First Term Examination (19 September 2017)

Class XI
Sub - Mathematics
(Set-B)

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.   Write negation of the sentence, " $\sqrt{7}$ is a rational number"

Q2.   Find value of $\tan \dfrac{19\pi}{3}$

Q3.   Solve $7x+3<5x+9$. Show the graph of solution on number line.

Q4.   Let $A\{1,2,3,4,5...10\}$, $B\{2,3,5,7\}$. Show that $A \cap B = B$

SECTION – B

Q5.   Find values of other five trigonometric functions if $Cos\, x = \dfrac{-1}{2}; x$ lies in 3rd quadrant

Q6.   Solve $\dfrac{2x+4}{x-1} \geq 5$

Q7.   Find the component of the statement, "All primes are either odd or even" and check whether it is true

or false.

Q8.   Prove that $\sin^2 6x - \sin^2 4x = \sin 2x \cos 10x$

Q9.   Let $A\{1,2,3\}$, $B\{1,2,3,4,5\}$. Is ACB? What is AUB?

Q10.   Express: $\dfrac{\left(3+i\sqrt{5}\right)\left(3-i\sqrt{5}\right)}{\left(\sqrt{3}+\sqrt{2}i\right)-\left(\sqrt{3}-i\sqrt{2}\right)}$ in $a+ib$ form

Q11.   Prove that $\dfrac{\tan\left(\dfrac{\pi}{4}+x\right)}{\tan\left(\dfrac{\pi}{4}-x\right)} = \left(\dfrac{1+\tan x}{1-\tan x}\right)^2$

Q12.   Solve $\dfrac{1}{2}\left(\dfrac{3x}{5}+4\right) \geq \dfrac{1}{3}(x-6)$

SECTION – C

Q13. Prove by PMI $3^{n+2} - 8n - 9$ is divisible by 8.

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

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

Class	0-10	10-20	20-30	30-40	40-50
Frequency	5	10	20	5	10

Q16. Find the general and principal solution of $\cos 3x + \cos x - \cos 2x = 0$

Q17. Convert the following in the polar form : $\dfrac{1+7i}{(2-i)^2}$

Q18. Solve $\sqrt{3}x^2 - \sqrt{2}x + 3\sqrt{3} = 0$ by factorization method.

Q19. Find real values of x & y for which $-3 + ix^2 y \text{ and } x^2 + y + 4i$ are conjugate of each other.

Q20. Solve for real x, $|x+1| + |x| > 3$

Q21. Rewrite the following statement with 'if-then' in fine different ways:

"If a natural number is odd, then its square is also odd".

Q22. Ravi obtained 80 and 75 marks in first unit test. Find minimum marks he should get in the third test to have an average of atleast 70 marks.

Q23. Prove that $(\cos x - \cos y)^2 + (\sin x - \sin y)^2 = 4\sin^2 \dfrac{x-y}{2}$

SECTION - D

Q24. Solve $x^2 - (7-i)x + (18-i) = 0$ by using general expression for the roots of quadratic equations.

Q25. Exhibit graphically the solution set of linear in equations $x + y \geq 1, 7x + 9y \leq 63, x \leq 6, y \leq 5$

Q26. If $\sin x = \dfrac{\sqrt{5}}{3}$ and x lies in 2nd quadrant then find values of $\cos \dfrac{x}{2}$, $\sin \dfrac{x}{2}$ and $\tan \dfrac{x}{2}$

Q27. Calculate Mean, Variance and standard Deviation for the following distribution:

Marks	20-30	30-40	40-50	50-60	60-70	70-80	80-90
No. of students	3	6	13	15	14	5	4

Q28. Prove by PMI $1.2.3 + 2.3.4 + -- + n(n+1)(n+2) = \dfrac{n(n+1)(n+2)(n+3)}{4}$

Q29. In a survey of 25 students, it was found that 15 had taken mathematics, 12 had taken Physics and 11 had taken Chemistry, 5 had taken Maths & Chemistry 9 had taken Maths & Physics 4 had taken Physics & Chemistry and 3 had taken all three subjects. Find the number of students that had taken:

i) Only Physics

ii) Only Mathematics

iii) Only Chemistry