

July 16

Current Allowance

Max Need

Need

Total Resources = 12  gradeup

| | | | | |
|----------|----|---|---|-------|
| <u>Q</u> | P1 | 3 | 8 | 5 X |
| | P2 | 4 | 9 | 5 X |
| | P3 | 2 | 5 | 3 X |
| | P4 | 1 | 3 | (2) ✓ |

Is system safe? ~~(1)~~ If yes, what is

safe sequence?

(1) No (2) Yes, P1 P2 P3 P4

~~(3)~~ Yes P4, P3, P1, P2 (4) Yes, P2 P1, P3, P4

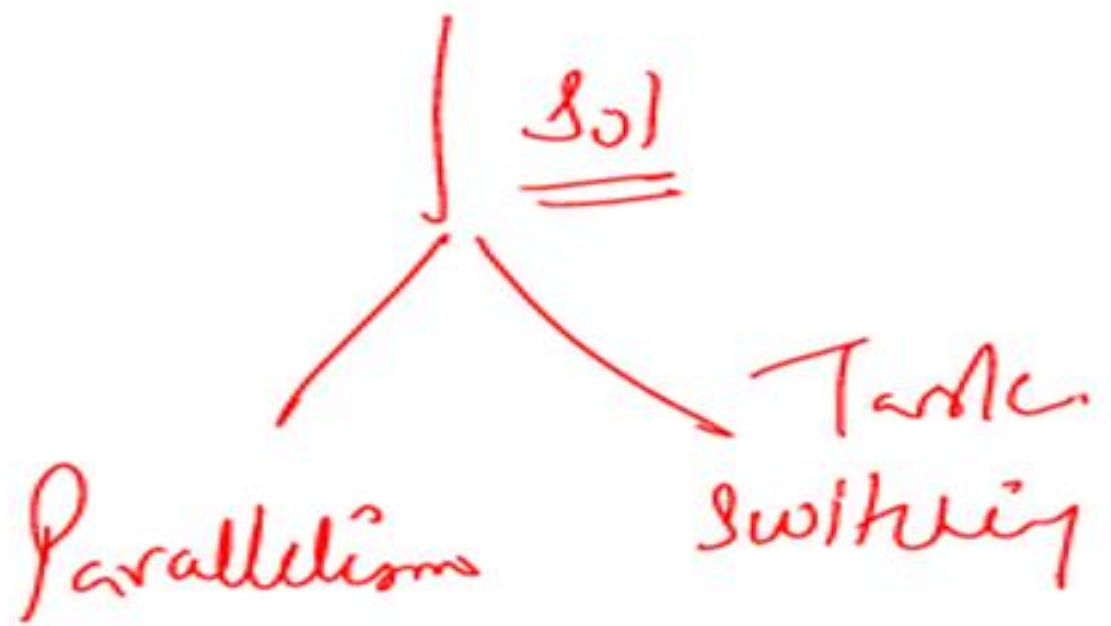
 gradeup

Sahi Prep Hai Toh Life Set Hai ^{<P4}

Class 9: Dead Lock Part 1

Concurrency :- Problem

2 or more processes want to execute at same time.



