GEPM 375

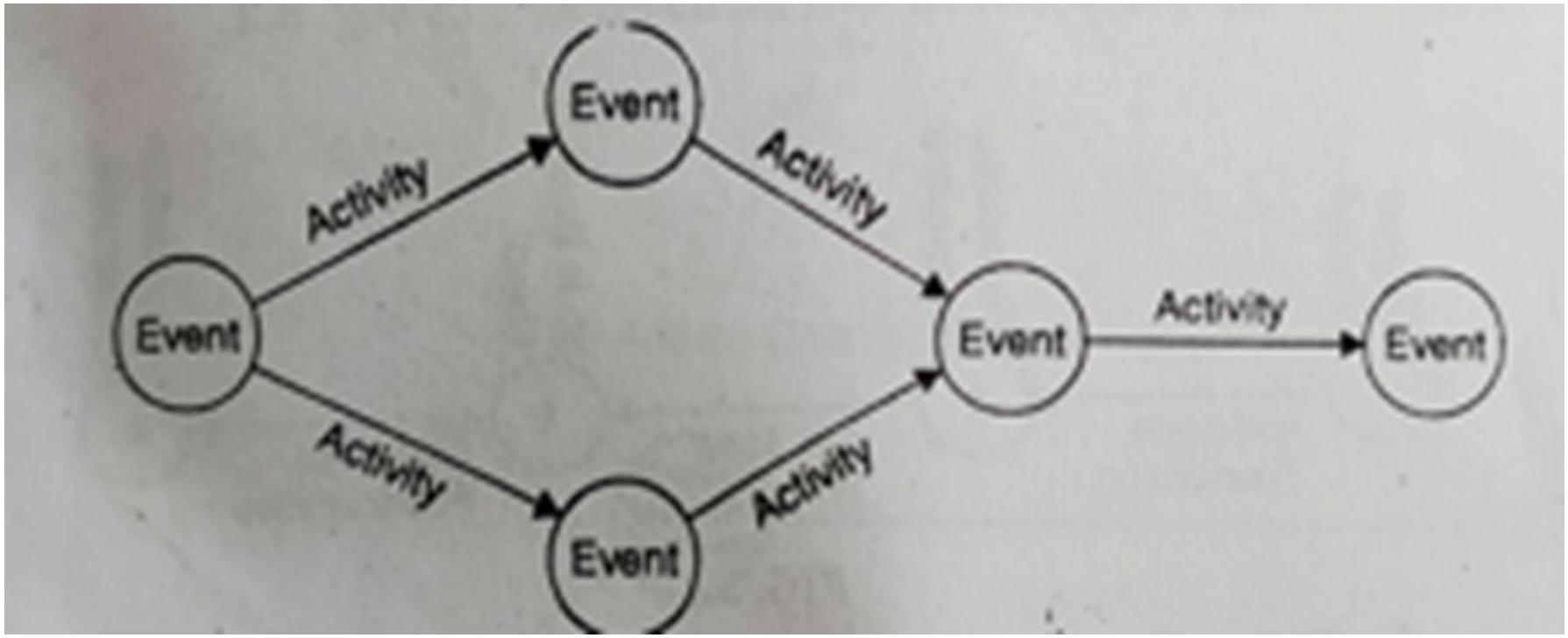
Project Planning and Construction Management

Network in Project Management

What is a Network in Project Management?

- A network is a **flow diagram consisting** of **activities** and **events**, **connected logically and sequentially**.

- Network techniques is one of the **most modern tools** of project management.



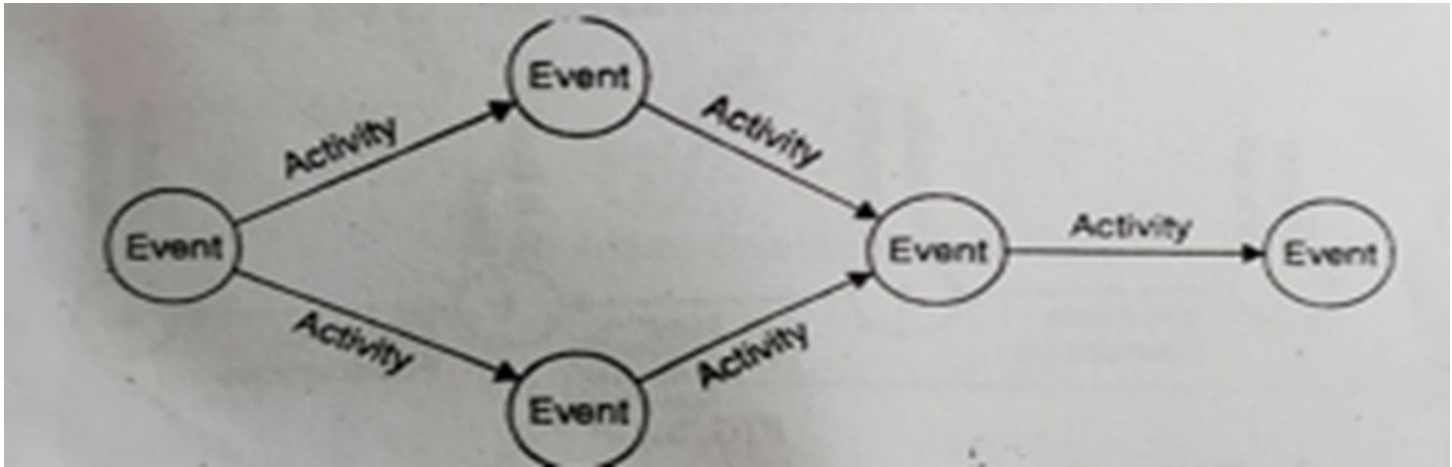
Activities:

- Breaking up of the entire project into a number of **distinct, well defined jobs or tasks**.
- A single, defined unit of work that needs to be completed to achieve a project deliverable

Events:

- **Beginning or end of each** activity constitutes an event of the project.
- Event" refers to a specific point in time that marks the start or completion of an activity.

In the network diagram, an **activity is represented by arrows** while **events are represented, usually by circle**.



Types of Network

Networks are two types:

- **PERT** network: Event oriented
- **CPM** network: Activity oriented

Both networks are **techniques** of project management **involving graphical and diagrammatic representation**, which the authority can use in **planning**, **scheduling** and **controlling of operations** in a project.

Characteristics of Network

- Project to be **planned by network technique** should **consist of clearly recognizable jobs or operations**, usually **called activities**.
- Jobs or operations or activities **must have definite commencement and completion.**
- Start or end of activity is **called event**.
- **Events must occur in a definite pattern** and **activity** must be performed in a **technological sequence**.

