CODE: SET 1 **KENDRIYA VIDYALAYA SANGATHAN GUWAHATI REGION** **TOTAL PAGES :2**

HALF YEARLY EXAMINATION 2018-19

CLASS: XI **TIME: 3 HRS**

SUBJECT: MATHEMATICS **MM: 100**

***General Instructions*:-**

1. *This question paper consists of 4 sections.*
2. *Section A consists of 4 questions each of 1 mark*
3. *Section B consists of 8 questions each of 2 marks.*
4. *Section C consists of 11 questions each of 4 marks.*
5. *Section D consists of 6 questions each of 6 marks*
6. *There is no overall choice, however in section C there are 3 internal choices and in section C 2 internal choices.*
7. *Use of calculator is prohibited. However you may ask for log table for calculation.*

SECTION-A

1. If A=$\{-1,1\}$, write A$\times$A$\times$A
2. If$\frac{2+3i}{3-2i}$= $x+iy$, then find $x-y$
3. Find the value of $\sin\left(\frac{31\pi}{3}\right)$
4. How many three digit even numbers can be formed using the digits 0,3,4,5,6 if the digits are not repeated?

SECTION B

5. If A and B are any two non- empty sets , prove using Venn diagrams (AUB)' = A'∩B'
6. If f(x) = x^2-1 and g(x)= 2 x + 1 Find the value of (f-g)(2) and $(\frac{f}{g})(1)$
7. Show that $\frac{\tan\left(\frac{\pi}{4}+x\right)}{\tan\left(\frac{\pi}{4}-x\right)}=\left(\frac{1+\tan x}{1-\tan x}\right)^2$
8. Find the Multiplicative inverse of 2-3i
9. Solve:$\frac{2x-1}{3}\geq\frac{(3x-2)}{4}-\frac{(2-x)}{5}$, $x\in R$
10. How many words with or without meaning can be made from the letters of the word MONDAY, assuming that no letter is repeated, if (i) 4 letters are used at a time.(ii) all letters are used but first letter is a vowel.
11. Determine the number of 5 card combinations out of 52 cards if each selection of 5 cards has exactly one king
12. Find the co-efficient of x^6y^3 in the expansion of$(x+2y)^9$

SECTION C

13. If A=$\{1,2,3,4,\ldots.8,9\}$ B=$\{2,4,6,8\}$ and C =$\{2,3,5,7\}$ verify that A – (BUC) = (A-B)∩(A-C)
14. Let f =$\{(1,1),(2,3),(0,-1),(-1,-3)\}$ be function from **Z** to **Z** defined by f(x) = ax- b for some integer a and b. Find a and b
15. Find the domain and range of the function f given by f(x) =$\sqrt{x-1}$

(OR)

Find the domain and range of the function f(x) = -$|x|$

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

17. Prove by the principle of mathematical induction $41^n - 14^n$ is an integral multiple of 27

18. If $(a+ib)^3 = u+iv$, then show that $\frac{u}{a}+\frac{v}{b}=4(a^2-b^2)$

19. If $Z_1 = 2-i$ and $Z_2 = 1+i$, find $\left|\frac{Z_1+Z_2+1}{Z_1-Z_2+i}\right|$

20. A man wants to cut three lengths from a single piece of board of length 91 cm. The second length is to be 3cm longer than the shortest and the third length is to be twice as long as the shortest. What are the possible lengths of the shortest board if the third piece is to be 5cm longer than the second?

21. If ${}^nP_5 = 42\ {}^nP_3$ Find the value of n.

(OR)

Find the number of arrangements of the letters of the word PERMUTATIONS. In how many of these arrangements

(i) do the word start with P and end with S

(ii) do all the vowels always occur together?

22. 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 girl?

(ii) atleast one boy and one girl?

(iii) at least three girls?

23. Find $(a+b)^4 - (a-b)^4$ using binomial theorem. Hence evaluate $(\sqrt{3}+\sqrt{2})^4 + (\sqrt{3}-\sqrt{2})^4$

OR

Using Binomial theorem, show that $9^{n+1} - 8n - 9$ is divisible by 64, whenever n is positive integer.

SECTION D

24. In a survey, it was found that 21 people like to play football 26 like to play volley ball and 29 like to play cricket. If 14 people like to play football and volley ball 12 people like to play cricket and football,14 people like to play volley ball and cricket and 8 like to play all the three. Find how many like to play cricket only. How many play exactly two games? "Playing a game keeps you in good health". Do you agree with this statement? Why?

25. If $\tan x = \frac{4}{-3}$, and x belongs to the second quadrant, find $\sin\frac{x}{2}$, $\cos\frac{x}{2}$, $\tan\frac{x}{2}$

(OR)

Find the Value of $\tan\frac{\pi}{8}$

26. Using the principal of mathematical induction, prove that $1+2+3+\ldots\ldots+n < \frac{1}{8}(2n+1)^2$

27. Convert the complex number $\frac{1+3i}{1-2i}$ into Polar form

(OR)

Find the square root of the complex number -7-24i

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

29. The coefficient of $(r-1)^{th}$, r^{th}, $(r+1)^{th}$ terms in the expansion of $(x+1)^n$ are in the ratio 1:3:5 .Find the value of both n and r.