④ - Cluster Priority:-

	T1	T2	T3
C1	0	53	10
C2	0	1	60
C3	0	16	0

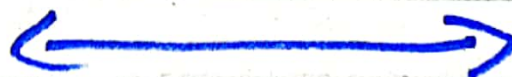Formula:- $\text{Purity} = \left(\frac{1}{N}\right) \sum_{i=1}^{K} \max_j |C_i \cap T_j|$

$N = 0 + 53 + 1 + 16 + 10 + 60 + 0$

$$\boxed{N = 140}$$

$$" = \left(\frac{1}{140}\right)(53 + 60 + 16) = 0.9214$$

$" = 0.92 \times 100$

$$\boxed{\text{Purity} = 92 \%}$$

←————————→

⑤ 1- Average Cluster Purity (ACP) :-

- ⓐ t1 :- c1, c2, c3, c4
- ⓑ t2 :- l1, l2, l3   (Theoratical)
- ⓒ t3 :- m1, m2, m3

- ⓓ e1 :- c1, c2
- ⓔ e2 :- l1, l2, l3, c3   (Emperical)
- ⓕ e3 :- m1, m2
- ⓖ e4 :- c4

⊙ Emperical Clusters :-

e1	e2	e3	e4
(c1, c2)	(l1, l2, l3, c3)	(m1, m2)	(c4)

⊙ Theoratical Clusters :-

t1	t2	t3
(c1, c2, c3, c4)	(l1, l2, l3)	(m1, m2, m3)

