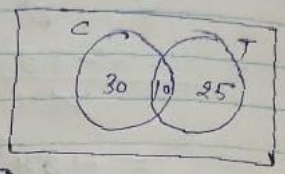
MARKING SCHEME
CLASS :- XI (MATHEMATICS)

① $n(C \cup T) = 65 \quad n(C) = 40 \quad n(T) = ?$
$n(C \cap T) = 10$

$n(C \cup T) = n(C) + n(T) - n(C \cap T)$ — ①

$65 = 40 + n(T) - 10$

$n(T) = 35$



(i) Tennis only not Cricket
$= 25$ — ①

(ii) Like Tennis $= 35$ — ①

② $A = \{1, 2, 3, 4, 6\}$

$R = \{(a, b) : a, b \in A, b \text{ is exactly divided by } a\}$

(i) $R = \{(1,1)(1,2)(1,3)(1,4)(1,6)(2,2)(2,4)$
$(2,6)(3,3)(3,6)(4,4)(6,6)$ — ①

(ii) domain $= \{1, 2, 3, 4, 6\}$ — ①

(iii) Range $= \{1, 2, 3, 4, 6\}$ — ①

③ $f(x) = \frac{x}{1+x^2}$

Domain $= R$ — ①

Range :- $y = \frac{x}{1+x^2}$

$y + x^2 y = x \quad , \quad x^2 y - x + y = 0$

$x = \frac{1 \pm \sqrt{1 - 4y^2}}{2y}$ — ①

x is defined by $1 - 4y^2 \geq 0$

$(1 - 2y)(1 - 2y) \geq 0$

$$\frac{(\sqrt{a}+\sqrt{b})^2}{(\sqrt{a}-\sqrt{b})^2} = \frac{4}{2} = 2 \quad \text{— (1)}$$

Square root both sides

$$\frac{\sqrt{a}+\sqrt{b}}{\sqrt{a}-\sqrt{b}} = \frac{\sqrt{2}}{1}$$

Again Apply Componendo and dividendo Rule.

$$\frac{\sqrt{a}+\sqrt{b}+\sqrt{a}-\sqrt{b}}{\sqrt{a}+\sqrt{b}-\sqrt{a}+\sqrt{b}} = \frac{\sqrt{2}+1}{\sqrt{2}-1}$$

$$\frac{2\sqrt{a}}{2\sqrt{b}} = \frac{\sqrt{2}+1}{\sqrt{2}-1} \quad \text{— (1)}$$

Squaring both sides

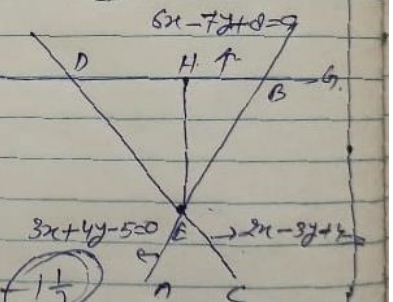
$$\frac{a}{b} = \frac{(\sqrt{2}+1)^2}{(\sqrt{2}-1)^2} = \frac{2+1+2\sqrt{2}}{2+1-2\sqrt{2}}$$

$$\frac{a}{b} = \frac{3+2\sqrt{2}}{3-2\sqrt{2}} \quad \text{— (1)}$$

(2) Solving Eqn of the line AB and CD

$$2x-3y=-4$$
$$3x+4y=5$$

$$x = -\frac{1}{17} \quad y = \frac{22}{17} \quad \text{— (1½)}$$



Eqn of the line EH :- Slope of FG = 6/7

$FG \perp HE \quad m_1 m_2 = -1$

$$m_2 = -7/6 \quad \text{— (1)}$$

Eqn of the line HE

$$y - \frac{22}{17} = -7/6\left[x + \frac{1}{17}\right]$$

$$119x + 102y = 125 \quad \text{— (1½)}$$

$x < 900$ — (1½)

45% of $1125 < 30\%$ of $(1125 + x)$

$x > 562.5$

$562.5 < x < 900$ — (1½)

(10) (i)

4	7
G	B
0	5

No. of words $= {}^4C_0 \times {}^7C_5 = 21$ — (1)

