Introduction:

'project Management' deals with both 'materials' as well as 'human factors' to increase the productivity.

Objectives of project:

→ It should be completed in minimum time with minimum capital investment.

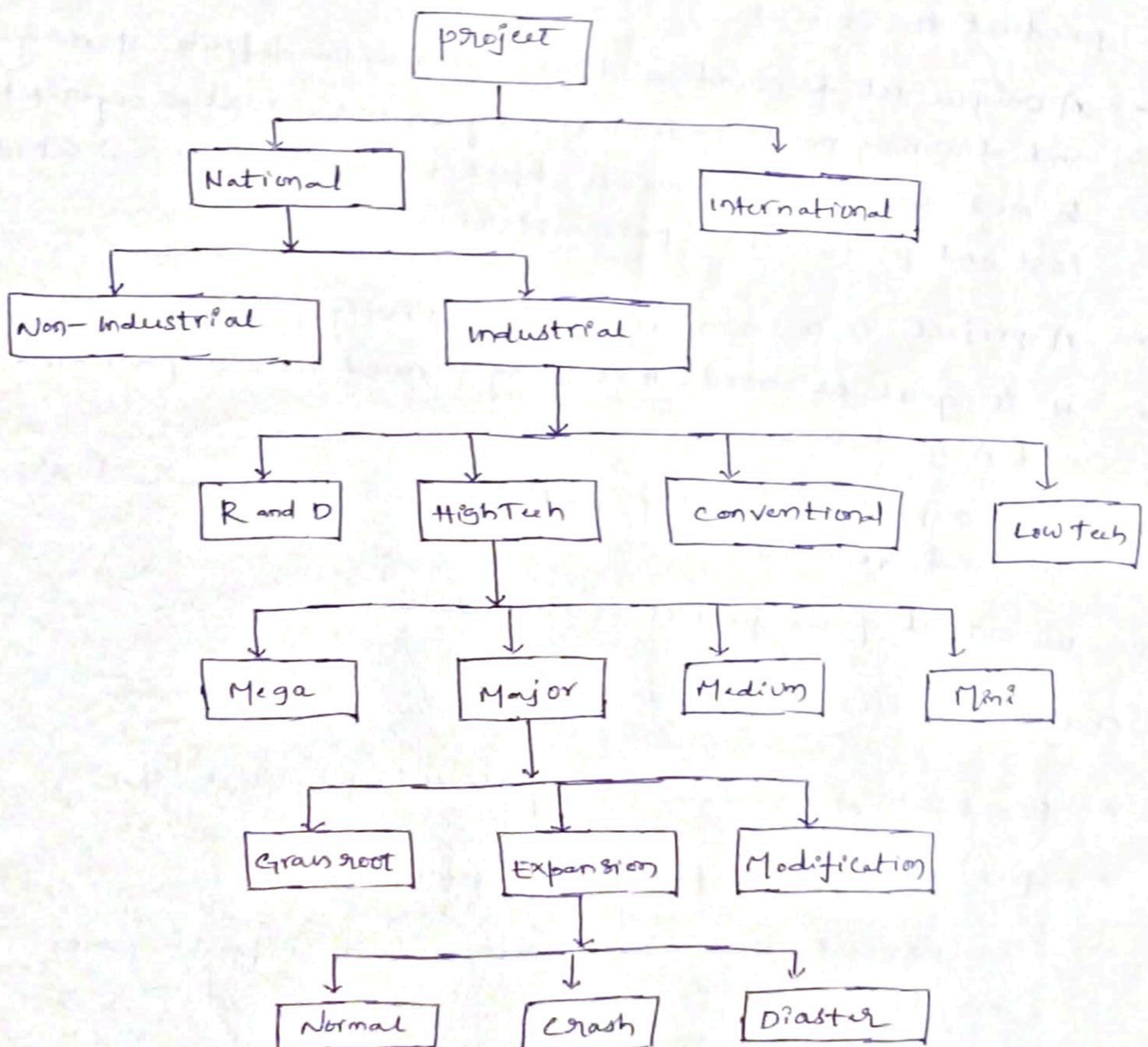→ It should be use available manpower and other resources optimally.

What is project?

→ project is temporary endeavour undertaken to create unique product or services.