For (e1) :-

① ⟹ (e1) & (t1) $= \frac{2^2}{2} \Rightarrow \boxed{2}$

② ⟹ (e1) & (t2) $= \frac{0^2}{2} \Rightarrow \boxed{0}$

③ ⟹ (e1) & (t3) $= \frac{0^2}{2} \Rightarrow \boxed{0}$

e1 = 2 + 0 + 0 ⟹ $\boxed{e1 = 2}$

For $(e2)$:-

① $\Rightarrow$ $(e2)$ & $(t1)$ = $1^2/4$ $\Rightarrow$ $\boxed{0.25}$

② $\Rightarrow$ $(e2)$ & $(t2)$ = $3^2/4$ $\Rightarrow$ $\boxed{2.25}$

③ $\Rightarrow$ $(e2)$ & $(t3)$ = $0^2/4$ $\Rightarrow$ $\boxed{0}$

$e2 = 0.25 + 2.25 + 0$

$\Rightarrow$ $\boxed{e2 = 2.5}$

For $(e3)$:-

① $\Rightarrow$ $(e3)$ & $(t1)$ = $0^2/2$ $\Rightarrow$ $\boxed{0}$

② $\Rightarrow$ $(e3)$ & $(t2)$ = $0^2/2$ $\Rightarrow$ $\boxed{0}$

③ $\Rightarrow$ $(e3)$ & $(t3)$ = $2^2/2$ $\Rightarrow$ $\boxed{2}$

$e3 = 0 + 0 + 2$

$\Rightarrow$ $\boxed{e3 = 2}$

For $(e4)$:-

① $\Rightarrow$ $(e4)$ & $(t1)$ = $1^2/1$ $\Rightarrow$ $\boxed{1}$

② $\Rightarrow$ $(e4)$ & $(t2)$ = $0^2/1$ $\Rightarrow$ $\boxed{0}$

③ $\Rightarrow$ $(e4)$ & $(t3)$ = $0^2/1$ $\Rightarrow$ $\boxed{0}$

$e4 = 1 + 0 + 0$

$\Rightarrow$ $\boxed{e4 = 1}$

$$ACP = \frac{1}{z} \sum_{j=1}^{e} \sum_{j=1}^{t} \frac{n_{ij}^{*2}}{n_i}$$

$$z = 9$$

$$ACP = \left(\frac{1}{z}\right)\left[e1 + e2 + e3 + e4\right]$$

$$ACP = \left(\frac{1}{9}\right)\left[2 + 2.5 + 2 + 1\right]$$

$$ACP = 0.83$$
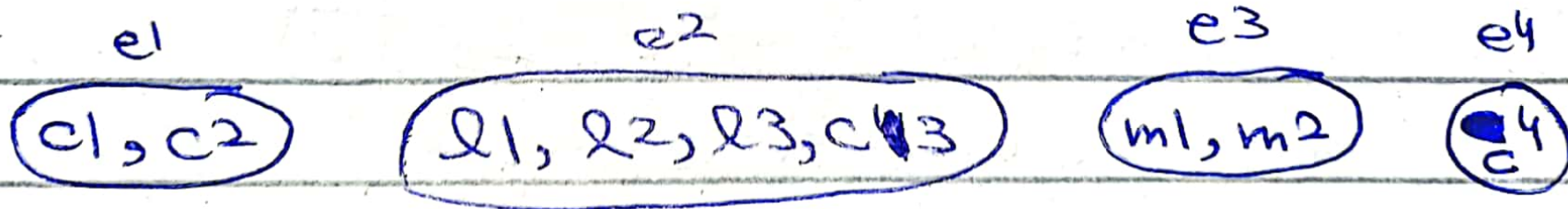
$$= 0.83 \times 100$$

$$\Rightarrow ACP = 83\%$$

⑥. Average Type Purity (ATP):- → Final

◉ Theoratical Cluster

t1

(c1, c2, c3, c4)

t2

(l1, l2, l3)

t3

(m1, m2, m3)

◉ Emperical Cluster

e1

(c1, c2)

e2

(l1, l2, l3, c3)

e3

(m1, m2)

e4

(c4)
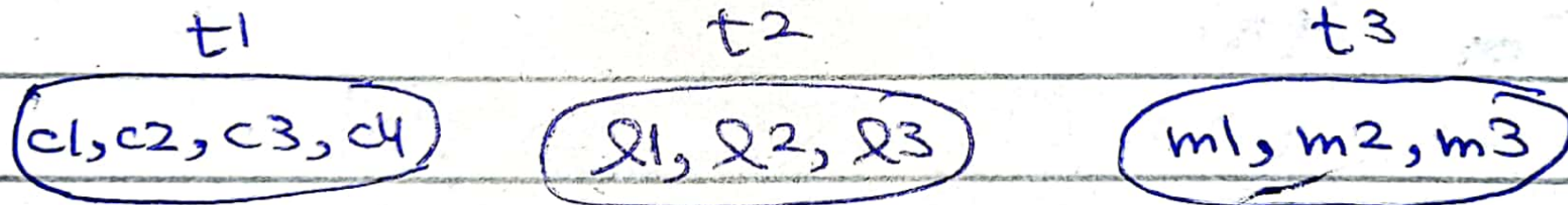
For ①:-

① ⟹ t_1 & e_1 = $2^2/4$ = $\boxed{1}$

② ⟹ t_1 & e_2 = $1^2/4$ = $\boxed{0.25}$

③ ⟹ t_1 & e_3 = $0^2/4$ = $\boxed{0}$

~~④~~

④ ⟹ t_1 & e_4 = $1^2/4$ = $\boxed{0.25}$

$$t_1 = 1 + 0.25 + 0 + 0.25$$

$$\Rightarrow \boxed{t_1 = 1.5}$$

For ②

① ⟹ t_2 & e_1 = $0^2/3$ ⟹ $\boxed{0}$

② ⟹ t_2 & e_2 = $3^2/3$ ⟹ $\boxed{3}$

③ ⟹ t_2 & e_3 = $0^2/3$ ⟹ $\boxed{0}$

④ ⟹ t_2 & e_4 = $0^2/3$ ⟹ $\boxed{0}$

$$t_2 = 0 + 3 + 0 + 0$$

$$\Rightarrow \boxed{t_2 = 3}$$

For ③

① ⟹ t_3 & e_1 = $0^2/3$ ⟹ $\boxed{0}$

② ⟹ t_3 & e_2 = $0^2/3$ ⟹ $\boxed{0}$

③ ⟹ t_3 & e_3 = $2^2/3$ ⟹ $\boxed{1.33}$

④ ⟹ t_3 & e_4 = $0^2/3$ ⟹ $\boxed{0}$

$$t_3 = 0 + 0 + 1.33 + 0$$

$$\Rightarrow \boxed{t_3 = 1.33}$$

$$ATP = \left(\frac{1}{z}\right) \sum_{j=1}^{t} \sum_{i=1}^{e} \frac{h_{ij}^2}{h_j}$$

$$\boxed{z = 9}$$

$$ATP = \left(\frac{1}{z}\right) \left[t1 + t2 + t3 \right]$$

$$'' = \left(\frac{1}{9}\right) \left[1.5 + 3 + 1.33 \right]$$

$$'' = \boxed{0.64}$$

$$'' = 0.64 \times 100$$

$$\Rightarrow \boxed{ATP = 64\%}$$

K-Measure

$$K\text{-}Measure = \sqrt{ACP * ATP}$$

$$'' = \sqrt{(0.83) * (0.64)}$$

$$'' = \sqrt{0.5312}$$

$$'' = 0.73$$

$$'' = 0.73 \times 100$$

$$\Rightarrow \boxed{K\text{-}Measure = 73\%}$$