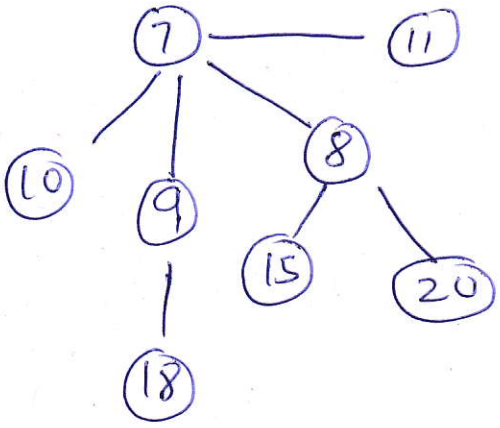
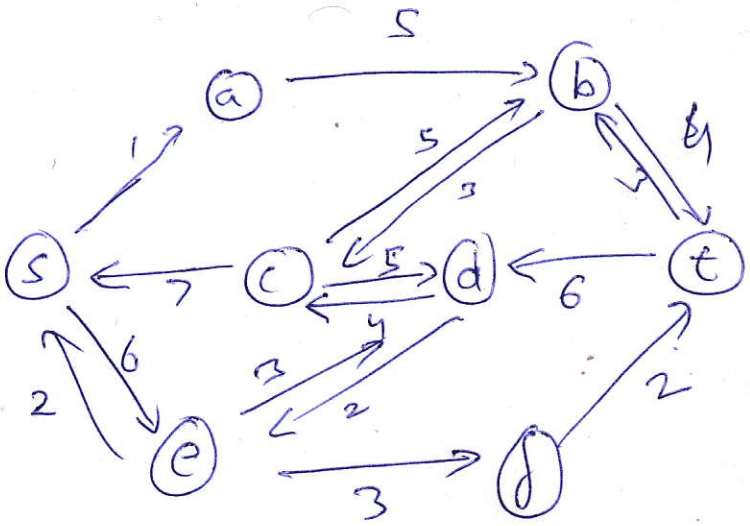
19CS30048 SUHAS JAIN

1)



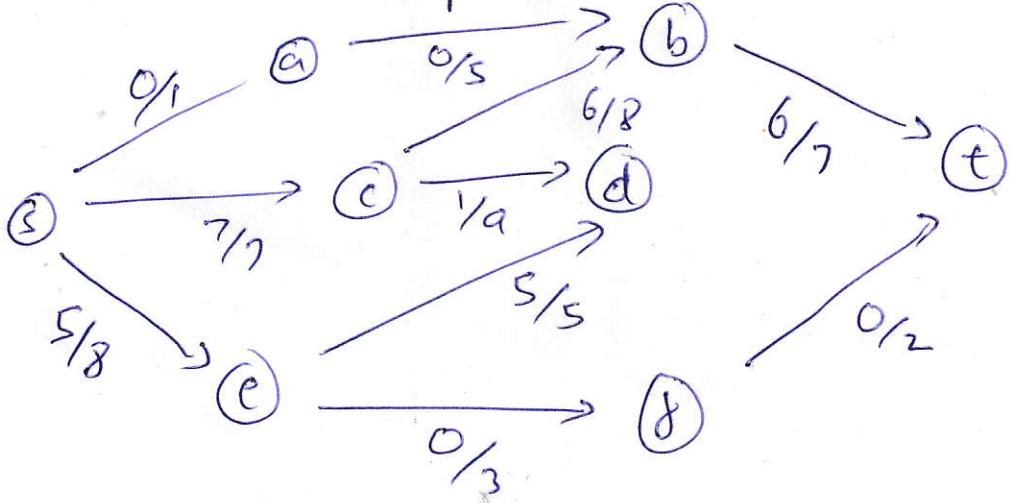
2) (i) Residual graph.



(ii) Augmenting path. s - e - d - c - b - t

Capacity = 3

(iii)



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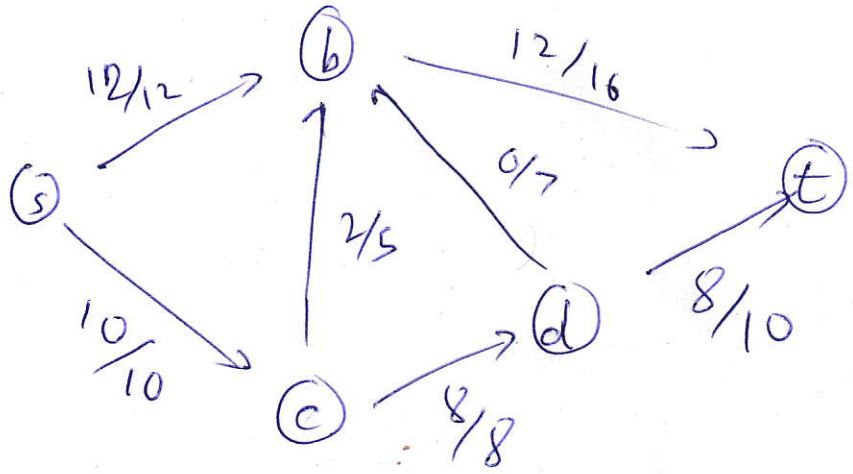
3)

(i) Relabel (d)

(ii) Relabel (c)

(iii) Push (d, t) [8/10]

(iv) Push (c, b) [2/5]