→ A unique set of coordinated activities with definite starting and finishing points undertaken by an individual or organization to meet specific performance objectives with in defined schedule, cost and performance parameters.

→ A project is a 'non-repetitive activity'

→ It is goal oriented - It is being persued with a particular end or goal in mind.

→ It has a particular set of constraints - usually centred around time and resource.

→ the output of the project is measurable.

characteristics of project:

→ Fixed set objectives. once they are met, project is closed.

→ project has a definite life span.

→ the project is a single entity, while is participants may be many.

→ Team work is absolutely essential. people from all functional groups are needed.

→ projects have definite life cycles.

→ All projects are unique, as the people and plans involved in similar projects also are different.

→ A project is subjected to a lot of change

→ Has a high level of sub contracting

→ A project is fraught with risk and uncertainly.

→ The diagram given indicates the categories of projects.

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                        ┌─────────┐
                        │ project │
                        └────┬────┘
              ┌──────────────┴──────────────┐
              ▼                              ▼
        ┌──────────┐                  ┌──────────────┐
        │ National │                  │ International │
        └────┬─────┘                  └──────────────┘
      ┌──────┴────────────┐
      ▼                   ▼
┌────────────────┐  ┌────────────┐
│ Non-Industrial │  │ Industrial │
└────────────────┘  └─────┬──────┘
         ┌───────────┬────┴──────┬──────────────┐
         ▼           ▼           ▼              ▼
    ┌────────┐  ┌─────────┐ ┌──────────────┐ ┌──────────┐
    │ R and D│  │ HighTech│ │ Conventional │ │ Low Tech │
    └────────┘  └────┬────┘ └──────────────┘ └──────────┘
         ┌───────────┼───────────┬──────────┐
         ▼           ▼           ▼          ▼
    ┌────────┐  ┌────────┐  ┌────────┐  ┌──────┐
    │  Mega  │  │ Major  │  │ Medium │  │ Mini │
    └────────┘  └───┬────┘  └────────┘  └──────┘
         ┌──────────┼───────────┐
         ▼          ▼           ▼
   ┌───────────┐ ┌───────────┐ ┌──────────────┐
   │ Grass root│ │ Expansion │ │ Modification │
   └───────────┘ └─────┬─────┘ └──────────────┘
         ┌─────────────┼─────────────┐
         ▼             ▼             ▼
    ┌────────┐    ┌────────┐    ┌─────────┐
    │ Normal │    │ Crash  │    │ Diaster │
    └────────┘    └────────┘    └─────────┘
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→ Based on the speed of execution of a project, they can be classified as:

1. **Normal projects:** Adequate time is provided for implementation. project will involve minimum capital cost and no sacrifice in terms of quality

2. **Crash projects:** Additional capital cost are incurred to gain time. In this case the quality may be compromised.

3. **Disaster projects:** Anything needed to gain time is allowed in this type of projects. quality short of failure level is also accepted. Round the clock work is usually done.

What is project Management:

project management is the coordinating effort to fulfill the goals of the project. the project manager, as the head of the project team, is responsible for this effort and its ultimate result. project managers use knowledge, skills, tools, and methodologies to do the following

→ Identify the goals, objectives, requirements, and limitations of the project.

→ coordinate the different needs and expectations of the various project stakeholders including team members, resource managers, senior management, customers, and sponsors

→ plan, execute and control the tasks, and deliverables of the project based on the identified project goals and objectives.

→ close the project when completed and capture the knowledge accrued.

→ project management includes planning, organizing, directing, monitoring and controlling the activities and optimum allocation of resources.

Roles and Responsibilities of project Manager:

1. Co-ordinating and integrating activities across Multiple functional lines.

2. Defining and maintaining the integrity of the project

3. Development of project execution plan.

4. Organising for the execution plan.

5. Setting targets and developments of systems and procedures for accomplishment of project objectives and targets.

6. Negotiations for commitments from suppliers, clients and project members.

7. Direction, co-ordination and control of project activities.

8. Non-human resource management including financial matters.

9. Management of personnel, that is man management.

10. Satisfy government, customer, promoters and public.

11. Achievement of cash surplus-project objectives and higher productivity.

12. Managing human inter-relationships in the project organisation.

13. Maintaining the balance between technical and managerial project functions.

project managers are also responsible for balancing and integrating competing demands to implement all aspects of the project successfully, as follows.

