus	Limits and Derivatives	--	2(1)*	4(1)	--	6(2)
Mathematical reasoning	Mathematical Reasoning	1(1)	2(1)	--	--	3(2)
Statistics & probability	Statistics	--	--	--	6(1)	6(1)
	Probability	--	2(1)*	4(1)	--	6(2)
	<b>Total</b>	<b>4(4)</b>	<b>16(8)</b>	<b>44(11)</b>	<b>36(6)</b>	<b>100(29)</b>

Note: \* - Internal Choice Questions

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**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. Given that  $N = \{1, 2, 3, \dots, 100\}$ , then write the subset B of N, whose element are represented by  $x + 2$ , where  $x \in N$ .
2. Find the coefficient of  $a^5b^7$  in  $(a - 2b)^{12}$ .  
**OR**  
Find the number of terms in the expansion of  $(a + 2b - 3c)^n$ .
3. Find the equation of a line which passes through the point (2, 3) and makes an angle of  $30^\circ$  with the positive direction of x-axis.
4. Write the negation of “ $2 + 3 = 5$  and  $8 < 10$ .”

**SECTION – B**

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

5. Find the domain for which the functions  $f(x) = 2x^2 - 1$  and  $g(x) = 1 - 3x$  are equal.  
**OR**  
Given  $R = \{(x, y) : x, y \in W, x^2 + y^2 = 25\}$ . Find the domain and Range of R.
6. A circular wire of radius 3 cm is cut and bent so as to lie along the circumference of a hoop whose radius is 48 cm. Find the angle in degrees which is subtended at the centre of hoop.
7. What is the probability that a randomly chosen two-digit positive integer is a multiple of 3?  
**OR**  
A bag contains 8 red and 5 white balls. Three balls are drawn at random. Find the probability that One ball is red and two balls are white.
8. Evaluate :  $(1 + i)^6 + (1 - i)^3$
9. The 4th term of a G.P. is square of its second term, and the first term is  $-3$ . Determine its 7th term.
10. Find the positive integer  $n$  so that  $\lim_{x \rightarrow 3} \frac{x^n - 3^n}{x - 3} = 108$

**OR**

Find the derivative of each of the following functions, with respect to x :  $x^2 \sin x$

11. Find the value of  $n$  such that  ${}^n P_4 : {}^{n-1} P_4 = 5 : 3, n > 4$ .
12. Write the converse of the following statements
- If  $x < y$ , then  $x + 5 < y + 5$
  - If  $ABC$  is an equilateral triangle, then  $ABC$  is an isosceles triangle

### SECTION – C

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

13. Let  $A, B$  and  $C$  be sets, then using properties of sets, show that  
 $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$
14. Find the derivative of  $f(x) = \tan(ax + b)$ , by first principle.
15. Find the coordinate of the points which trisect the line segment joining the points  $A(2, 1, -3)$  and  $B(5, -8, 3)$ .
16. A group consists of 4 girls and 7 boys. In how many ways can a team of 5 members be selected if the team has (i) no girls (ii) at least one boy and one girl (iii) at least three girls.
- OR**
- If the letters of the word RACHIT are arranged in all possible ways as listed in dictionary. Then what is the rank of the word RACHIT ?
17. Prove by using Mathematical Induction for all  $n \in N$  that  $n^3 - 7n + 3$  is divisible by 3, for all natural numbers  $n$ .
18. Find the coordinates of the foot of perpendicular from the point  $(-1, 3)$  to the line  $3x - 4y - 16 = 0$ .
19. Find the equation of the circle which passes through the points  $(20, 3), (19, 8)$  and  $(2, -9)$ . Find its centre and radius.
20. Suppose that each child born is equally likely to be a boy or a girl. Consider a family with exactly three children. Find probability of :
- The event that exactly one child is a girl.
  - The event that at least two children are girls
  - The event that no child is a girl

21. Find the range of the function (i)  $f(x) = \frac{|x-4|}{x-4}$  (ii)  $f(x) = \sqrt{16-x^2}$

22. If  $(x+iy)^{\frac{1}{3}} = a+ib$  where  $x, y, a, b \in R$ , show that  $\frac{x}{a} - \frac{y}{b} = -2(a^2 + b^2)$

**OR**

If  $a+ib = \frac{(x+i)^2}{2x^2+1}$ , then prove that  $a^2 + b^2 = \frac{(x^2+1)^2}{(2x^2+1)^2}$

23. Solve the equation  $\sin \theta + \sin 3\theta + \sin 5\theta = 0$

**OR**

Prove that:  $\frac{\sec 8\theta - 1}{\sec 4\theta - 1} = \frac{\tan 8\theta}{\tan 2\theta}$

## SECTION – D

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

24. If  $\alpha$  and  $\beta$  are the solutions of the equation  $a \tan \theta + b \sec \theta = c$ , then show that

$$\tan(\alpha + \beta) = \frac{2ac}{a^2 - c^2}$$

**OR**

A tree stands vertically on a hill side which makes an angle of  $15^\circ$  with the horizontal. From a point on the ground 35m down the hill from the base of the tree, the angle of elevation of the top of the tree is  $60^\circ$ . Find the height of the tree.

25. If  $a$  and  $b$  are the roots of  $x^2 - 3x + p = 0$  and  $c, d$  are roots of  $x^2 - 12x + q = 0$ , where  $a, b, c, d$  form a G.P. Prove that  $(q + p) : (q - p) = 17:15$ .

**OR**

Find the sum of the following series up to  $n$  terms:  $0.6 + 0.66 + 0.666 + \dots$

26. Solve the system of inequalities graphically:  $x + 2y \leq 10, x + y \geq 1, x - y \leq 0, x \geq 0, y \geq 0$

27. Find  $a, b$  and  $n$  in the expansion of  $(a + b)^n$  if the first three terms of the expansion are 729, 7290 and 30375, respectively.

**OR**

Find the expansion of  $(3x^2 - 2ax + 3a^2)^3$  using binomial theorem.

28. In a town of 10,000 families it was found that 40% families buy newspaper A, 20% families buy newspaper B, 10% families buy newspaper C, 5% families buy A and B, 3% buy B and C and 4% buy A and C. If 2% families buy all the three newspapers.

Find (a) The number of families which buy newspaper A only. (b) The number of families which buy none of A, B and C (c) Write the importance of newspaper reading.

29. From the data given below state which group is more variable, A or B?

Marks	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60	60 – 70	70 – 80
Group A	9	17	32	33	40	10	9
Group B	10	20	30	25	43	15	7