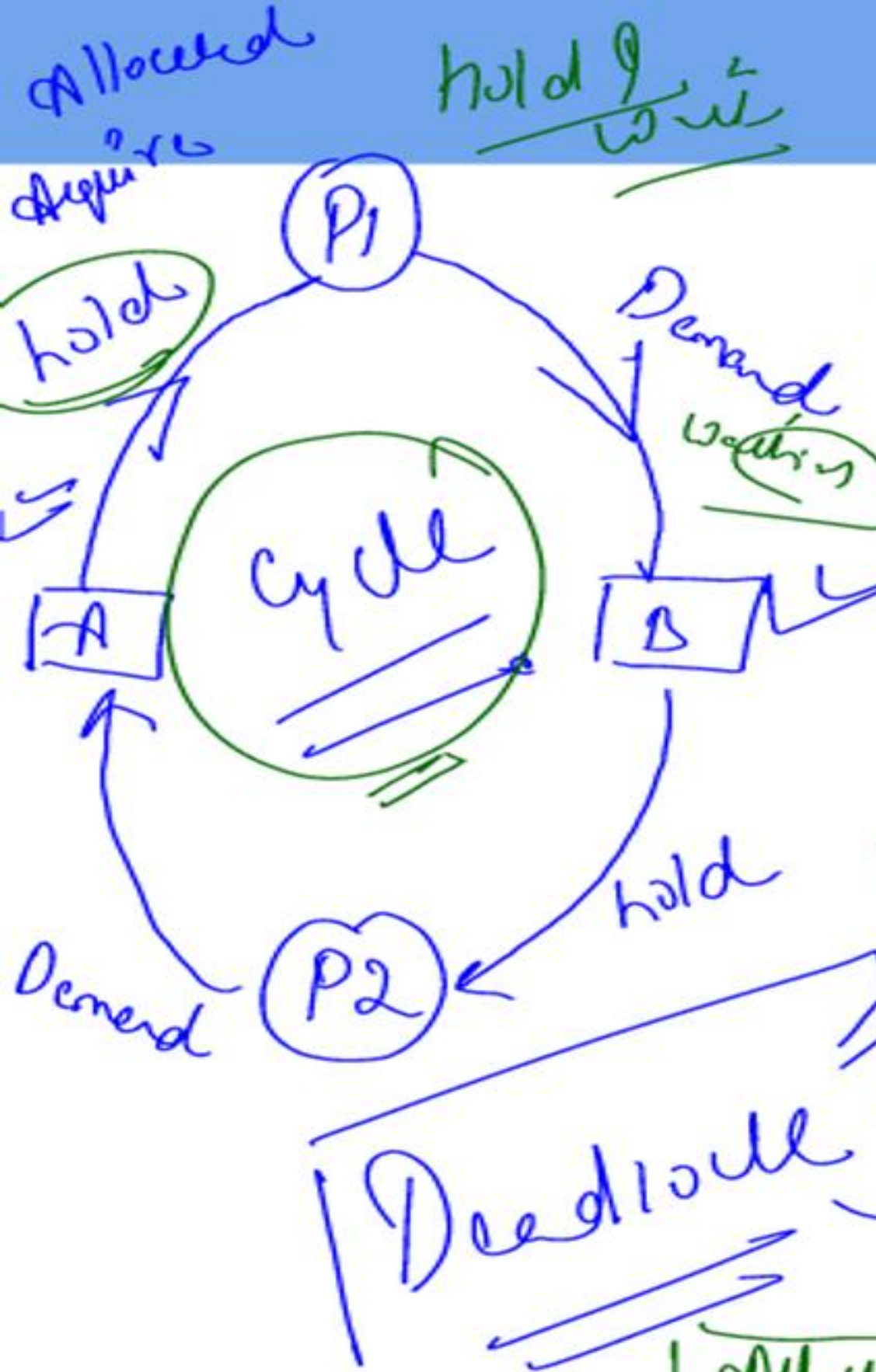
Content :-

1. Definition
2. Necessary Conditions
3. Resource allocation graph
4. Process Wait for graph
5. Methods of deadlock handling



DeadLock :- It is a condition , wherein a set of processes are waiting forever for the resources held by each other. None of them is able to proceed with its execution.





Necessary Conditions For DeadLock To Occur :-

1. **Mutual exclusion** :- Some processes must hold some resources in a non shareable mode or mutually exclusive mode.
2. **Hold and wait** :- Some processes must be holding some resources in a non-shareable mode and at the same time must be waiting to acquire some more resources, which are currently held by the other processes in a non-shareable mode. *Forcibly not*
3. **No Preemption** :- the resources held by processes cannot be preempted forcibly. A process releases the resource voluntarily when finished with it.
4. **Cycle Wait** :- A set of process, say $[P_0, P_1, P_2, P_3, \dots, P_{N-1}]$ must wait in a cycle fashion for resources held by each other.