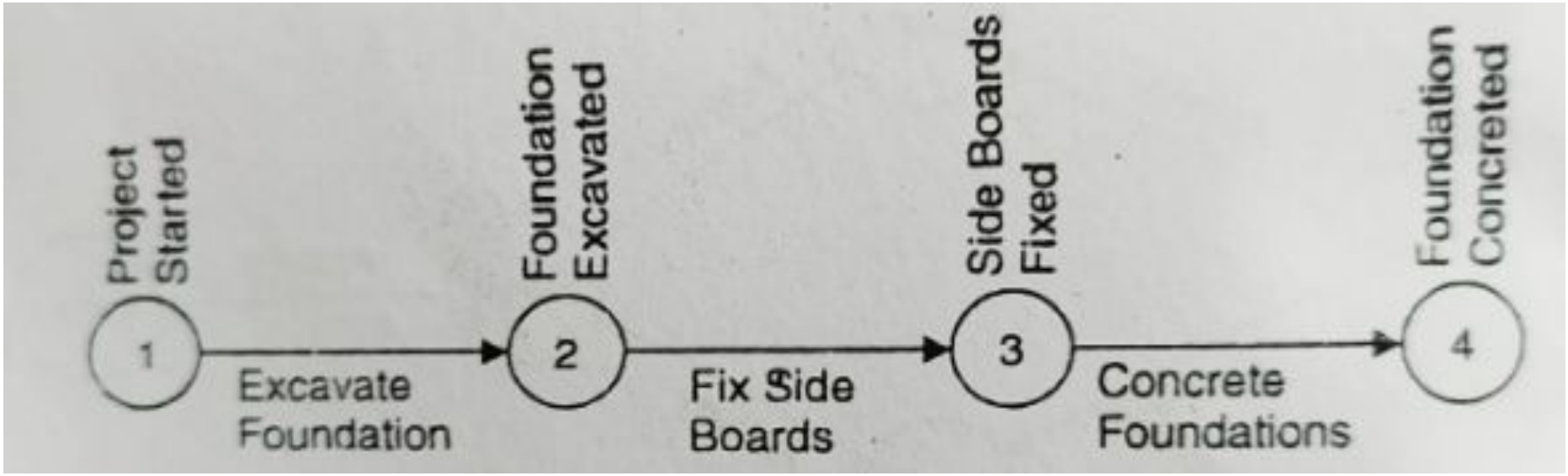
Example of Network

Example: Consider a project of **Laying of structural Foundation**.

Project consists of the following well **defined operations**:

- **Excavation of foundation**
- **Fixing/Laying side boards**
- **Concreting foundation**.

All the three operations are to be **performed in a sequential order.** Simple network follows:



Another Example of Network

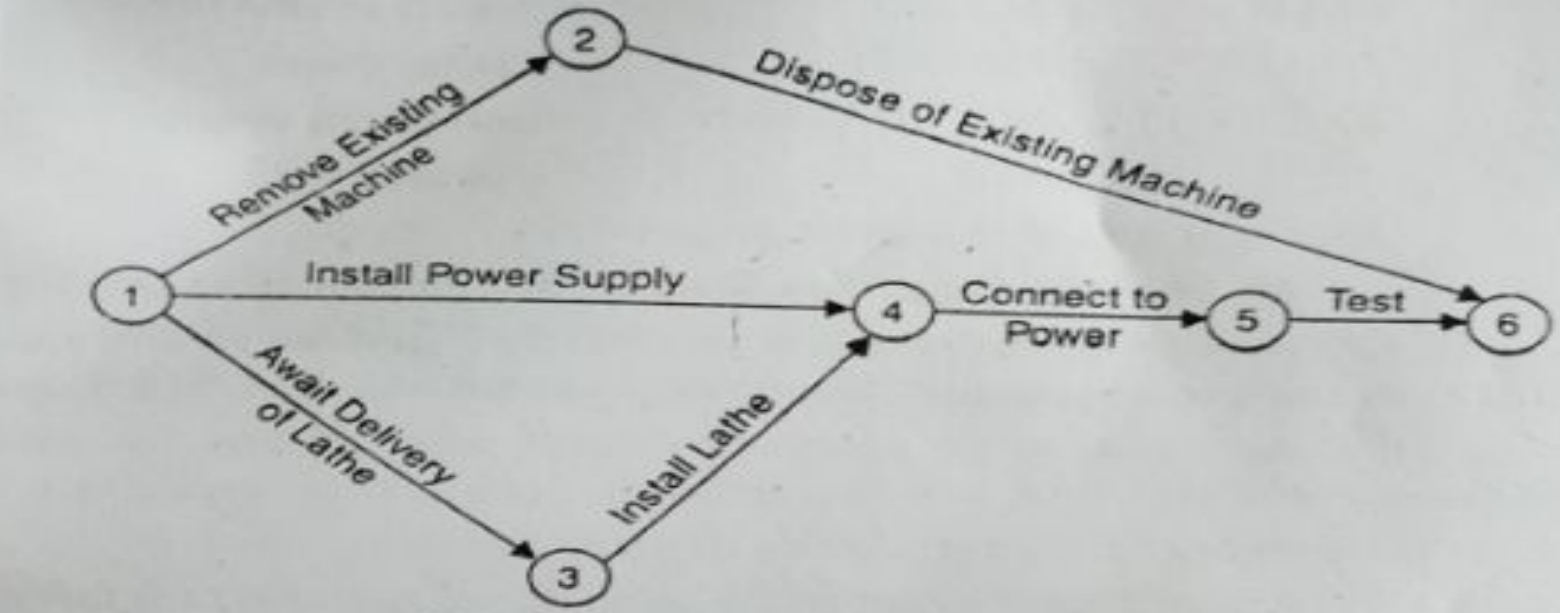
Project consists of "**Purchasing of a new heavy duty lathe and disposing of the old lathe**".

Project consists of the **following activities**:

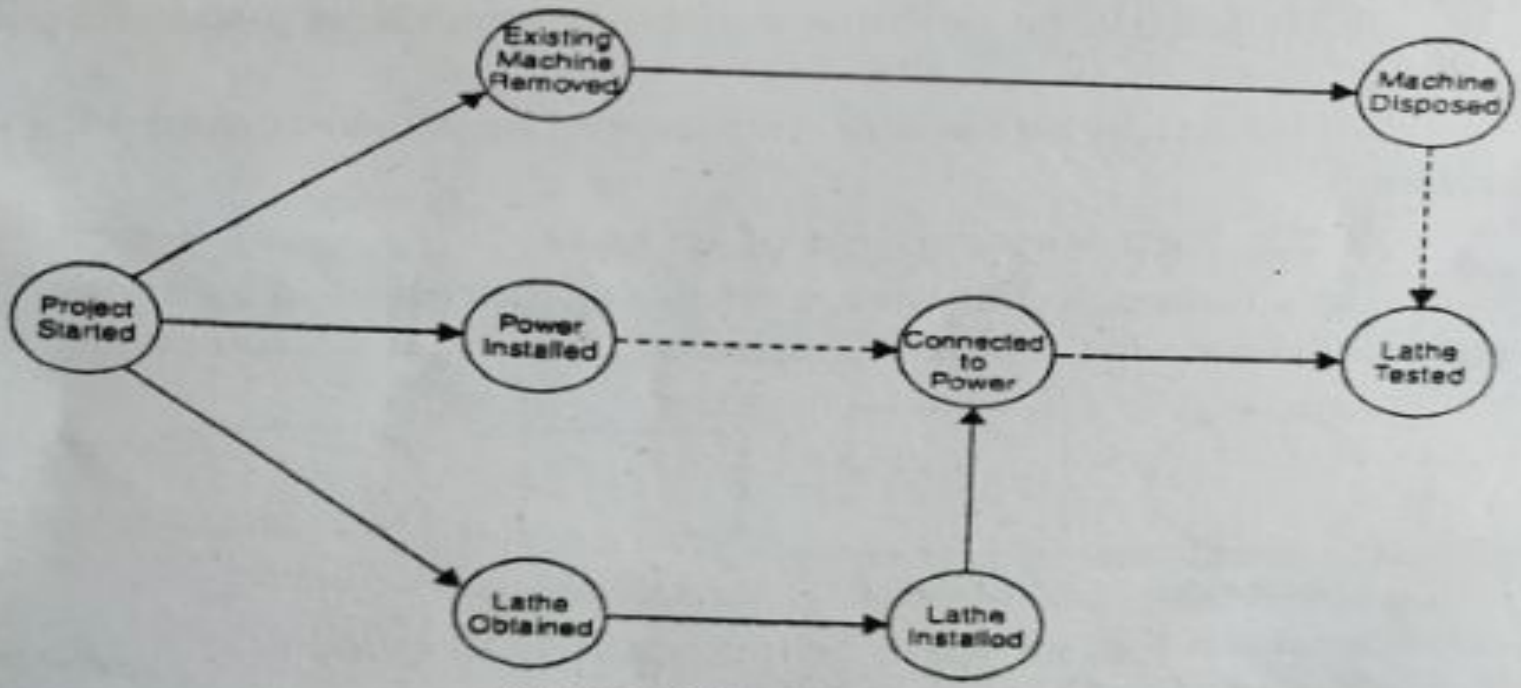
- **Await delivery of lathe**
- **Remove existing lathe**
- **Install power supply**
- **Install lathe Connect to power**
- **Test**
- **Dispose of existing lathe**.



Project can be represented by a network.



(a) Activity Oriented Network **CPM Network**



(b) Event Oriented Network PERT Network

Elements of Network - Event

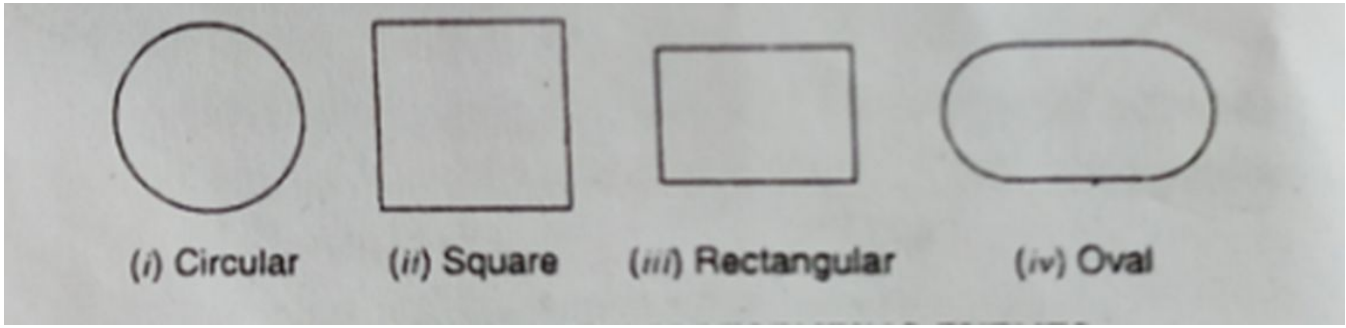
What is an event? Or Define an event.

- **Commencement or completion of an activity** is called an event.
- An event is that **particular instant of time** at which some specific part of a plan has been or is to be achieved.
- An event is a **definable accomplishment** in a project plan, **recognizable** at a particular instant of time.
- **Example**: Design completed.

  : Excavation completed.

Representation of Events:

- **By nodes or Nodes may be any geometrical shape**, usually **by circular nodes**.



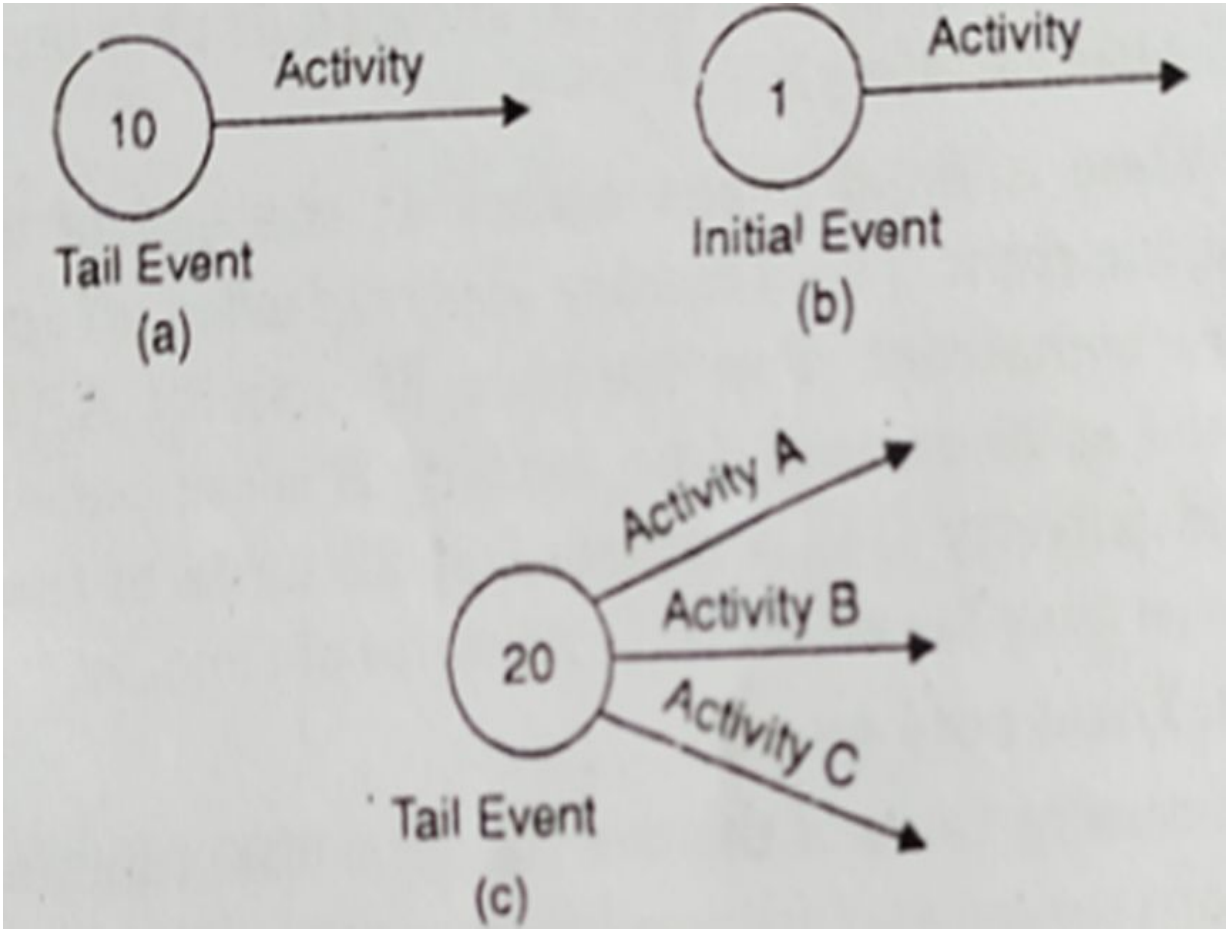
Events

Specifying Events in network diagram:

- **Tail event**
- **Head event**
- **Dual role event**.