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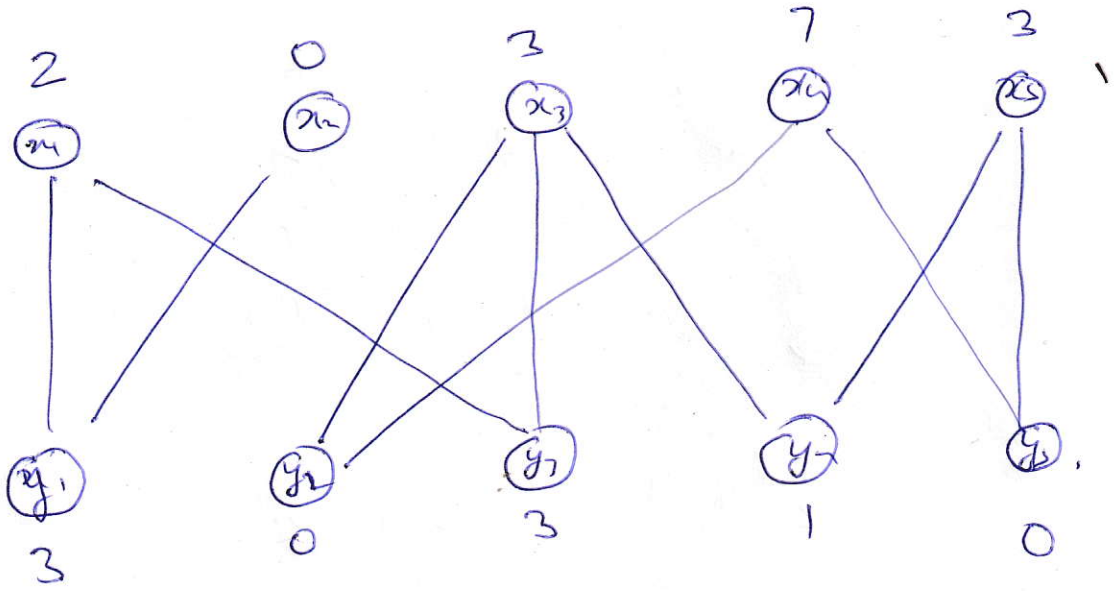
4) ~~$\alpha = \min\{7+0-2=0, 7+$~~

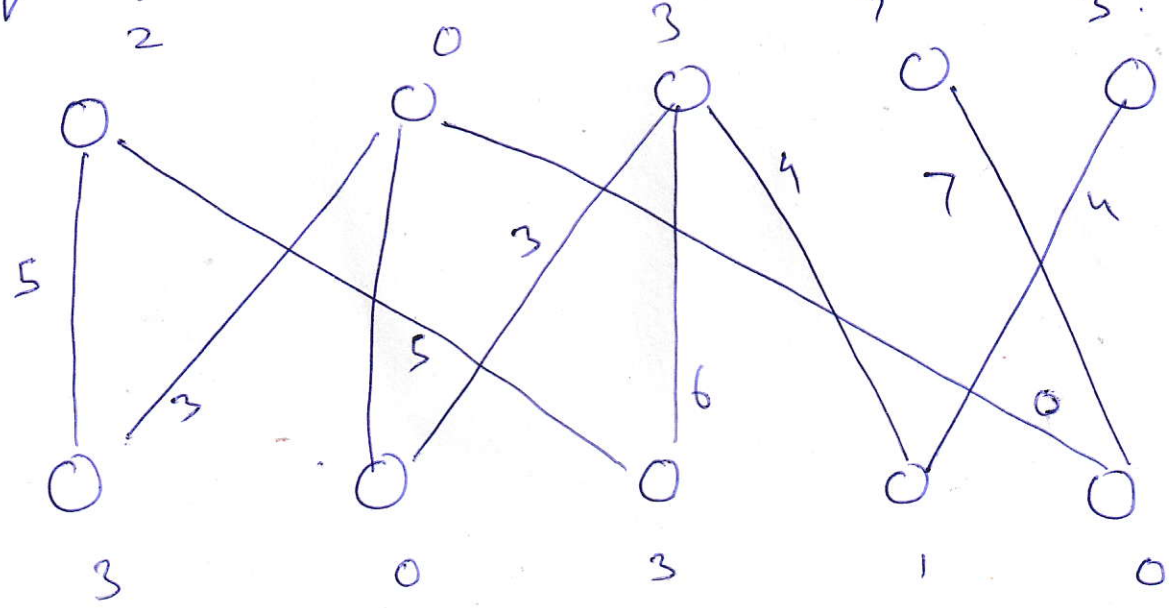
4) $\alpha = \min\{3+0-0, 3+0-0, 1+0-0, 1+0-0, 4+0-3, 4+0-0, 4+0-0, 4+0-2\}$

$= 1$

New labelling



Equality subgraph:



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5) We construct a graph with 4 layers.

- 1st layer with a source vertex (s)
- 2nd layer with p nodes. (A_1 ---- A_p)
- 3rd layer with q nodes. (B_1 ---- B_q)
- 4th layer with a destination node (t)

We connect these in the following way.

- Connect s with A_i by a edge with max flow as sum of i^{th} row.
- Connect B_i with t by an edge with max flow as sum of i^{th} column.
- Connect all pairs of A_i, B_j with + ∞ (infinity)

We find the max flow in this graph. as minimum cut is Σ sum of all rows = Σ sum of all columns. we will find a suitable flow.

Value in the edge connecting A_i with B_j represents value in the cell. i, j.

→ Since edges are integer flow in the graph will always be integer. (along any edge)

(augmenting path is always integral).