Deadlock

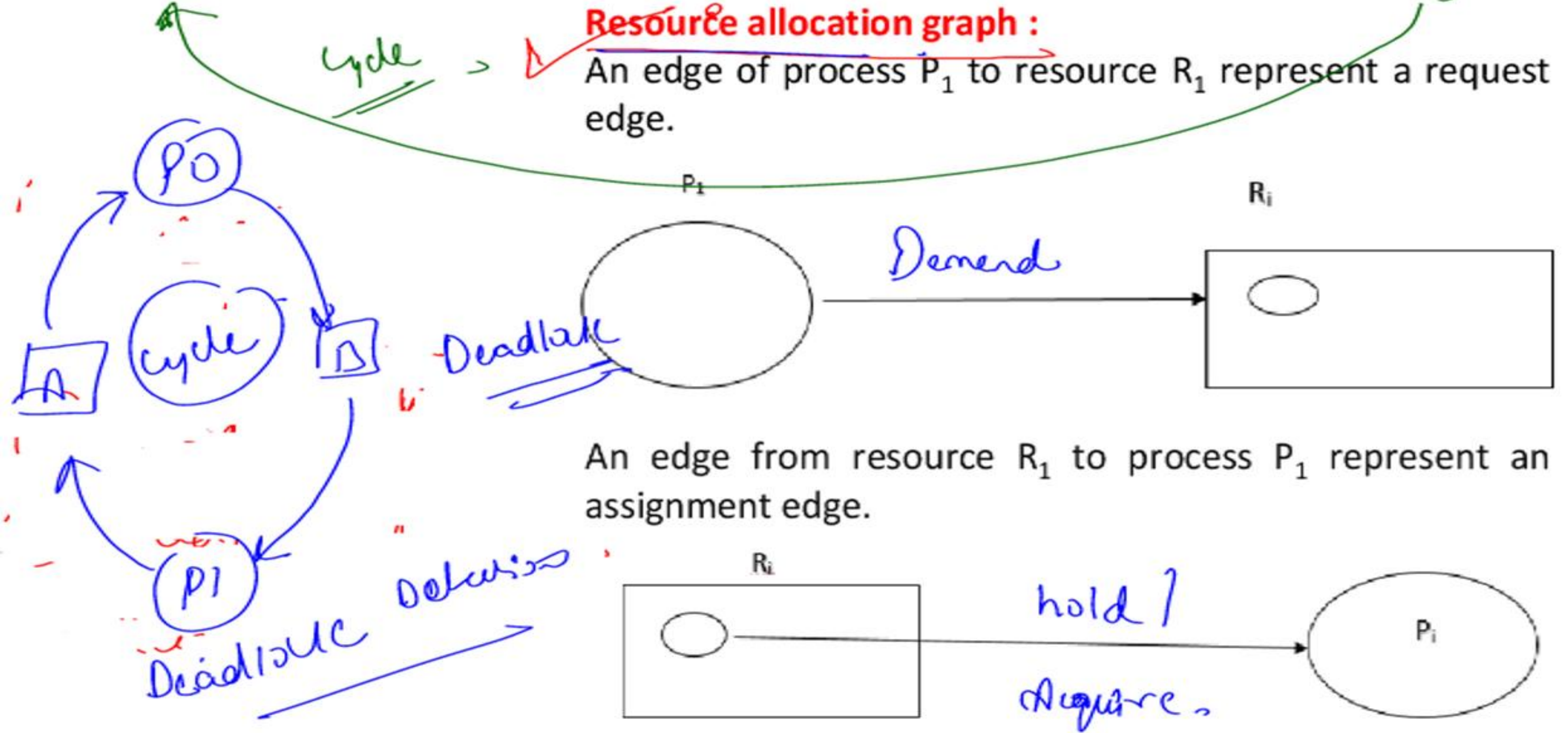
Note : THIS ARE NECCERAY CONDITION BUT NOT SUFFICIENT.

All 4 should be present for Deadlock to occur.

$P_0 \rightarrow r_0 \rightarrow P_1 \rightarrow r_1 \rightarrow P_2 \rightarrow r_2 \rightarrow P_3 \rightarrow r_3$ gradeup

Resource allocation graph :

