THE INDIAN SCHOOL, KINGDOM OF BAHRAIN

Sample Paper

Class XI Mathematics

Section A [6 x 1 = 6 marks]

1. Solve $x^2 + x + \frac{1}{\sqrt{2}} = 0$
2. Evaluate: i^{-39}
3. Find the multiplicative inverse of 2- 2i.
4. 8-3x < 2 When x is a natural number.
5. Find the principal solution of sin x = $\frac{\sqrt{3}}{2}$
6. Find the value of sin 15^0

Section B [13 x 4 = 52 marks]

7. Solve : cos4x = cos 2x **OR** sin2x + cosx = 0
8. Prove that $\frac{\cos x + \cos 3x}{\sin x + \sin 3x} = \cot 2x$
9. Prove that $\cos\left(\frac{3\pi}{4} + x\right) - \cos\left(\frac{3\pi}{4} - x\right) = -\sqrt{2}\cos x$
10. Prove that $\cos 2x \cos\frac{x}{2} - \cos 3x \cos\frac{9x}{2} = \sin 5x \sin\frac{5x}{2}$
11. Prove using PMI that $\frac{1}{1.4} + \frac{1}{4.7} + \frac{1}{7.10} + ... + \frac{1}{(3n-2)(3n+1)} = \frac{n}{3n+1}$ For n $\in N$
12. Prove using PMI that $1.3 + 2.3^2 + 3.3^3 + ... + n.3^n = \frac{(2n-1)3^{n+1} + 3}{4}$ For n $\in N$
13. Prove using PMI that $1 + \frac{1}{(1+2)} + \frac{1}{(1+2+3)} + ... + \frac{1}{(1+2+3+.....+n)} = \frac{2n}{n+1}$

    OR

    Prove using PMI that $1.3 + 2.3^2 + 3.3^3 + ... + n.3^n = \frac{(2n-1)3^{n+1} + 3}{4}$
14. Find the square root of – 7 – 24i
15. If a – ib = $\frac{(x+i)^2}{2x^2+1}$ Prove that $a^2 + b^2 = \frac{(x^2+1)^2}{(2x^2+1)^2}$
16. Reduce $\left(\frac{1}{1-4i} - \frac{2}{1+i}\right)\left(\frac{3-4i}{5+i}\right)$ to the standard form.

    OR

    Find the number of non – zero integral solutions of the equation $|1-i|^x = 2^x$
17. Find the real numbers x and y if (x – iy)(3 + 5i) is the conjugate of – 6 – 24i.
18. A manufacturer has 600 litres of a 12% solution of acid. How many litres of a 30% acid solution must be added to it so that acid content in the resulting mixture will be more than 15% but less than 18%?

19. Solve : $-5 \le \frac{2-3x}{4} \le 9$ **OR** $\frac{2x-1}{3} \ge \frac{3x-2}{4} - \frac{2-x}{5}$

Section C [7 x 6 = 42 marks]

20. Derive the formula for cos(A + B) using the unit circle.

21. If tanx = ¾, x is in third quadrant find the values of sinx/2, cosx/2 and tanx/2.
OR
If sinx = 3/5 and cosy = -12/13, where x and y both lie in second quadrant, find the value of
i) sin(x + y) ii) tan(x – y) iii) cos2y

22. Prove that $\cos^2 x + \cos^2(x + 120^0) + \cos^2(x - 120^0) = 3/2$

23. Prove using PMI that $x^{2n} - y^{2n}$ is divisible by x + y for $n \in N$

24. If α and β are two different complex numbers such that $|\alpha| = 1$ find the value of $\left|\frac{\alpha - \beta}{1 - \overline{\alpha}\beta}\right|$

25. Find real θ such that $\frac{3 + 2i\sin\theta}{1 - 2i\sin\theta}$ is purely real .

OR

Express in the polar form: $\frac{i-1}{\cos\frac{\pi}{3} + i\sin\frac{\pi}{3}}$

26. Graphically solve the following system of linear inequalities:
x + y < 3 , 2x + y ≥ 4, 2x – 3y ≤ 6