

# 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  $\sin\left(\frac{-11\pi}{3}\right)$

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  $\sin^2 \frac{\pi}{6} + \cos^2 \frac{\pi}{3} - \tan^2 \frac{\pi}{4} = \frac{-1}{2}$

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

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

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

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

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

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

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

## 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:

|           |   |    |    |    |    |
|-----------|---|----|----|----|----|
| <b>xi</b> | 3 | 9  | 17 | 23 | 27 |
| <b>fi</b> | 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  $z = \frac{1+3i}{1-2i}$  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  $\frac{|x|-1}{|x|-2} \geq 0$

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

#### 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:

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

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

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  $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}$