(ii)

4	7
G	B
1	4
2	3
3	2
4	1

No. of words $= {}^4C_1 \times {}^7C_4 + {}^4C_2 \times {}^7C_3 + {}^4C_3 {}^7C_2 + {}^4C_4 \times {}^7C_1$ — (1½)

(iii)

4	7
G	B
3	2
4	1

No. of words $= {}^4C_3 \times {}^7C_2 + {}^4C_4 \times {}^7C_1$ — (1½)

(11) Let the Nos be a, b

$a + b = 6\sqrt{ab} = 3 \times 2\sqrt{ab}$

$\frac{a+b}{2\sqrt{ab}} = \frac{3}{1}$ — (1)

Applying componendo and dividendo Rule

$\frac{a+b+2\sqrt{ab}}{} = \frac{3+1}{}$

$$\frac{AT}{AM-1} = \frac{TB}{TM} = \frac{5}{9} \quad \text{—(1)}$$

$$\frac{1+7\times\left(\frac{30}{m+1}\right)}{1+(m-1)\left(\frac{30}{m+1}\right)} = \frac{5}{9}$$

$$m = 14. \quad \text{—(1)}$$

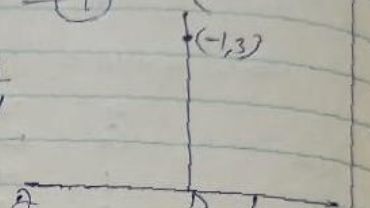
(7) Slope of $AB = +\frac{3}{+4} = \frac{3}{4}$

$CD \perp AB$

$m_1 m_2 = -1$

$\frac{3}{4} \times m_2 = -1$

$m_2 = -4/3$



—(1)

Equation of the line CD

$$y-3 = -4/3\,(x+1) \quad \text{—}(1\tfrac{1}{2})$$

$$4x+3y = 5 \quad \text{—(ii)}$$

Solving (i) and (ii)

$$x = \frac{68}{25} \qquad y = -\frac{49}{25} \quad \text{—}(1\tfrac{1}{2})$$

(8) $IQ = \frac{MA}{CA} \times 100$, $CA = 12$.

$$80 \le IQ \le 140$$

$$80 \le \frac{MA}{12} \times 100 \le 140 \quad \text{—}(1\tfrac{1}{2})$$

$$9.6 \le MA \le 16.8 \quad \text{—}(1\tfrac{1}{2})$$

(9) Let water be added x ltr.

45% of 1125 acid solution

Total mixture =

(4) $(x+iy)^3 = u+iv$

$x^3+i^3y^3+3x^2iy+3xi^2y^2 = u+iv$

$x^3-iy^3+3x^2yi-3xy^2 = u+iv$

$(x^3-3xy^2)+i(3x^2y-y^3) = u+iv$

$u = x^3-3xy^2 \quad v = 3x^2y-y^3$ — $1\frac{1}{2}$

L.H.S $\frac{u}{x}+\frac{v}{y}$

$= \frac{x(x^2-3y^2)}{x} + \frac{y(3x^2-y^2)}{y}$

$= x^2-3y^2+3x^2-y^2 = 4x^2-4y^2 = 4(x^2-y^2)$ — $1\frac{1}{2}$

(5) $x-iy = \sqrt{\frac{a-ib}{c-id}}$ — (i) — 1

i Replaces by $-i$

$x+iy = \sqrt{\frac{a+ib}{c+id}}$ — (ii) — 1

Eqn (i) × (ii)

$(x-iy)(x+iy) = \sqrt{\frac{a-ib}{c-id}} \times \sqrt{\frac{a+ib}{c+id}}$

$x^2+y^2 = \sqrt{\frac{a^2+b^2}{c^2+d^2}}$

$(x^2+y^2)^2 = \frac{a^2+b^2}{c^2+d^2}$ — 1

(6) $A_1 A_2 \cdots A_7 \cdots A_{m-1} A_m$ 31

$a = 1 \quad a_m = 31 \quad n = m+2$

$31 = 1+(m+2-1)\cdot d$

$d = \frac{30}{m+1}$ — 1