

HALF YEARLY EXAMINATION -2014
XI MATHEMATICS

Time : 3 Hours

(Set II)

M.M.100.

SECTION A

Questions 1 – 6 carry 1 mark each

1. What point on the X axis is equidistant from (2,3) and (3, - 5)
2. Find the foot of the perpendicular from the point (2, 3,4) on the XY plane.
3. Write the real and imaginary parts of the multiplicative inverse of $z = 3 - 4i$.
4. Does the point (3, -4) lie inside, outside or on the circle $x^2 + y^2 = 25$.
5. Find the angle in radian subtended at the centre of a circle of radius 4 feet by an arc of length 1 foot.
6. A coin is tossed. If head appears, the coin is tossed again otherwise a dice is thrown. Write the Sample space.

SECTION B

Questions 7– 19 carry 4 mark each

7. Find the points which trisect the line segment joining the points P(10, -16, 6) and Q(4, 2, -6).
8. Find the equation of the line passing through the intersection of the lines $3x + y - 9 = 0$ and $4x + 3y - 7 = 0$ and parallel to the line $4x + 5y + 1 = 0$.
9. A perpendicular to the line segment joining the points (2, 3) and (1, 0) divides it in the ratio 3:1 Find its equation.
10. A line is such that its segment between the lines $5x - y + 4 = 0$ and $3x + 4y - 4 = 0$ is bisected at the point (1, 5). Find its equation.
11. Find the equation of the circle concentric with $x^2 + y^2 - 5x + 8y + 1 = 0$ and passing through (2, 7).
12. Find the equation of the ellipse with major axis on the Y axis and passing through (4, 3) and (6, 2).
13. Convert the complex number $\frac{2}{1-i}$ into polar form.
14. Find the square root of $10 - 6i$
15. Prove that : $\frac{\sin A}{1 + \cos A} + \frac{1 + \cos A}{\sin A} = 2 \operatorname{cosec} A$.
16. A and B are two events such that $P(A \cup B) = 0.75$, $P(A \cap B) = 0.15$ and $P(B') = 0.9$
Find P(A).

17. In a triangle ABC, prove that $\frac{\cos A}{a} + \frac{\cos B}{b} + \frac{\cos C}{c} = \frac{a^2 + b^2 + c^2}{2abc}$

18. Express the solution of the following system of linear inequations on a number line.

$$5x - 1 < 19, \quad 7x + 4 > 18$$

19. Solve the trigonometric equation $\sin x + \sin 2x + \sin 3x = 0$.

SECTION C

Questions 20 – 26 carry 6 mark each

20. An equilateral triangle is inscribed in the parabola $x^2 = 24y$ with one vertex at the origin. Find the area of the triangle.

21. Find the equations of the medians of the triangle PQR and show that they are concurrent. Where P(1,3), Q(2, -1) and R(4, 5).

22. In a triangle ABC, prove that :

$$\left(\frac{b^2 - c^2}{a^2}\right) \sin 2A + \left(\frac{c^2 - a^2}{b^2}\right) \sin 2B + \left(\frac{a^2 - b^2}{c^2}\right) \sin 2C = 0$$

23. Using the principle of Mathematical Induction prove that the following statement is true for all $n \in N$.

$$\frac{1}{3} + \frac{1}{9} + \frac{1}{27} + \dots + \frac{1}{3^n} = \frac{1}{2} \left(1 - \frac{1}{3^n}\right)$$

24. Solve the system of inequations graphically
 $3x - 4y \leq 24, \quad -3x + 2y \leq 6, \quad x + 3y \geq 6$

25. Calculate the Mean Deviation from the Median of the following data:

x_i	10	15	20	25	30	35
frequency	7	6	8	5	6	8

26. Calculate the standard deviation for the data:

Classes	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
frequency	5	6	10	14	10	5