Max. Marks: 100
Date: 22/09/2017
Time: 3hrs.

Std.: XI
Subject: Mathematics

General Instructions:-

- *Questions of Section A consists of **1 mark** each.*
- *Questions of Section B consists of **4 marks** each.*
- *Questions of Section C consists of **6 marks** each.*
- *All questions are compulsory.*
- *Use of calculator is not allowed.*

SECTION A

1) Let A, B and C be three sets. If $A \in B$ and $B \subset C$, is it true that $A \subset C$? If not give an example.

2) A={a,b} , B={a,b,c}. What is AxB?

3) Find $\tan 19\frac{\pi}{3}$.

4) Prove $(1 - i)^2$ = -2i

5) Write additive inverse of -2+3i.

6) Solve 3x-9<0.

SECTION B

7) Let A={p,q,r,s}, B={p,q,r} and C={q,s}. Find all sets X such that
   i) $X \subset B$ and $X \subset C$ ii) $X \subset A$ and $X \not\subset B$.

8) Let U={1,2,3,4,5,6,7,8,9}, A={1,2,3,4}, B ={2,4,6,8}. Find
   i) A' ii) B' iii) $(A \cup B)'$

9) Let A={$\frac{1}{2}$, 2} , B={2,3,5}, C={-1,-2} then verify Ax(B∪C) = (AxB)∪(AxC)

10) Find domain and range of
    i) f(x) = $\sqrt{(x - 1)(3 - x)}$
    ii) f(x) = 1-|x|

11) A wheel rotates making 20 revolutions per second. If radius of the wheel is 35 cm, what linear distance does a point of its rim traverse in three minutes?

12) Prove $\dfrac{\sec\theta-\tan\theta}{\sec\theta+\tan\theta} = 1-2\sec\theta\tan\theta + 2\tan^2\theta$

13) Prove $3\cos^2\dfrac{\pi}{4} + \sec\dfrac{2\pi}{3} + 5\tan^2\dfrac{\pi}{4} = \dfrac{29}{2}$

14) Suppose P(n): n^2+n is even. Prove P(n) is true $\forall n \in N$ by mathematical induction.

15) Prove $\left[\left(\dfrac{3+2i}{2-5i}\right) + \left(\dfrac{3-2i}{2+5i}\right)\right]$ is rational.

16) Simplify $(-1+2i) + (\dfrac{1}{2} - i) - (-2 - \sqrt{-25})$.

17) Express $3+4i$ in polar form.

18) Solve $\dfrac{x-3}{x-5} > 0$.

19) Find conjugate of $\dfrac{(3-2i)(2+3i)}{(1+2i)(2-i)}$

SECTION C

20) If A and B are any two sets prove that
   i) $A-B = A \cap B^c$ ii) $(A-B) \cup B = A \cup B$

21) If R is a relation in NxN show that the relation R defined by (a,b)R(c,d) iff ad=bc is an equivalence relation.

22) If tanA + sinA = m and tanA − sinA = n then show that $m^2 - n^2 = \pm 4\sqrt{mn}$

23) If $\cos A = \dfrac{1}{7}$ and $\cos B = \dfrac{13}{14}$ prove that A-B = 60°

24) By Principle of Mathematical Induction prove that $\forall n \in N$, 3^{2n} when divided by 8 the remainder is always 1.

25) Find the square root of -48-14i.

26) Draw the graph of the inequation $3x-5y+8 \geq 0$

************** *Good Luck* **************