

KENDRIYA VIDYALAYA SANGATHAN-AHMEDABAD REGION

SESSION ENDING EXAMINATION 2016-17

SUBJECT : MATHEMATICS

CLASS : XI

MAX. MARKS : 100

TIME : 3 HRS.

General Instructions :

1. All questions are compulsory.
2. The question paper consists of 29 questions divided into four sections A, B,C and D. Section A comprises of 4 questions of one mark each, section B comprises of 8 questions of two marks each, section C comprises of 11 questions of four marks each and section D comprises 6 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. There is no overall choice. However, internal choice has been given.
5. Use of calculators is not permitted. You may ask for logarithmic tables, if required.

SECTION A

- 1 Write the set $\left\{\frac{2}{5}, \frac{3}{7}, \frac{5}{9}, \frac{7}{11}, \frac{9}{13}\right\}$ in set builder form. 1
- 2 Write the multiplicative inverse of $-i$. 1
- 3 Name the octant in which $(-3,-1,4)$ lies? 1
- 4 Write the negation of the statement: "sum of 2 and 3 is 6" 1

SECTION B

- 5 Let $R = \{(x,y) : x,y \in R, y = 2x + 8\}$, if $(a,-2)$ and $(4,b^2) \in R$, find the values of a and b . 2
- 6 Given $A = \{1,2,3,4,5\}$, $S = \{(x,y) : x \in A, y \in A\}$. Find the ordered pairs which satisfy $x + y = 5$. 2
- 7 Find the value of $\sec(2\pi-x) \cos(-x)$ 2

- 8 Find the coefficient of x^5 in $(x+3)^8$ 2
- 9 Given that the points $P(3,2,-4)$, $Q(5,4,-6)$ and $R(9,8,-10)$ are collinear. Find the ratio in which Q divides PR. 2
- 10 Evaluate the limit: 2
- $$\lim_{x \rightarrow 3} \frac{x^4 - 81}{2x^2 - 5x - 3}$$
- 11 Write the contrapositive and converse of the statement: A positive integer is prime only if it has no divisors other than one and itself. 2
- 12 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? 2

SECTION C

- 13 A survey was conducted on 100 customers and it was found that 65 liked product X and 38 customers liked product Y. Find the least number that must have liked both products. 4
- 14 A relation R is defined on the integers Z as $R = \{(a,b): a^2 + b^2 = 25\}$. (i) Write R (ii) find the domain and range of R. 4
- 15 If $U = \{1,2,3,4,5,6,7,8,9\}$, $A = \{2,4,6,8\}$, $B = \{2,3,5,7\}$ verify that (i) $(A \cup B)' = A' \cap B'$ (ii) $(A \cap B)' = A' \cup B'$ 4
- 16 Find in degrees and radians the angle between the minute hand of a clock and the hour hand when the time is 7.20 a.m. 4
- 17 Using Principle of mathematical induction, prove that $(10^{2n-1} + 1)$ is divisible by 11. 4
- 18 In how many ways can the letters of the word "ASSASSINATION" be arranged so that all S's are together? 4
- 19 Find the lengths of transverse and conjugate axes, eccentricity, coordinates of foci and vertices of the hyperbola $16x^2 - 9y^2 = 144$. 4

OR

An arch is in the form of a semi ellipse. It is 8m wide and 2 m high at the centre. Find the height of the arch at a point 1.5 m from one end.

- 20 In how many ways can one select a cricket team of eleven from 17 players in which only 5 players can bowl if each cricket team of 11 must include exactly 4 bowlers? 4
- 21 The second, third and fourth term in the binomial expansion of $(x+a)^n$ are 240,720 and 1080 respectively. Find x, a and n. 4
- 22 Find the derivative of $\frac{\cos x}{1+\sin x}$ with respect to x. 4

OR

Find the derivative of $\cos 2x$ using first principle.

- 23 In a class of 60 students 30 opted for NCC,32 opted for NSS and 24 opted both NCC and NSS. If one of these students is selected at random, find the probability that 4
- (i)The student opted for NCC or NSS
- (ii)The student has opted neither NCC nor NSS
- (iii) The student has opted NSS but not NCC

OR

Three letters are written to three persons and an envelope is addressed to each of them, the letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the probability that atleast one letter is in its proper envelope.

SECTION D

24 If $\tan x = -\frac{4}{3}$, x is in quadrants II. Find the value of $\sin \frac{x}{2}$, $\cos \frac{x}{2}$, $\tan \frac{x}{2}$

OR

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

25 Find four numbers in G.P in which third term is greater than the first by 9 and the second term is greater than the fourth by 18. 6

26 Solve the given system of inequalities graphically: 6
 $x - 2y \leq 3$, $3x + 4y \geq 12$, $x \geq 1$, $y \geq 1$.

27 If $x - iy = \sqrt{\frac{a-ib}{c-id}}$, find $(x^2 + y^2)^2$. 6

OR
Let $z_1 = 2 - i$ and $z_2 = -2 + i$, then find

(i) $\operatorname{Re} \left[\frac{z_1 z_2}{z_1} \right]$

(ii) $\operatorname{Im} \left[\frac{1}{z_1 z_2} \right]$

28 Calculate the mean and variance for the distribution: 6

Classes	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Frequencies	3	7	12	15	8	3	2

29 The line through the point $(h, 3)$ and $(4, 1)$ intersect the line $7x - 9y = 19$ at right angles. Find the value of h . 6
