Q1.

Tid	list of Item ids
T_{100}	I_1, I_2, I_5
T_{200}	I_2, I_4
T_{300}	I_2, I_3
T_{400}	I_1, I_2, I_4
T_{500}	I_1, I_3
T_{600}	I_2, I_3
T_{700}	I_1, I_3
T_{800}	I_1, I_2, I_3, I_5
T_{900}	I_1, I_2, I_3

The minimum support is 22%

The confidence is 70%

Generate strong Association Rules.

min support = 22% of 9 transactions

$= \frac{22}{100} \times 9 = 1.98$

≈ 2

100% = 9 transactions

22% = x

$x = 1.98 \approx 2$

To Generate candidate set C_1

C_1 =

Itemset	Support Count
$\{I_1\}$	6
$\{I_2\}$	7
$\{I_3\}$	6
$\{I_4\}$	2
$\{I_5\}$	2

L_1 = compare candidate count with minimum support count

Generate L_1

L_1 =

Itemset	support count
$\{I_1\}$	6
$\{I_2\}$	7
$\{I_3\}$	6
$\{I_4\}$	2
$\{I_5\}$	2

$\bowtie$ = natural join

cartesian join + production

$C_2 = L_1 \bowtie L_1$

Itemset	support count
$I_1 I_2$	4
$I_1 I_3$	4
$I_1 I_4$	1
$I_1 I_5$	2
$I_2 I_3$	4
$I_2 I_4$	2
$I_2 I_5$	2
$I_3 I_4$	0
$I_3 I_5$	1
$I_4 I_5$	0

Generate L_2 $L_2 =$

Itemset	support count
$\{I_1 I_2\}$	4
$\{I_1 I_3\}$	4
$\{I_1 I_5\}$	2
$\{I_2 I_3\}$	4
$\{I_2 I_4\}$	2
$\{I_2 I_5\}$	2

$C_3 = L_2 \bowtie L_2$

Itemset	support count
$\{I_1 I_2 I_3\}$	2
$\{I_1 I_2 I_5\}$	2
$\{I_1 I_3 I_5\}$	1
$\{I_2 I_3 I_4\}$	0
$\{I_2 I_3 I_5\}$	1
$\{I_2 I_4 I_5\}$	0
$\{I_1 I_2 I_4\}$	1

Generate L3 L3 =

Itemset	support count
$I_1 I_2 I_5$	2
$I_1 I_2 I_5$	2

⋈ – natural Join

6 marks soln

4 marks

classmate Date Page

if confidence is given

2 Association rule

2 strong Association rule

Generate C_4 From L_3

$C_4 = L_3 \bowtie L_3$

Itemset	support count
$\{I_1 I_2 I_3 I_5\}$	1

Generate L_4 $\quad L_4 = 0$

stopping condition → After pruning proving $\{I_1, I_2, I_3, I_5\}$ is not frequent so $C_4 = \phi$

Ans) The frequent Item set are $\{I_1, I_2 I_3\}$ and $\{I_1, I_2, I_5\}$

For any 1.

The Association Rule can be generated is as follows for the item set $\{I_1, I_2, I_5\}$

confidence $= \frac{\text{tuples contain } A \wedge B}{\text{tuples contain } A}$

Association Rule $A \Rightarrow B$	
$I_1 \Rightarrow I_2 \wedge I_5$	confidence $= 2/6 = 33.33\%$
$I_2 \Rightarrow I_1 \wedge I_5$	confidence $= 2/7 = 28.57\%$
$I_5 \Rightarrow I_2 \wedge I_1$	confidence $= 2/2 = 100\%$
$I_2 \wedge I_5 \Rightarrow I_1$	confidence $= 2/2 = 100\%$
$I_1 \wedge I_5 \Rightarrow I_2$	confidence $= 2/2 = 100\%$
$I_1 \wedge I_2 \Rightarrow I_5$	confidence $= 2/4 = 50\%$

The strong association rules are (compare with confidence given)

$I_5 \Rightarrow I_1 \wedge I_2$, $I_2 \wedge I_5 \Rightarrow I_1$, $I_1 \wedge I_5 \Rightarrow I_2$

Q2. Apply Association Rule to find all frequent item set & strong Association Rule with the help of following table

Transaction ID	Items
T100	1, 3, 4, 6
T200	2, 3, 5, 7
T300	1, 2, 3, 5, 8
T400	2, 5, 9, 10
T500	1, 4

The minimum support = 60% and minimum confidence = 80%

min support = 60% of 5

$= \frac{60}{100} \times 5$

$= 3$

100% = 5

60% = x

x = 3

C1 =

Itemset	support count
1	3
2	3
3	3
4	2
5	3
6	1
7	1
8	1
9	1
10	1

L_1 =

Itemset	support count
1	3
2	3
3	3
5	3

$C_2 = L_1 \bowtie L_1$

Itemset	support count
{1,2}	1
{1,3}	2
{1,5}	1
{2,3}	2
{2,5}	3
{3,5}	2

L_2 =

Itemset	support count
{2,5}	3

After pruning Itemset {2,5} is frequent.

$\therefore C_3 = \phi$

Ans) The frequent Itemset is {2,5}

Association Rule

$2 \Rightarrow 5$ confidence = $3/3 = 100\%$

$5 \Rightarrow 2$ confidence = $3/3 = 100\%$

Strong Association Rule are = $2 \Rightarrow 5$, $5 \Rightarrow 2$

because confidence > minimum confidence