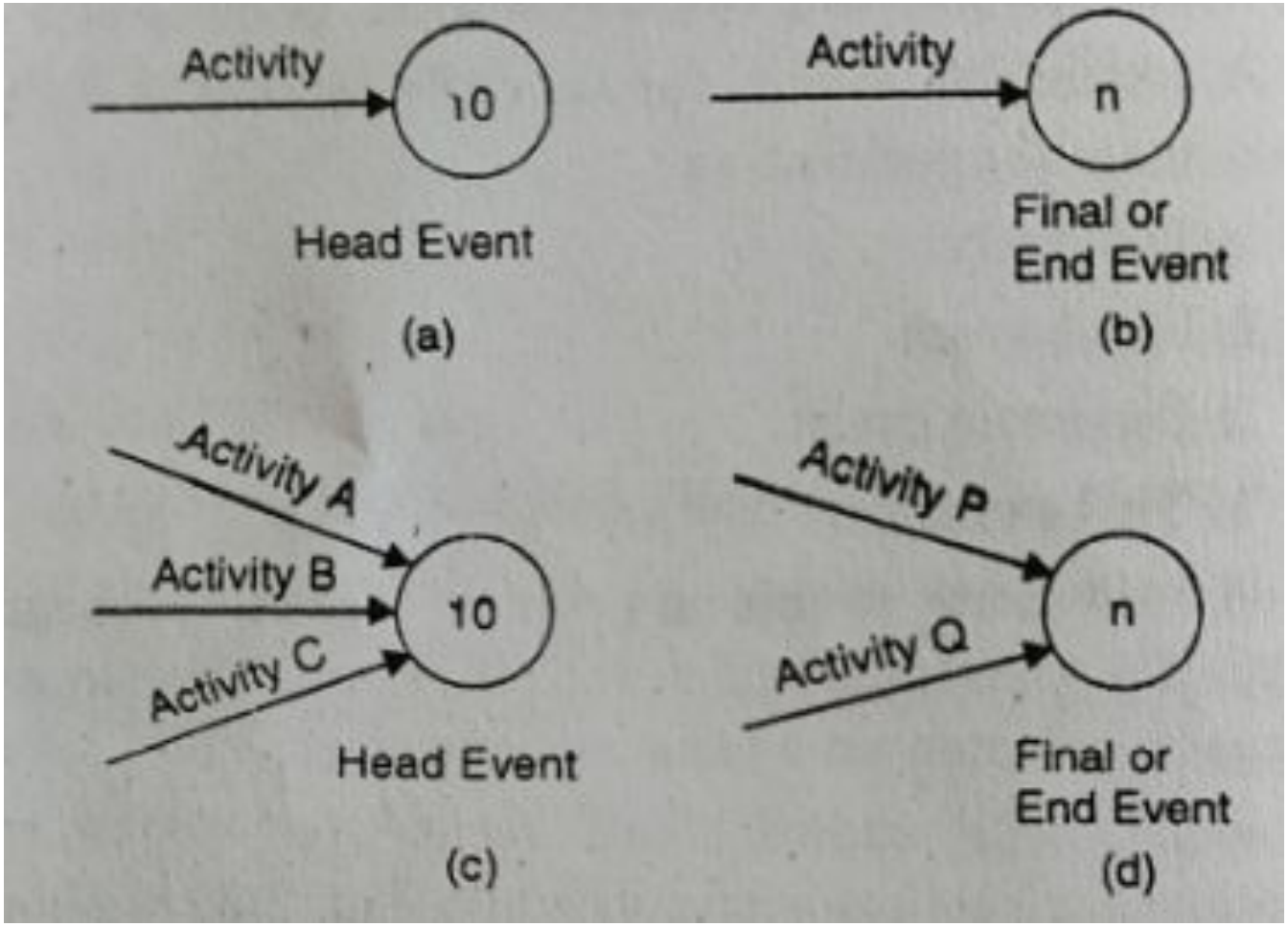
Tail Events:

- Marks the **beginning** of an activity/activities.
- **Commencement** of Project is known as **initial event**.



Head Events:

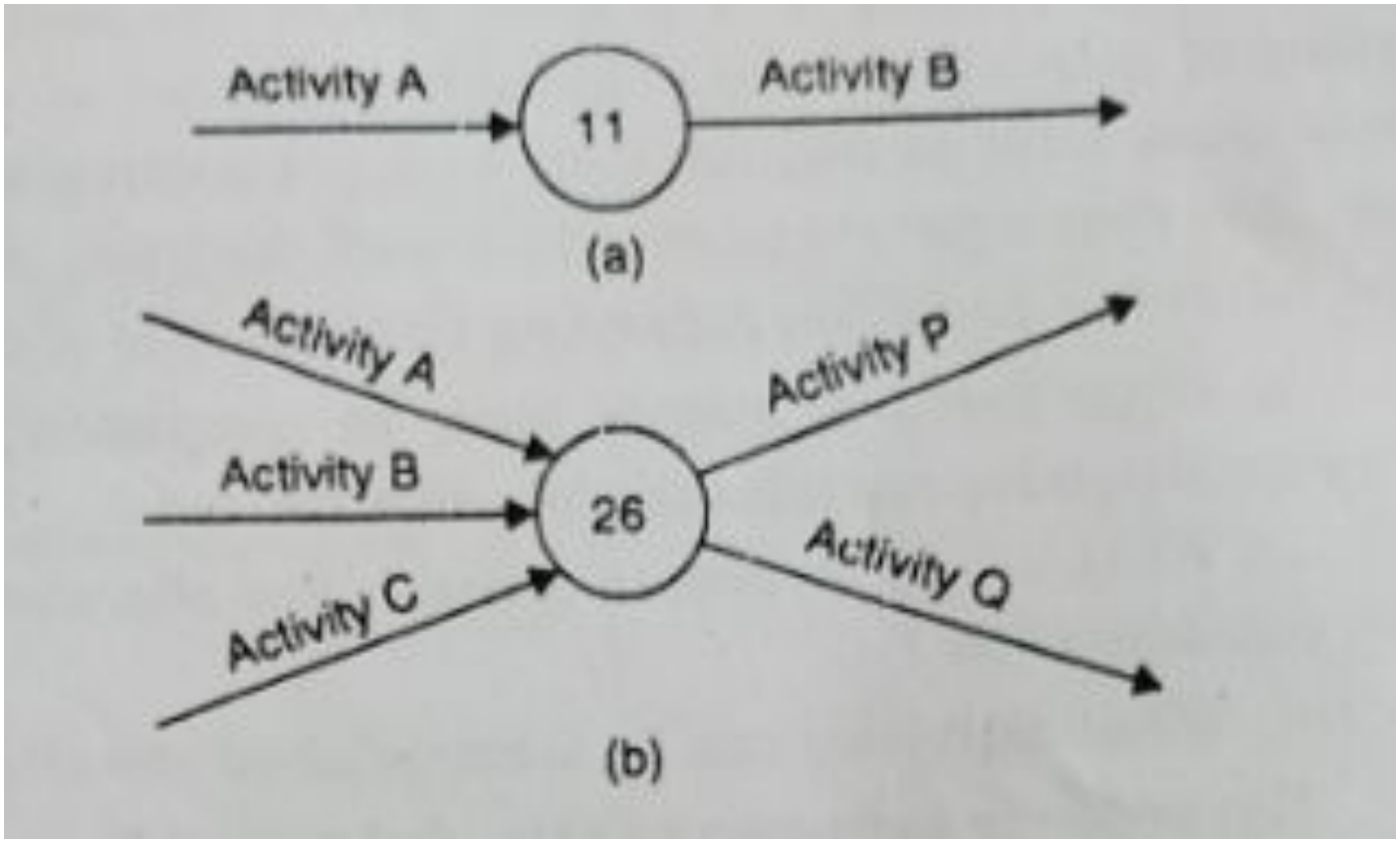
- Activity/activities **ending at a point**.
- Event **marks the completion of a project** is known as Final/End event.



