

MATHEMATICS

Time: 2 ½ hours

HSE I

Maximum: 80 Scores

Cool of time: 15 minutes

- 1) i) Express the given complex number in the form $a + ib$: $3(7 + i7) + i(7 + i7)$ (2)
ii) Convert the given complex number in polar form: $\sqrt{3} + i$ (2)
iii) Solve the equation $x^2 + 3x + 5 = 0$ (2)

- 2) i) Let $A = \{x: x \in \mathbb{R} \text{ and } x \text{ satisfy } x^2 - 8x + 12 = 0\}$, $B = \{2, 4, 6\}$, $C = \{2, 4, 6, 8, \dots\}$, $D = \{6\}$.

Which among the following sets, are subsets of one and another: (2)

- ii) In a survey of 600 students in a school, 150 students were found to be taking tea and 225 taking coffee, 100 were taking both tea and coffee. Find how many students were taking neither tea nor coffee? (2)
- 3) i) Convert the equation of the line $6x + 3y - 5 = 0$ into normal form. (1)
ii) Find the equation of the line passing through $(-3, 5)$ and perpendicular to the line through the points $(2, 5)$ and $(-3, 6)$. (2)

- 4) i) Find the distance between parallel lines $15x + 8y - 34 = 0$ and $15x + 8y + 31 = 0$ (1)
ii) Find angles between the lines $\sqrt{3}x + y = 1$ and $x + \sqrt{3}y = 1$ (2)

- 5) i) If $f(x) = x^2$, find $\frac{f(1.1) - f(1)}{(1.1 - 1)}$. (2)
ii) Find the domain and the range of the real function f defined by $f(x) = |x - 1|$. (3)

- 6) i) Find the equation of the hyperbola satisfying the give conditions: Vertices $(0, \pm 3)$, foci $(0, \pm 5)$ (2)
ii) Find the coordinates of the focus, axis of the parabola, the equation of directrix and the length of the latus rectum for $x^2 = 6y$ (3)

- 7) i) Write the statements in the form "if p , then q ". There is traffic jam whenever it rains (1)
ii) Prove that $\sqrt{7}$ is irrational by method of Contradiction (2)

- 8) i) Solve the given inequality for real x : $\frac{x}{3} > \frac{x}{2} + 1$ (2)
ii) Solve the following system of inequalities graphically: $3x + 4y \leq 60$, $x + 3y \leq 30$, $x \geq 0$, $y \geq 0$ (3)