- project scope. Articulating the specific work to be done for the project

- project time : setting the finish date of the projects as well as any interim dead lines for phases, milestones, and deliverables.

→ project cost. calculating and tracking the project costs and budget.

→ project human resources : signing on the team members who will carry out the tasks of the project.

→ project procurement : Acquiring the material and equipment resources and obtaining any other supplies & services, needed to fulfill project tasks.

→ project communication. conveying assignments, updates, reports and other information with team members and other stakeholders.

→ project quality. identifying the acceptable level of quality for the project goals and objectives.

→ project risk. Analyzing potential project risks and response planning.

project planning:

planning is the most important phases of project management. planning involves defining objectives of the project, listing of tasks or jobs that must be performed, determining total requirements for materials, equipment and manpower and preparing estimates of costs and durations for the various jobs or activities to complete the project. it is necessary because

→ It provides direction
→ It helps to reveal future opportunities and (threat) threats
→ It provides performance standards.

The following steps may be used to develop a project plan:

→ Define the scope of work, method statement, and sequence of work and objectives of project.

→ Generate the work breakdown structure (WBS) to produce a complete list of activities.

→ Develop the organization breakdown structure (OBS) and link it with work breakdown structure to indentify responsibilities.

→ Determine the relationship between activities

→ Estimate activities time duration, cost expenditure and resource requirement.

→ Develop the project network

→ Determining gross requirement for materials, equipments and manpower and preparing estimates of costs and duration for various jobs.

project scheduling:

A project has certain objectives and project is said to be completed if they are fulfilled. A series of activities (are grouped into) in a project are to be completed in a project with in available resources. All these activities are grouped into packages. Activities and tasks of different packages are inter related and they are assigned with resources like time within which they are to be completed in proper logical sequence.

In other words, scheduling is the mechanical process of formalizing the planned functions, assigning the starting and completion dates to each part of the work in such a manner that the whole work (project) proceeds in a logical sequence and in an orderly manner.

steps in project Scheduling:

→ identifying the tasks that needs to be carried out.

→ estimating how long they will take.

→ allocating resources (mainly personnel)

→ scheduling when the tasks will occur.

In some cases, identifying the tasks and activities and allocation of resources to them i.e planning and scheduling takes place at the same time

project controlling:

→ planning and scheduling are done before the actual project starts while the controlling is done during the actual project operations.

→ controlling consists of reviewing the difference between the schedule and actual performance once the project has started.

→ project control helps to determine deviations from the basic plan, to determine the effect of these deviations on the plan and to re-plan and reschedule to compensate the deviations.

→ Determination of deviations from basic plan, and their effects on the project.

→ Replanning and rescheduling of activities to compensate for the deviations which is called "Updating".

→ It should be noted that planning and scheduling are accomplished before the actual project starts, while controling is operative during execution of the project.

→ the method of planning and controlling that was originally developed was called project planning and scheduling (pps). pps was later on converted into critical path method, so the CPM involves the deterministic approach and is used for the repetitive types of projects.

Techniques Used for project management:

1. Bar chart :

Firstly introduced by Henry Gantt around 1900 AD.

Features of bar chart are:

→ It is a pictorial chart

→ It has two co-ordinates axes, the horizontal co-ordinate represents the elapsed time and vertical co-ordinate represents the job or activity to be performed.

→ the beginning and end of each bar represents starting and finishing time of a particular activity respectively.

→ the length of bar shows the time required for completion.

→ Jobs can be concurrent or can be started one after other. so some bars can run parallel or overlap each other or may run serially.

Limitations of bar chart:

1. Lack of degree of details: only major activities are shown in bar chart and sub activities can not be separated out. Hence effective control over the activities in big projects can not be achieved.

2. A bar chart does not show progress of work and hence it can not be used as a control device.

3) A bar chart is unable to depict interdependencies of various activities clearly.

4. Bar chart are not useful in the projects where there are uncertainties in determination of estimation of time required for completion of various activities such as in R&D projects.