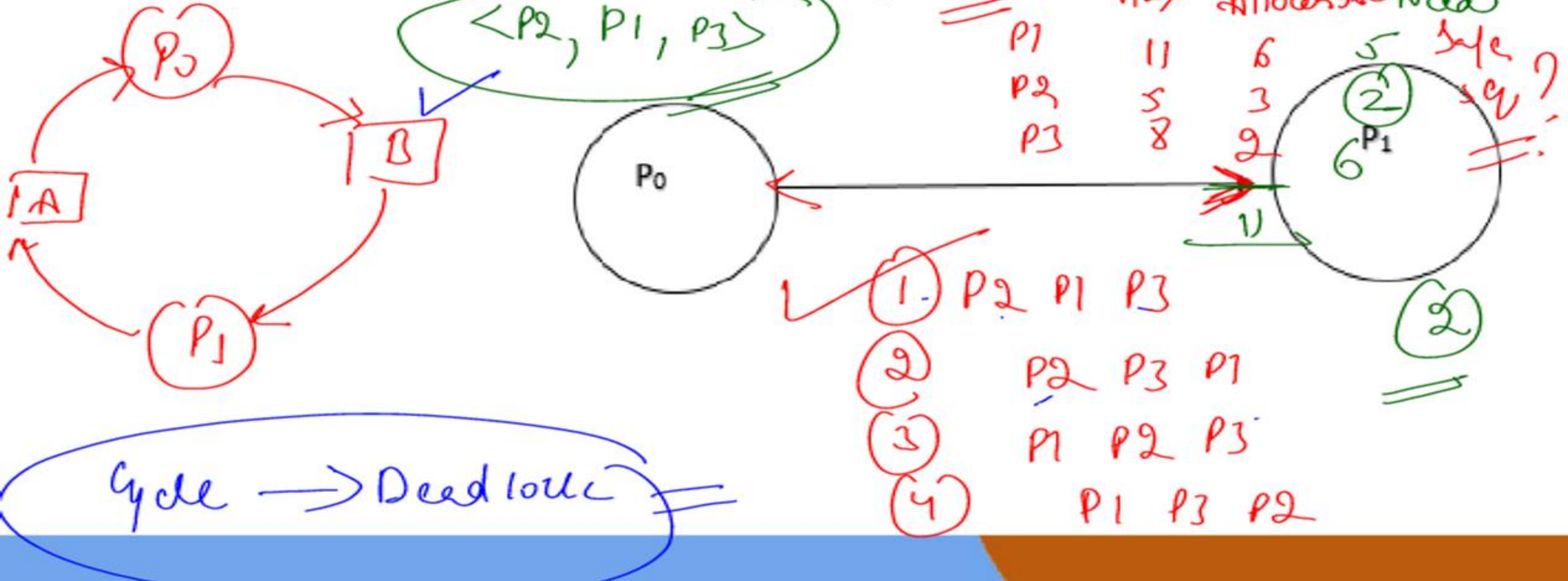
An edge of process P_1 to resource R_1 represent a request edge.