Elements of Network - Event

Dual Role Events:

- Head event to some activity/activities and tail event to other activity/activities.



Interrelationship between Events:

Predecessor events:

- Event/events that **occur before another event** are called predecessor events to that event.

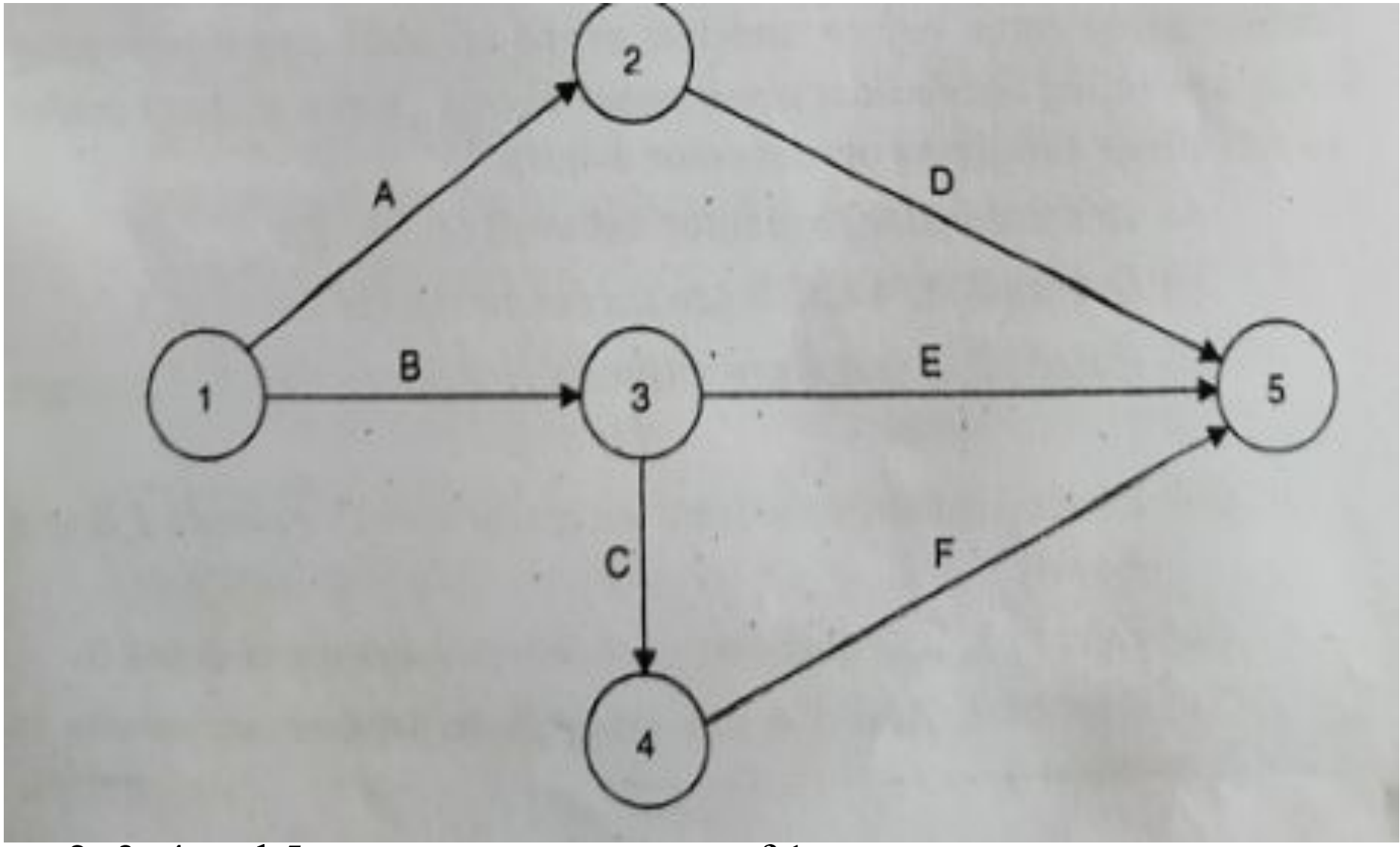
Successor Events:

- Event/events that **follow another event** are called successor events to that event.

Example:

- Events 2,3, 4 and 5 are **successor events** of 1.
- Events 2,3 are the **immediate successor** events of 1.
- Events 1, 2,3, 4 are the **predecessor events** of 5.
- Events 2,3, 4 are the **immediate successor events** of 5.

Interrelationship between Events



- 2, 3, 4 and 5 are **successor events** of 1.

Elements of Network - Activity

Definition of Activity:

- **Actual performance** of a task.
- **Work required** to complete a specific event.
- **Recognizable part of a work** of a project that **requires time and resources for its completion.**

Examples:

- Design of a structure
- Excavate trench

Representation- Activity:

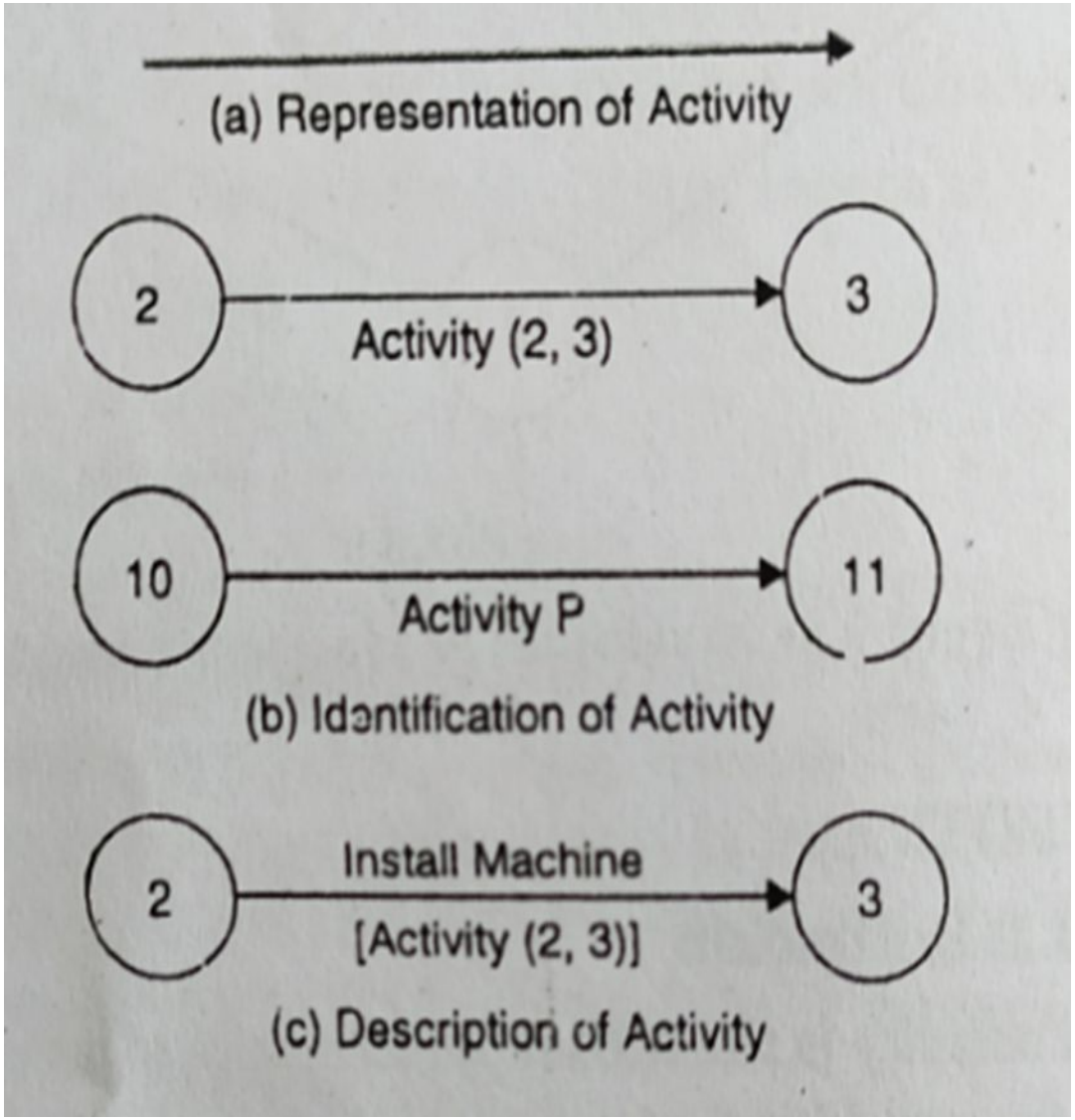
- Represented by **simple arrows**, usually drawn from left to right.
- **Length of arrows** to suit the drafting convenience.

Identification:

- **In terms of the events they connect,** by the use of event numbers.
- **By use of English alphabets**, such as Activity P ie. Excavate trench.

Description:

- Described **by writing actual performance over the arrow**.



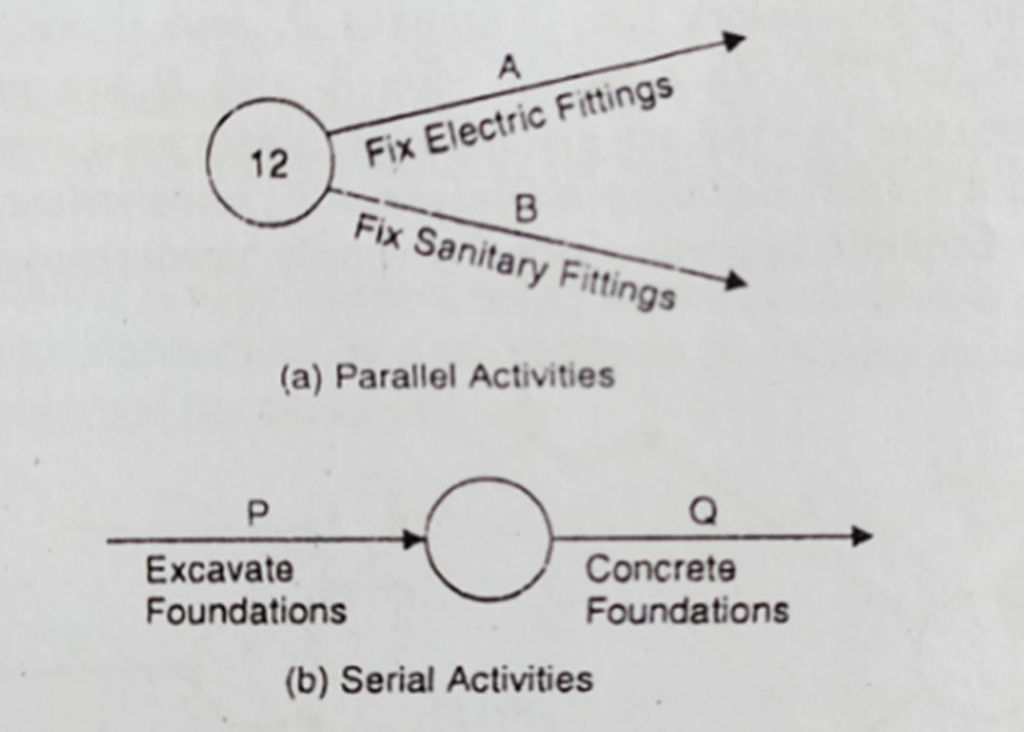
Inter-relationships

Parallel Activity:

- Activities can be **performed simultaneously and independently to each other**.

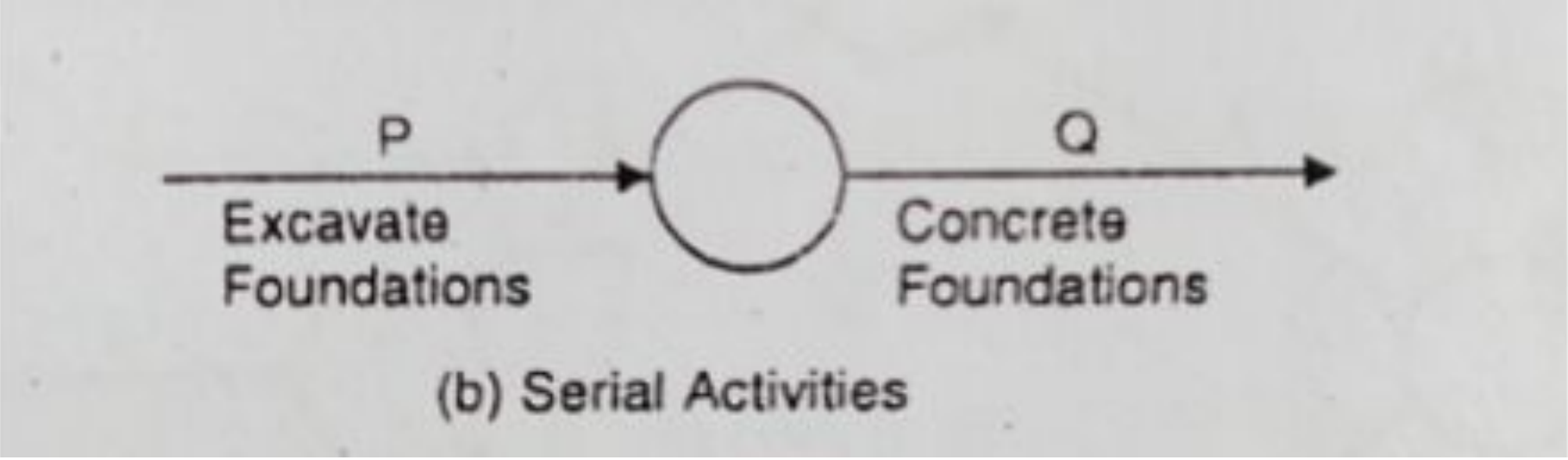
Serial activity:

- Activities those are to be **performed one after another in succession.**
- Activities P & Q in the figure are serial activities.



Interrelationships - **Activity**

- Activity P is known as **preceding activity** or predecessor activity of Q.
- Activity Q is known as **succeeding activity** or successor activity of P.



(b) Serial Activities

Elements of Network - Activity

Dummy:

- **Type of operation in the network** which **neither requires any time nor any resources.**

- Merely **a device to identify a dependence among operations.**

- **Connecting link** for control purpose or

- For **maintaining uniqueness** of activity.

Elements of Network - Dummy

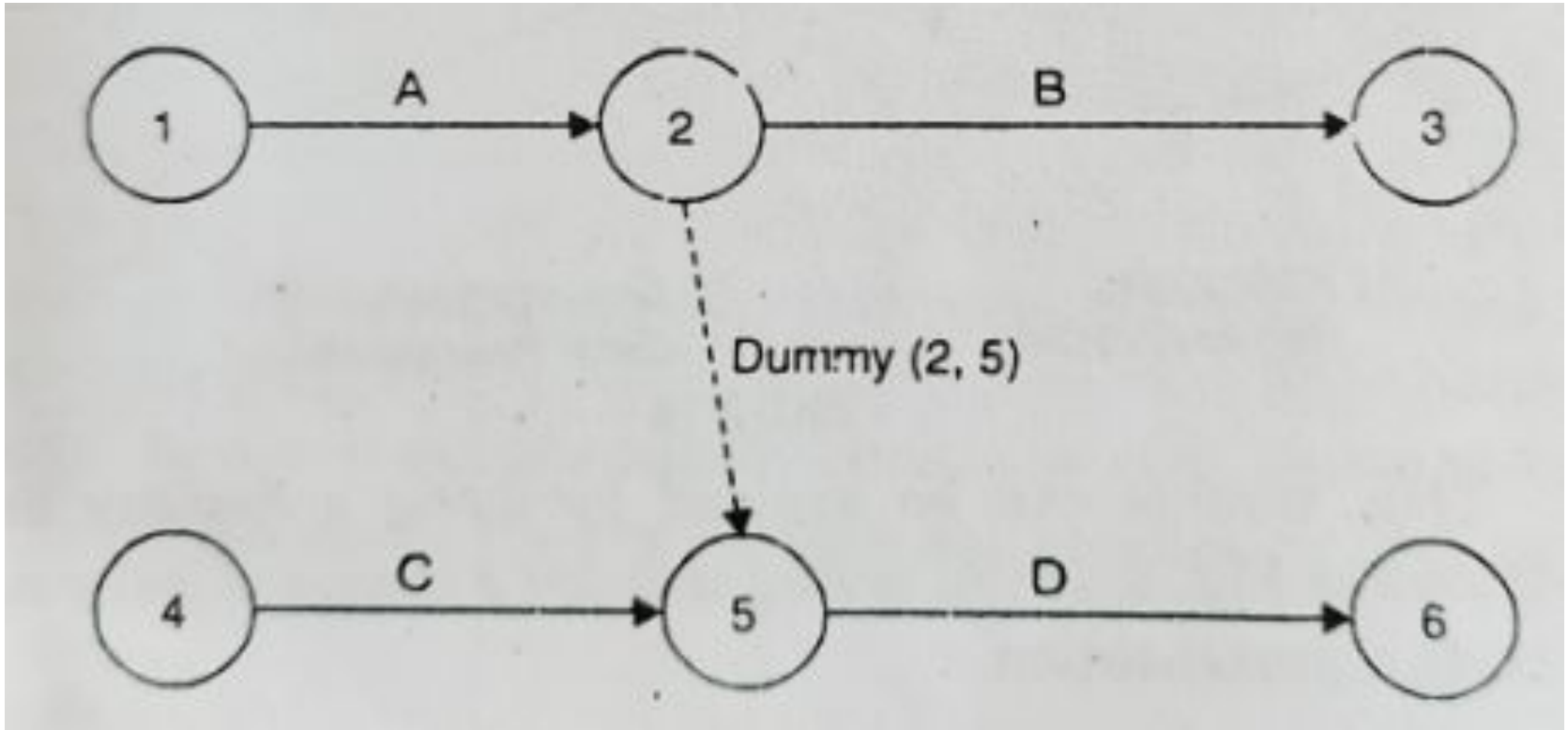
Example:

Set 1: A. **Await delivery of new machine**

B. **Install new machine**

Set 2: C. Remove existing machine

D. **Dispose of existing machine**



Elements of Network - Dummy

Explanation:

- **Activities A and B are to performed serially**.

- Similarly, Activities **C and D are to performed serially**.

- **Both the sets are performed serially.**

- From practical consideration, **activity D (dispose off existing machine) of set 2 can not be performed until activity A (Await delivery of new machine) of set 1 is completed**.

- Hence, **a dummy link is used**, joining node 2 to node 5, indicating that **activity D can not be started unless event 2 is over.**

Uses of Dummies

Dummies serve two purposes in a network:

- Grammatical purpose
- Logical purpose

Grammatical purpose:

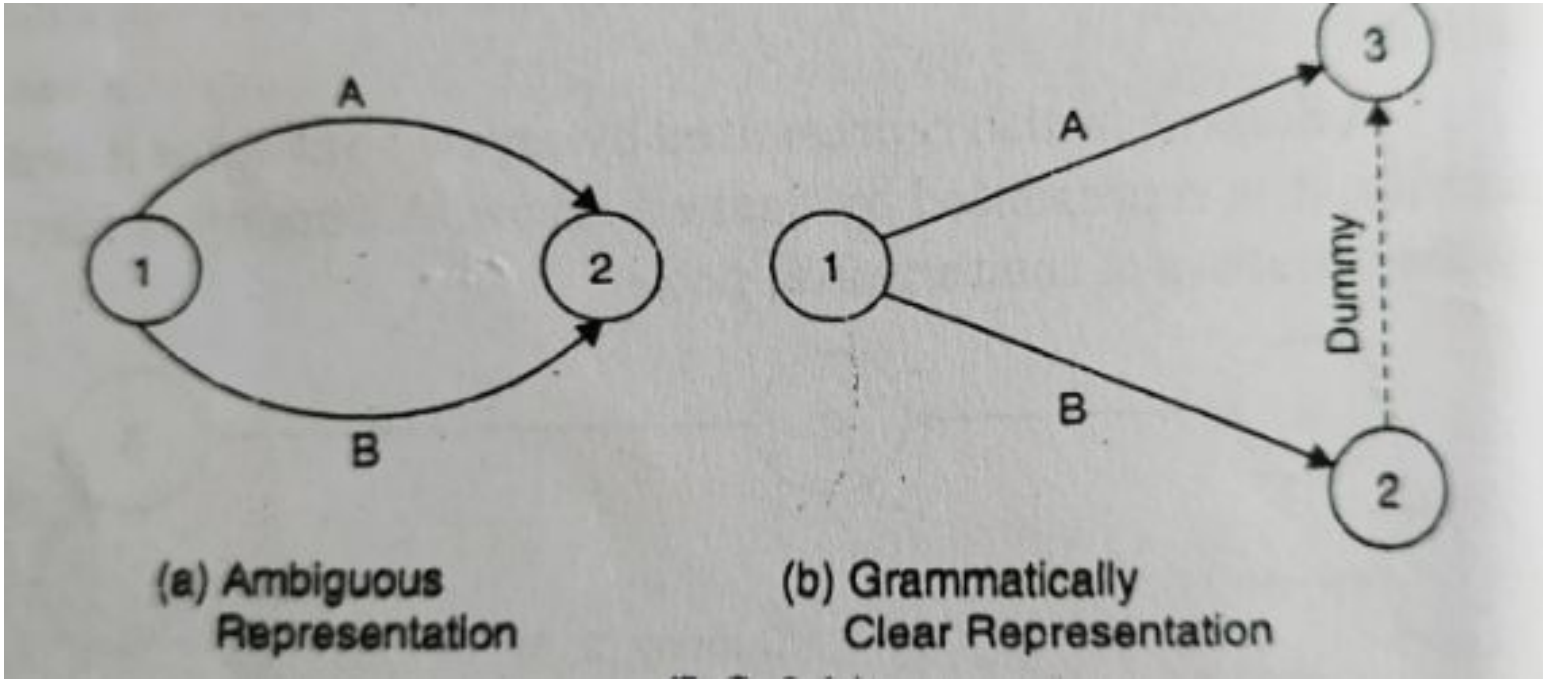
- Used to **prevent two arrows having common beginning and end points**.

Example:

- Arrows of Activities A and B, both start from node 1 and end at node 2.
- **Caused inconvenience** when net work is used for computation.

Uses Dummy

- Inconvenience frequently **leads to mistakes**.
- **Trouble can be avoided** by using a **dummy link**, given thereby a **grammatically correct and clear representation**.



Elements of Network – Uses of Dummies

Logical Purpose:

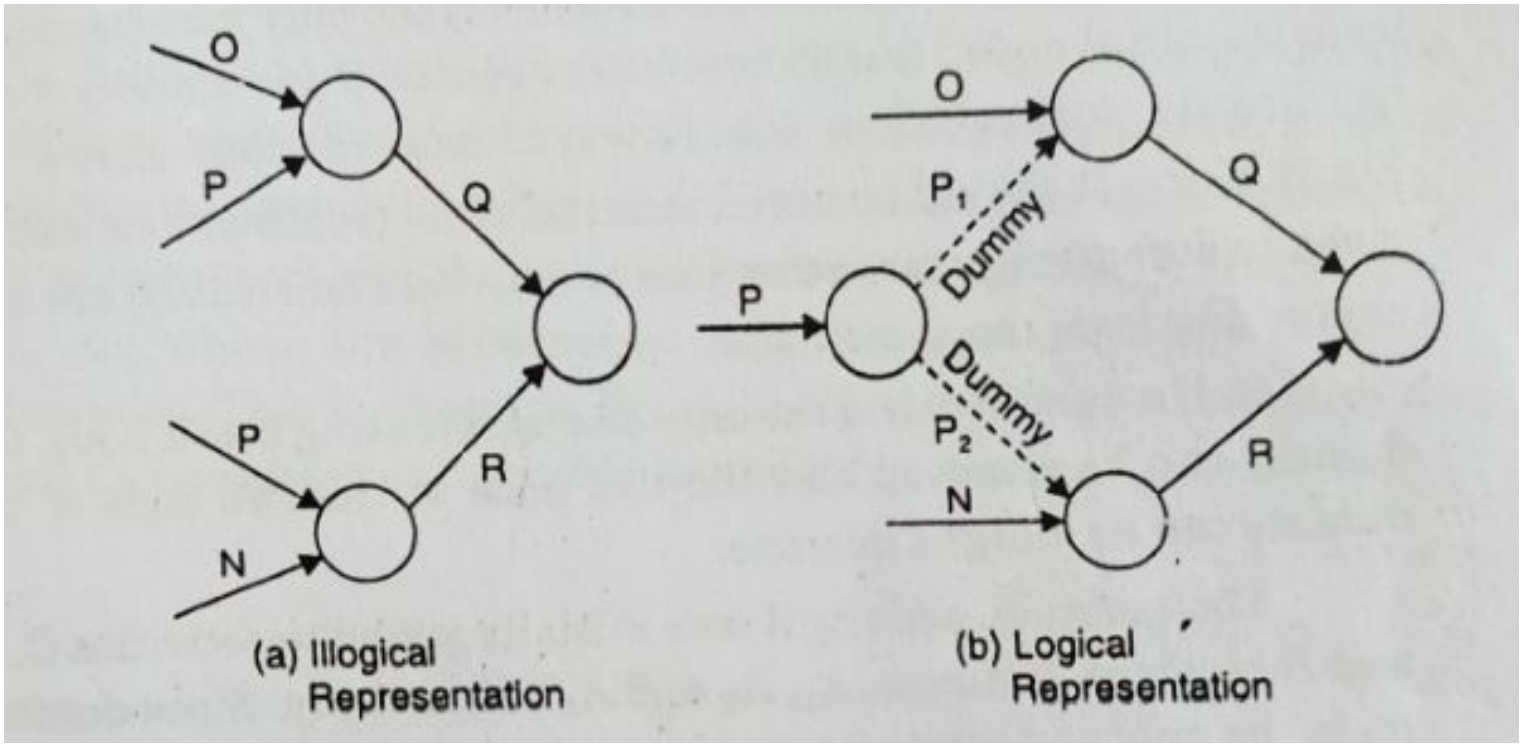
- Dummies are also used to give **logical clear representation in a network having an activity common to two sets of operations running parallel to each other.**

Example:

- Consider, two activities **Q and R having common end** node (event).
- Activity **Q has O and P as successor activities**, **activity R has P and N as successor activities.**
- Figure shows the **illogical representation of the activities**.

Elements of Network – Uses of Dummy

- Because, activity **P can not have dual identity**, it should have unique identity.
- Uniqueness can be maintained by **introducing two dummies P1 and P2 as shown.**



Thanks