

KENDRIYA VIDYALAYA SANGATHAN, HYDERABAD REGION
SESSION ENDING EXAM SAMPLE PAPER 03 (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	--	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)
	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.
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SECTION – A

Questions 1 to 4 carry 1 mark each.

1. Write the interval (6, 12] in the set-builder form.
2. How many 3-digit numbers can be formed by using the digits 1 to 9 if no digit is repeated?
3. Find the equation of the line, which makes intercepts –3 and 2 on the x - and y -axes respectively.
4. Write the negation of the statements: “Both the diagonals of a rectangle have the same length.”

SECTION – B

Questions 5 to 12 carry 2 marks each.

5. Express $(5 - 3i)^3$ in the form $a + ib$.
6. Write the contrapositive of the following statement:
 - (i) If a number is divisible by 9, then it is divisible by 3.
 - (ii) If you are born in India, then you are a citizen of India.
7. If ${}^nC_9 = {}^nC_8$, find n
8. Evaluate: $\lim_{x \rightarrow 0} \frac{\sin 4x}{\sin 2x}$
9. In a G.P., the 3rd term is 24 and the 6th term is 192. Find the 10th term.
10. A letter is chosen at random from the word ‘ASSASSINATION’. Find the probability that letter is (i) a vowel (ii) a consonant
11. The minute hand of a watch is 3 cm long. How far does its tip move in 40 minutes?
(Use $\pi = 3.14$).
12. Find the domain of the function $f(x) = \frac{x^2 + 3x + 5}{x^2 - 5x + 4}$.

SECTION – C

Questions 13 to 23 carry 4 marks each.

13. If $A = \{1, 2, 3, 4\}$, $B = \{3, 4, 5, 6\}$, $C = \{5, 6, 7, 8\}$ and $D = \{7, 8, 9, 10\}$; find (i) $A \cap (B \cup C)$
(ii) $A \cap (B \cup D)$ (iii) $(A \cap B) \cap (B \cup C)$ (iv) $(A \cup D) \cap (B \cup C)$

14. Convert the complex number $z = \frac{i-1}{\cos \frac{\pi}{3} + i \sin \frac{\pi}{3}}$ in the polar form.

OR

Find the square root of $16 - 30i$.

15. Let $f = \{(1,1), (2,3), (0,-1), (-1, -3)\}$ be a function from Z to Z defined by $f(x) = ax + b$, for some integers a, b . Determine a, b .

16. Prove that: $\sin x + \sin 3x + \sin 5x + \sin 7x = 4 \cos x \cos 2x \sin 4x$

OR

Solve $2 \cos^2 x + 3 \sin x = 0$

17. On her vacations Veena visits four cities (A, B, C and D) in a random order. What is the probability that she visits (i) A before B? (ii) A before B and B before C?

18. Differentiate $\frac{4x+5 \sin x}{3x+7 \cos x}$ w.r.t.x.

OR

Suppose $f(x) = \begin{cases} a+bx, & x < 1 \\ 4, & x = 1 \\ b-ax, & x > 1 \end{cases}$ and if $\lim_{x \rightarrow 1} f(x) = f(1)$, what are possible values of a and b ?

19. Find the equation of the circle passing through the points (2,3) and (-1,1) and whose centre is on the line $x - 3y - 11 = 0$.

20. Using section formula, prove that the three points (-4, 6, 10), (2, 4, 6) and (14, 0, -2) are collinear.

21. Find the equation of the line passing through the point of intersection of the lines $4x + 7y - 3 = 0$ and $2x - 3y + 1 = 0$ that has equal intercepts on the axes.

22. What is the number of ways of choosing 4 cards from a pack of 52 playing cards? In how many of these (i) four cards are of the same suit, (ii) four cards belong to four different suits, (iii) are face cards, (iv) two are red cards and two are black cards,

23. A manufacturer has 600 litres of a 12% solution of acid. How many litres of a 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18%?

SECTION – D

Questions 24 to 29 carry 6 marks each.

24. 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 $\forall n \in N$

OR

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

$$\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + \dots + \frac{1}{(3n-2).(3n+1)} = \frac{n}{(3n+1)}.$$

25. If the coefficients of a^{r-1} , a^r and a^{r+1} in the expansion of $(1+a)^n$ are in arithmetic progression, prove that $n^2 - n(4r+1) + 4r^2 - 2 = 0$.

26. If S_1, S_2, S_3 are the sum of first n natural numbers, their squares and their cubes, respectively, show that $9S_2^2 = S_3 (1 + 8S_1)$.

OR

The ratio of the A.M. and G.M. of two positive numbers a and b , is $m : n$. Show that

$$a : b = \left(m + \sqrt{m^2 - n^2}\right) : \left(m - \sqrt{m^2 - n^2}\right)$$

27. Find $\sin \frac{x}{2}, \cos \frac{x}{2}$ and $\tan \frac{x}{2}$, if $\cos x = -\frac{1}{3}$, x is in III quadrant.

OR

In any triangle ABC, prove that $a^3 \sin(B - C) + b^3 \sin(C - A) + c^3 \sin(A - B) = 0$

28. School is organized slogan competition on “SAVE ENVIRONMENT” for all classes. The following frequency distribution gives the number of slogans submitted by all the students:

No. of slogans	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50
No. of Students	2	3	6	7	14	12	4	2

Find the mean, variance and standard deviation. Which value is depicted from this?

29. A class has 175 students. The following description gives the number of students studying one or more of the subjects in this class.

Mathematics 100; Physics 70; Chemistry 46; Mathematics and Physics 30; Mathematics and Chemistry 28; Physics and Chemistry 23; Mathematics, Physics and Chemistry 18.

Find (i) how many students are enrolled in Mathematics alone; Physics alone and Chemistry alone. (ii) the number of students who have not offered any of these subjects.

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