Deadlock Detection

Do not draw resources

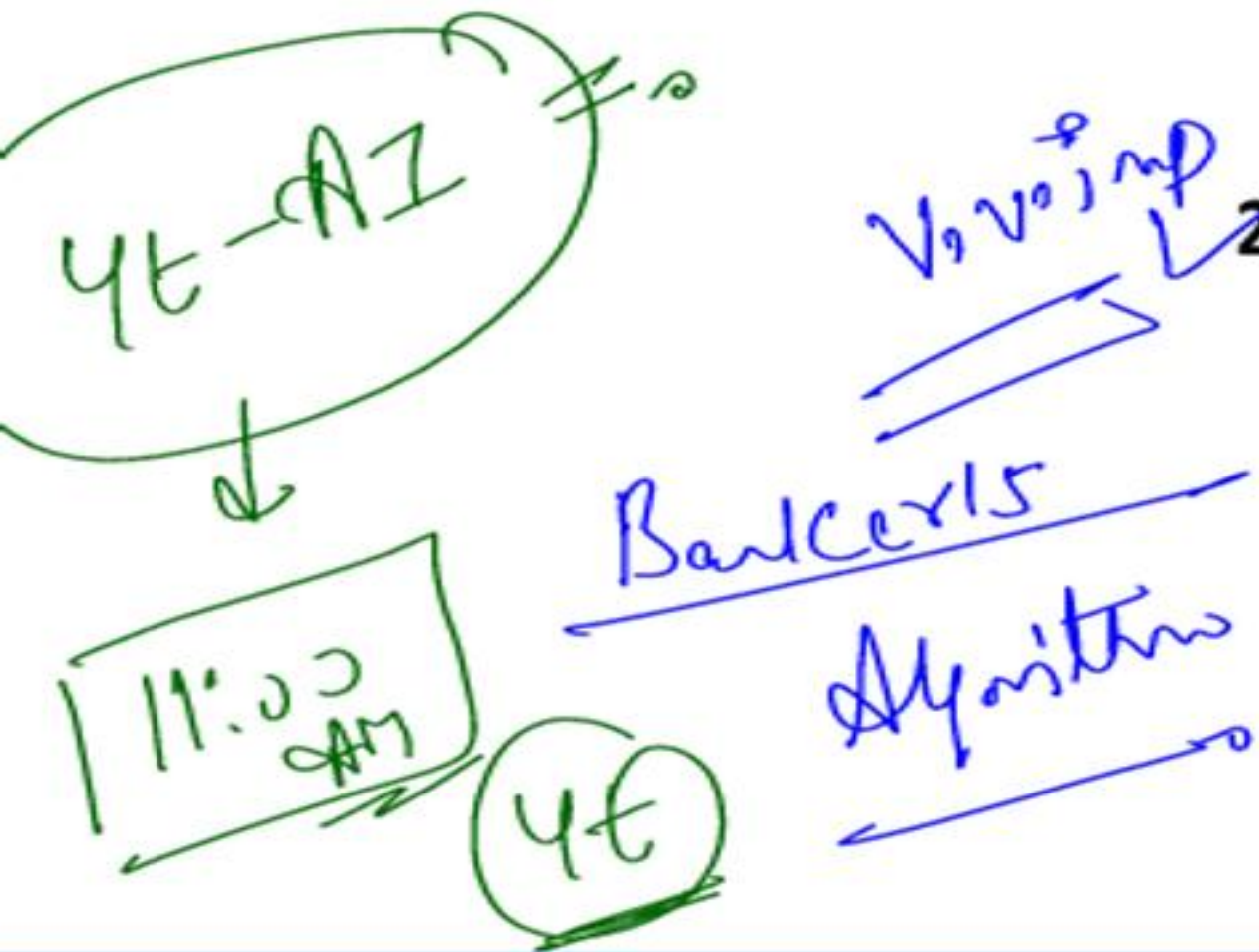
Process Wait for Graph (PWFG):- An edge from P_0 to P_1 indicates that process P_0 is waiting for a resource, currently held by P_1 .



Deadlock can be handle any of the following methods:

1. **Deadlock Prevention** :- Deadlock can be prevented from occurring by preventing one of the necessary four conditions (i.e. mutual exclusion, hold and wait, no preemption and cycle wait) from holding. If one of the conditions can be prevented from holding then deadlock will not occur.

2. Deadlock avoidance :- Deadlock can be avoided by maintaining the system always in safe state. The system is said to be in safe state, if all the pending processes can be successfully executed in some sequence, while satisfying their resource requirement fully. The sequence in which pending process can be executes is called as safe sequence.



Deadline
proposed 2 Possibilities
iPhone

Del - 22, 2023

1) Cannot demand
from Parents.
(Reminding Request)

2) You can demand
but whether they
depends

Deadline
Anish
fulfill w
background
can
sitting
they
can fulfill
their demand in
remained amount

3. Deadlock detection and recovery :- The above approaches consider overheads. A less costly approach, when system requirement is not very critical it can be:

- a. Allow deadlock to occur
- b. Detect deadlock, when it occurs
- c. Recovery from the deadlock

9 month

Rs 50,000

Rs 30,000 - Phone

4. Allow deadlock to occur :- Restart when the system stops functioning. This is least costly approach, while can be employed when application is not at all critical. When deadlock occurs, system will finally stop functioning. Just reboot the system.

Total Resources = 12 Magnetic Tapes

$$H_{\text{app}} \leq \text{Total}$$

gradeup

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Don't

sale

$\langle p_2, p_3, p_1 \rangle$

Practise c-wise quizzes

Keep attending
live classes

$$\text{fare} = \text{Total} -$$
$$= 12 -$$

2

Find sqe sequence

Σ Allowed to

10

Free =

9554 new safe?

yes


$$2 + (2)^{1-2} = 9 \quad p3$$
$$f_{ne} = 4 + (3)$$
$$\text{Func } 7 + (5)^{p1} = 12$$