5. Bar chart cannot distinguish between critical and non critical activities and hence resource smoothening and resource levelling cannot be done.

6. Bar charts diagrams are useful for only smaller and simpler conventional projects, especially construction and Manufacturing projects, in which time estimates can be made with fair degree of certainty.

Activities →

units of time →

0   10   20   30   40   50
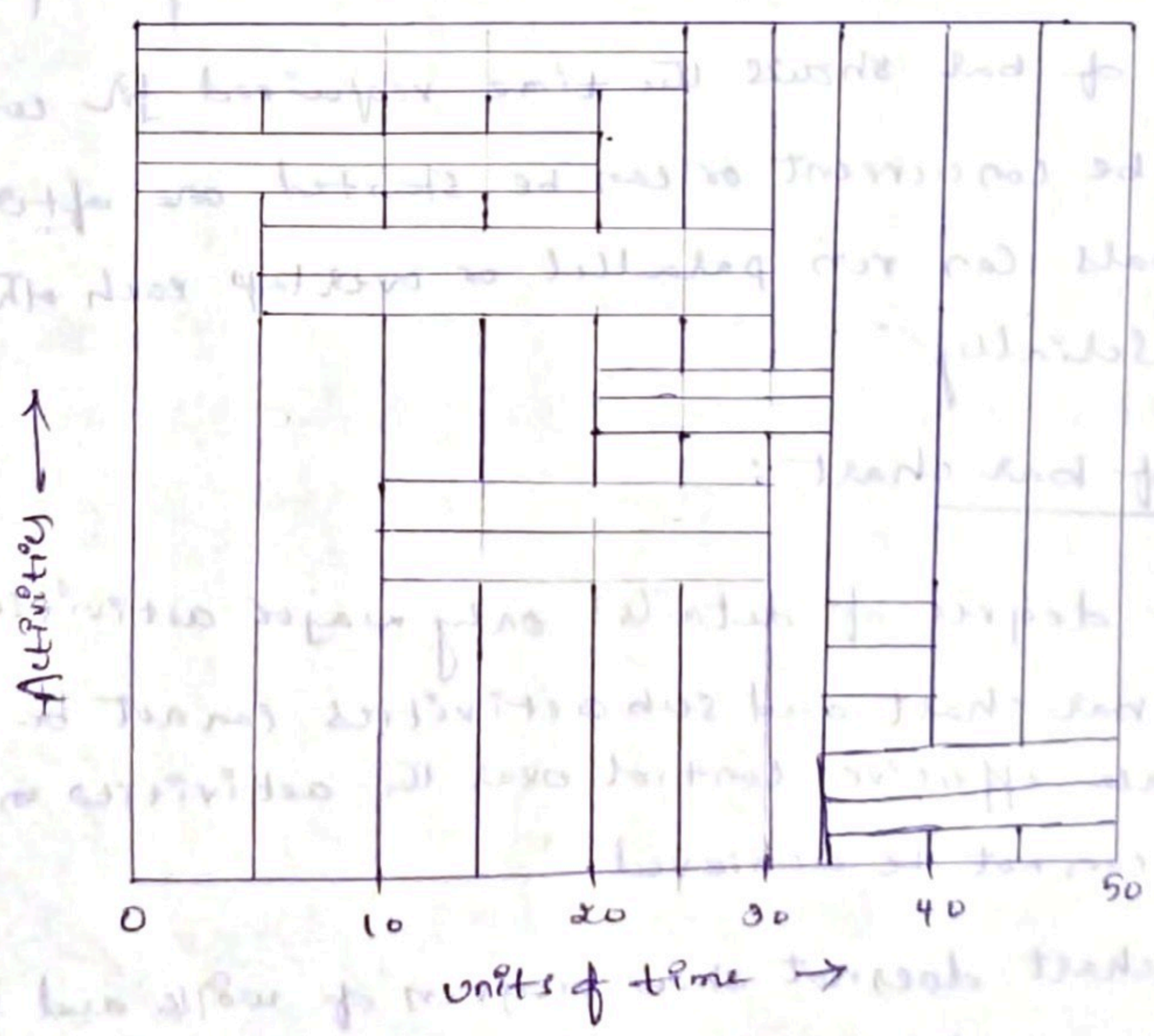
Like stone chart :

→ It is a modification over oliginal Gantt chart.

