

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION
SESSION ENDING EXAM SAMPLE PAPER 02 (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	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	1(1)	--	--	6(1)	7(2)
	Binomial Theorem	--	2(1)	4(1)	--	6(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)
	Total	4(4)	16(8)	44(11)	36(6)	100(29)

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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. Let $A = \{ 1, 2, 3, 4, 5, 6 \}$, $B = \{ 2, 4, 6, 8 \}$. Find $A - B$ and $B - A$.
2. If ${}^{16}C_r = {}^{16}C_{r+2}$, then find rC_4
3. Line through the points $(- 2, 6)$ and $(4, 8)$ is perpendicular to the line through the points $(8, 12)$ and $(x, 24)$. Find the value of x .
4. Write converse of, if two lines are parallel, then they do not intersect in same plane.

SECTION – B

Questions 5 to 12 carry 2 marks each.

5. Let $A = \{1, 2, 3, 5\}$ and $B = \{4, 6, 9\}$. Define a relation R from A to B by $R = \{(x, y) : x - y \text{ is odd natural number, } x \in A, y \in B\}$. Write R in roster form.
6. Solve the equation: $\sqrt{5}x^2 + x + 5 = 0$.
7. Find the coefficient of x^6y^3 in the expansion of $(x + 2y)^9$.
8. One card is drawn from a well shuffled deck of 52 cards. If each outcome is equally likely, calculate the probability that the card will be (i) a diamond (ii) not an ace
9. Write the component statements of the following compound statements and check whether the compound statement is true or false: "A line is straight and extends indefinitely in both directions."
10. In any triangle ABC , prove that $\frac{\sin(A - B)}{\sin(A + B)} = \frac{(a^2 - b^2)}{c^2}$
11. 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
12. Find the distance of the point $(3, - 5)$ from the line $3x - 4y - 26 = 0$.

SECTION – C

Questions 13 to 23 carry 4 marks each.

13. Find the domain and range of the function $f(x) = \sqrt{9 - x^2}$

14. Show that for any sets A and B, $A = (A \cap B) \cup (A - B)$ and $A \cup (B - A) = (A \cup B)$

15. 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 ?

16. Find the distance of the line $4x - y = 0$ from the point P (4, 1) measured along the line making an angle of 135° with the positive x -axis.

OR

In the triangle ABC with vertices A (2, 3), B (4, -1) and C (1, 2), find the equation and length of altitude from the vertex A.

17. The second, third and fourth terms in the binomial expansion $(x + a)^n$ are 240, 720 and 1080, respectively. Find x , a and n .

OR

The coefficients of three consecutive terms in the expansion of $(1 + a)^n$ are in the ratio 1: 7 : 42. Find n .

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

19. Find the derivative of $\sin(5x - 8)$ with respect to first principle.

20. A point R with x -coordinate 4 lies on the line segment joining the points P(2, -3, 4) and Q (8, 0, 10). Find the coordinates of the point R.

21. A man running a racecourse notes that the sum of the distances from the two flag posts from him is always 10 m and the distance between the flag posts is 8 m. Find the equation of the posts traced by the man.

22. In a relay race there are five teams A, B, C, D and E. (a) What is the probability that A, B and C finish first, second and third, respectively. (b) What is the probability that A, B and C are first three to finish (in any order) (Assume that all finishing orders are equally likely)

23. Prove that: $\frac{\sin 7x + \sin 5x + \sin 9x + \sin 3x}{\cos 7x + \cos 5x + \cos 9x + \cos 3x} = \tan 6x$

OR

Solve : $\sec x - \tan x = \sqrt{3}$

SECTION – D

Questions 24 to 29 carry 6 marks each.

24. Prove by Principle of Mathematical Induction $\forall n \in N$:

$$1.2.3 + 2.3.4 + 3.4.5 + \dots + n(n+1)(n+2) = \frac{n(n+1)(n+2)(n+3)}{4}$$

OR

Prove that $\frac{1}{3.5} + \frac{1}{5.7} + \frac{1}{7.9} + \dots + \frac{1}{(2n-1)(2n+1)} = \frac{n}{3(2n+3)}$ by principle of Mathematical induction for $\forall n \in N$

25. Find the sum of the following series up to n terms: $\frac{1^3}{1} + \frac{1^3 + 2^3}{1+3} + \frac{1^3 + 2^3 + 3^3}{1+3+5} + \dots$

OR

Let S be the sum, P the product and R the sum of reciprocals of n terms in a G.P. Prove that $P^2 R^n = S^n$.

26. If $\tan x = \frac{3}{4}$, $\pi < x < \frac{3\pi}{2}$ then find the value of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$ and $\tan \frac{x}{2}$.

OR

In any triangle ABC, prove that $(b^2 - c^2)\cot A + (c^2 - a^2)\cot B + (a^2 - b^2)\cot C = 0$.

27. A well known thinking about the students of senior secondary school is that they are brilliant, unique in maths. A maths teacher taught them properly and then he decided to take a test to justify them. He prepared a test consists 12 questions divided in two parts say part I and part II, containing 5 and 7 questions respectively. A student is required to attempt 8 questions in all, selecting atleast 3 from each part. In how many ways can a student select the questions ? Suggest any other quality of students that should be judge by teacher through this test.

28. A college awarded 38 medals in football, 15 in basketball and 20 in cricket. If these medals went to a total of 58 men and only three men got medals in all the three sports, how many received medals in exactly two of the three sports ? How many received exactly one medal of the three sports?

29. The mean of 5 observations is 4.4 and their variance is 8.24. If three of the observations are 1, 2 and 6, find the other two observations.

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