First Term Examination (19 September 2017)

Class XI

Sub - Mathematics

(Set-A)

Time 3hrs   **M.M. 100**

Note: i) All questions are compulsory.

    ii) This question paper contains 29 questions.

    iii) Question 1-4 in Section A carry 1 mark each.

    iv) Question 5-12 in Section B carry 2 marks each.

    v) Question 13-23 in Section C carry 4 marks each.

    vi) Question 24-29 in Section D carry 6 marks each.

SECTION - A

Q1.   Solve $3(1-x) < 2(x+4)$. Show the graph of solution on number line.

Q2.   Give two examples of sentences which are not statements. Give reason for the answer.

Q3.   Find value of $\sin\left(\dfrac{-11\pi}{3}\right)$

Q4.   Let $U = \{1,2,3,4,5,6\}$, $A = \{2,3\}$, $B = \{3,4,5\}$. Show that $(A \cup B)' = (A' \cap B')$

SECTION – B

Q5.   Prove that $\sin^2 \dfrac{\pi}{6} + \cos^2 \dfrac{\pi}{3} - \tan^2 \dfrac{\pi}{4} = \dfrac{-1}{2}$

Q6.   Write component statements of "All living things have two legs and two eyes" and find whether it is

true or false.

Q7.   If $\cot x = \dfrac{-5}{12}, x$ lies in 2nd quadrant, find values of other five trigonometric functions.

Q8.   Prove that $\dfrac{\cos 4x + \cos 3x + \cos 2x}{\sin 4x + \sin 3x + \sin 2x} = \cot 3x$

Q9.   Write $\left(\dfrac{1}{1-4i} - \dfrac{2}{1+i}\right)\left(\dfrac{3-4i}{5+i}\right)$ in $a+ib$ form

Q10.   Solve $\dfrac{x-2}{x+5} > 2$

Q11.   If $X = \{a,b,c,d\}$ and $Y = \{f,d,b,e,g\}$. *Find* (*i*) $X - Y$ (*ii*) $X \cap Y$

Q12.   Solve $\dfrac{2x-3}{4} + 9 \geq 3 + \dfrac{4x}{3}$

SECTION – C

Q13.   Prove by PMI $41^n - 14^n$ is multiple of 27.

Q14. Draw appropriate Venn diagrams for (i) $A' \cap B'$ (ii) $(A \cap B)'$

Q15. Complete mean deviation from the mean of following data:

xi	3	9	17	23	27
fi	8	10	12	9	5

Q16. Rewrite the following statement with 'if-then' in five different ways.

"If all the four sides of a rectangle are equal, then rectangle is a square".

Q17. Find real value of $x \, and \, y$ if $(x - iy)(3 + 5i)$ is conjugate of $-6 - 24i$

Q18. Solve $\sqrt{5}x^2 + x + \sqrt{5} = 0$ by factorization method.

Q19. Find general and principal solution of $\sin 5x + \sin 3x + \sin x = 0$

Q20. Write $z = \dfrac{1 + 3i}{1 - 2i}$ in polar form.

Q21. The longest side of a triangle is 3 times the shortest side and third side is 2cm shorter than the longest side. If perimeter of a triangle is atleast 61cm, find minimum length of shortest side.

Q22. Solve $\dfrac{|x| - 1}{|x| - 2} \geq 0$

Q23. Prove that $\cos^2 x + \cos^2\left(x + \dfrac{\pi}{3}\right) + \cos^2\left(x - \dfrac{\pi}{3}\right) = \dfrac{3}{2}$

SECTION - D

Q24. Exhibit graphically the solution set of linear inequations $x + y \leq 5, 4x + y \geq 4, x \leq 4, y \leq 3$

Q25. Solve $2x^2 - (3 + 7i)x - (3 - 9i) = 0$ by using general expression for the roots of quadratic equations.

Q26. Calculate Mean, Variance and standard Deviation for the following distribution:

Age	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of persons	3	51	122	141	130	51	2

Q27. If $\tan x = \dfrac{3}{4}, \pi < x < \dfrac{3\pi}{2}$, find values of $\sin\dfrac{x}{2}, \cos\dfrac{x}{2} \, and \, \tan\dfrac{x}{2}$

Q28. In an university, out of 100 students 15 offered Maths only, 12 offered statistics only, 8 offered Physics only, 40 offered Physics & Mathematics, 20 offered physics & statistics, 65 offered Physics. Find number of students who

i) Offered mathematics (ii) offered statistics

(iii) did not offer any of above three subjects.

Q29. Prove by PMI $\dfrac{1}{1.2} + \dfrac{1}{2.3} + \dfrac{1}{34.} + ... + \dfrac{1}{n(n+1)} = \dfrac{n}{n+1}$