→ Milestones are key events of main activities represented by bar

→ there fore they give idea about completion of sub-activities.

NOTE: Controlling can be better achieved with the help of milestone charts, but still activity interrelationship and accountability of time uncertainty can not be depicted which can be overcome in network technique

Network Methods :

→ It is an outcome of the improvements in the milestone charts.

→ They are called by various names such as PERT, CPM, UNETICS, LESS, TOPS and SCANS.

→ However all these have emerged from the two major network systems

1. PERT

2. CPM

Network Diagram and techniques :

Network :

→ It is the flow of diagram consisting of activities and events connected logically and sequentially.

→ Network diagram are of two types.

(i) Activity-on-Arrow Network (A-O-A)

(ii) Activity-on-Node Network (A-O-N)

Advantages of network method over bar chart and milestone chart.

1. Inter relationships between activities and events of a project are clearly shown.

2. The project can be treated as an integrated whole with all its sub-activities clearly related with each other. It helps in controlling the project.

3. Network method is useful for very complicated projects having large number of activities.

4. It indicates the time required in between two activities in which rescheduling of a project is possible.

5. Time uncertainty is accounted for and so it also useful for research and development projects.

Elements of a Network:

1. **Event:**
   → An event is either start or completion of an activity.

   → Events are significant points in a project which act as control points of the project.

   → An event is an instant of time and it does not require time or resources.

   Examples of an event:
   1. All parts assembled   2. A budget prepared
   3. construction completed.

   → Events are represented by nodes in a network. It may have any of the following shapes.
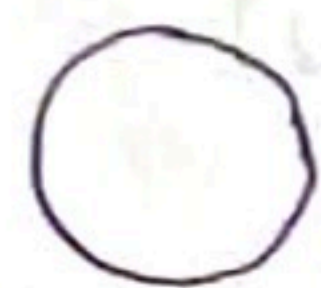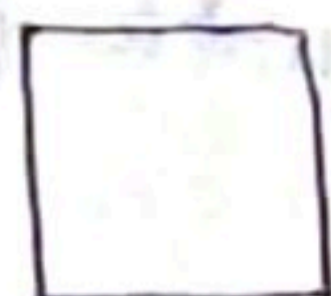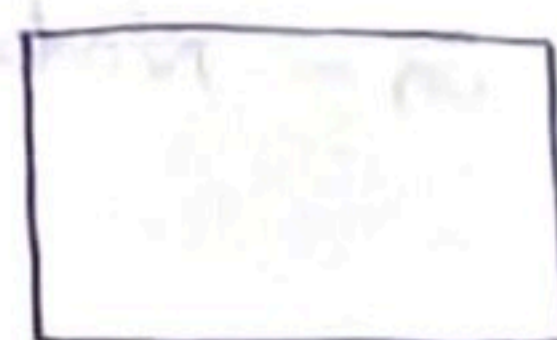
circular   square   Rectangular   Oval.
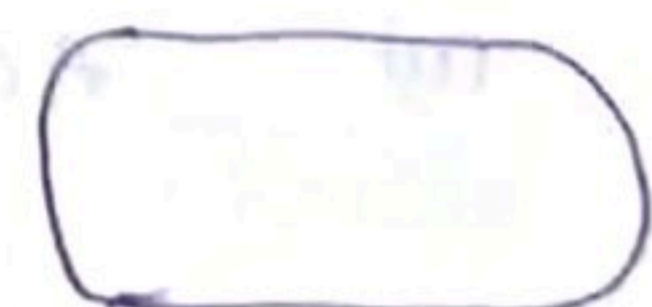
Tail event (s) start event :

→ It makes the beginning of an activity.

→ If it is the first event of project them known as "initial as start event". It has only outgoing arrow
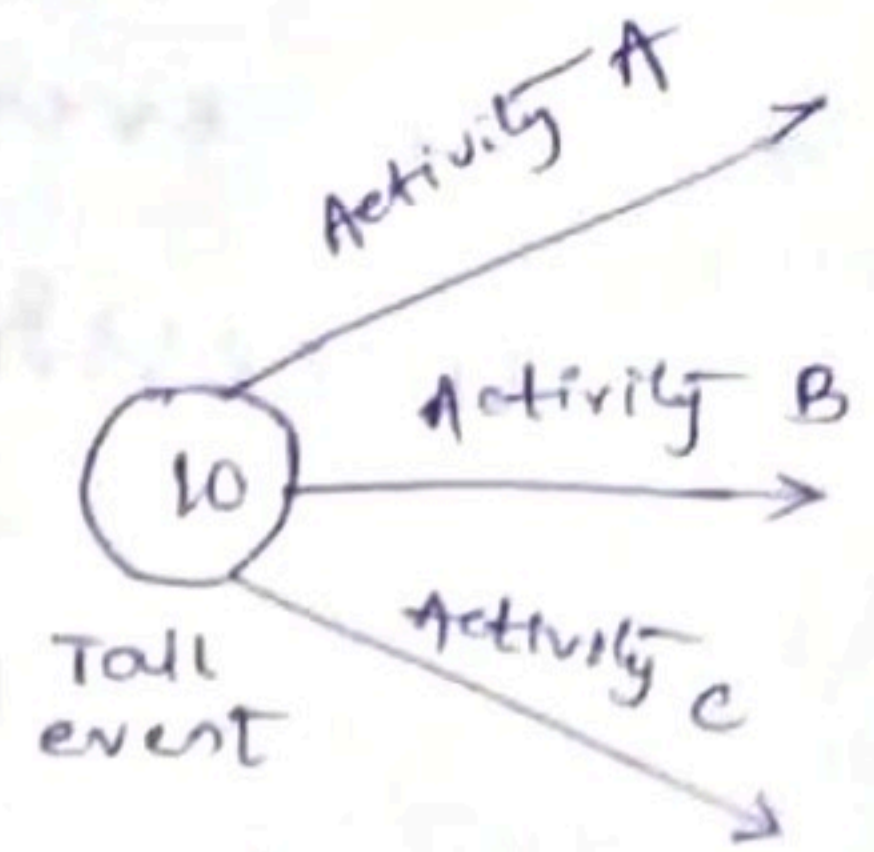
Eg: event 10 is a tail event. Arrows represent job or activity of the project.

Head event or the final event :

→ The event which marks the completion of an activity known as "head event".

→ If this event represents completion of entire project then it is called "Finish event".

→ It has only incoming arrows
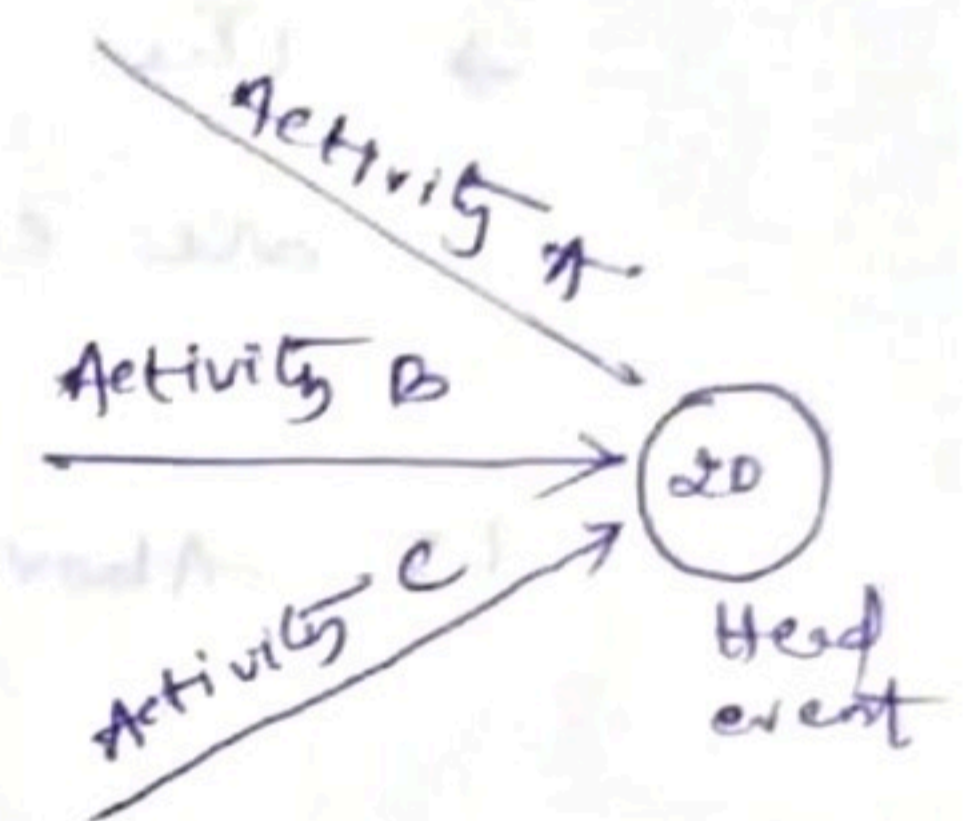
NOTE:

→ When a tail event represents beginning of more than one activity, then the event is said to occur when the first activity starts from it.

→ Similarly, when a head dead event occurs at end of more than one activity, the event is said to have occurred only when all the activities leading to it are completed.

Dual role events:

→ All events except the first and the last event of a project are dual role events.

→ They have both incoming and outgoing arrows.
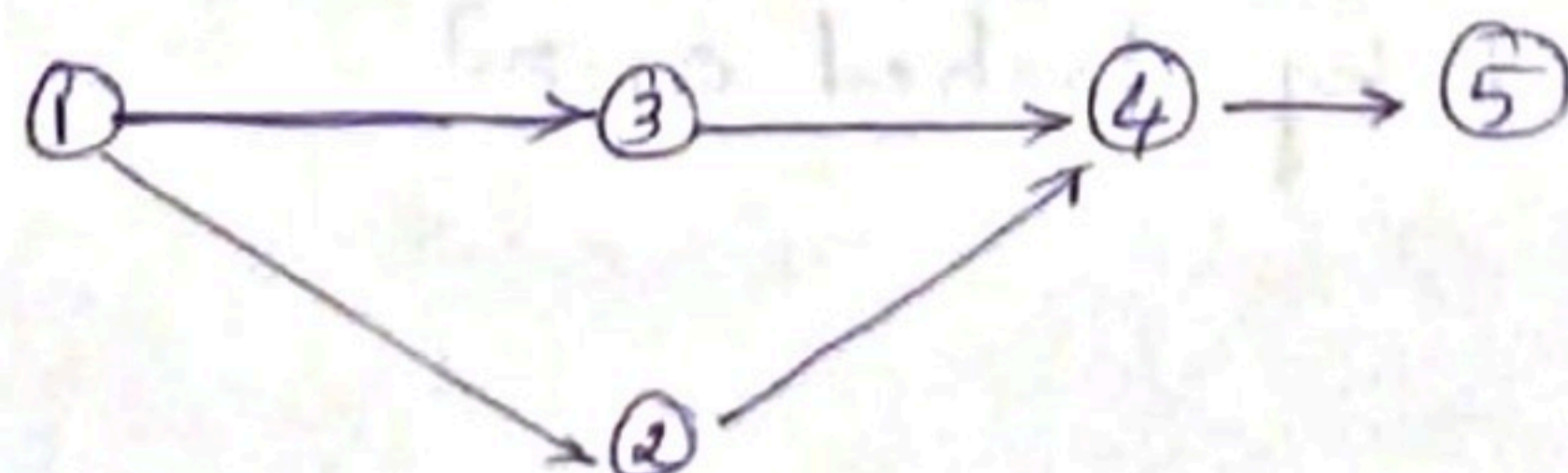
Eg: Events 2, 3, and 4 are dual role events.

successor events:

→ the events that follow another event are called successor events to that event
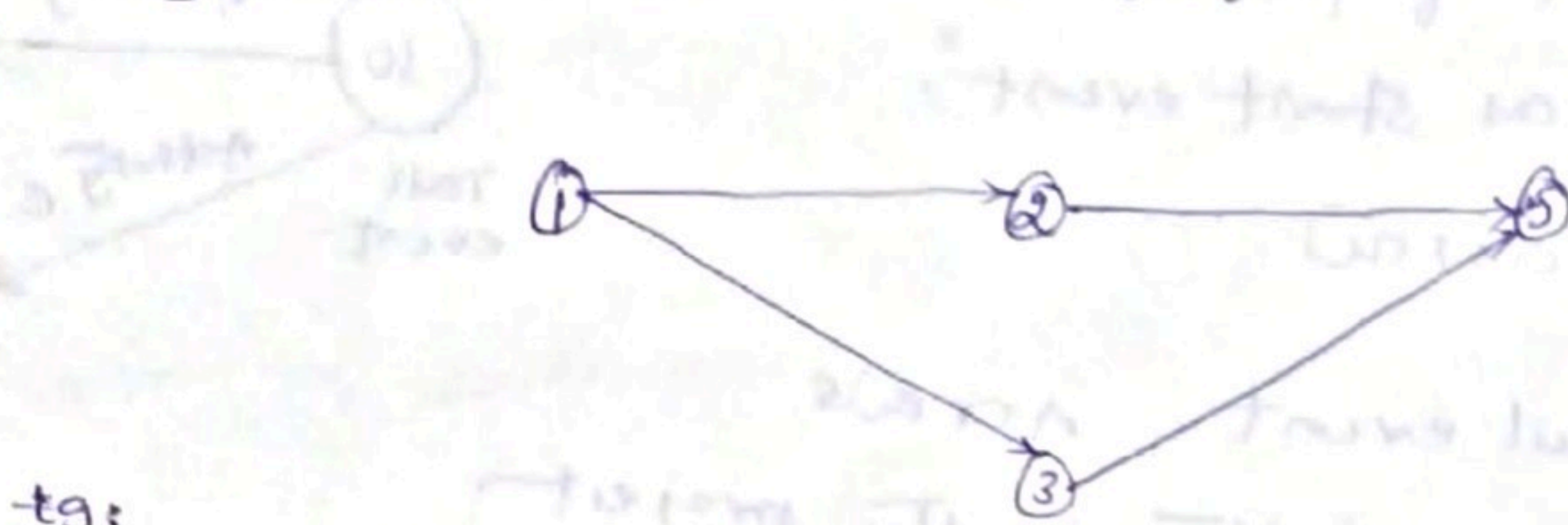
eg: Event 2 and 3 are successor events of event 1.

predecessor events:

→ the event or events that occur before another event are called predecessor event to that event.

eg: Above fig., events 2, 3 are predecessor to event 5.

Activity:

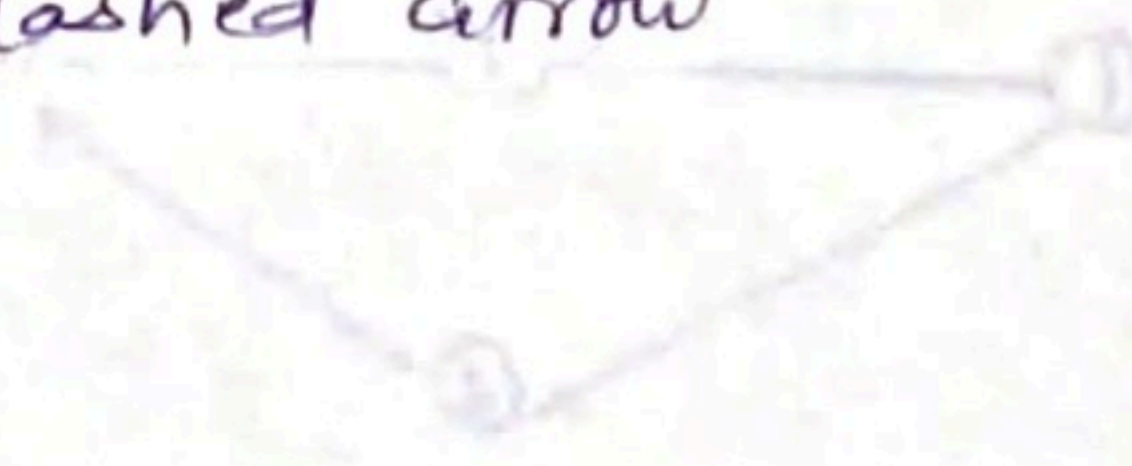→ Activity is actual performance of a job. It requires time and resources for its completion.
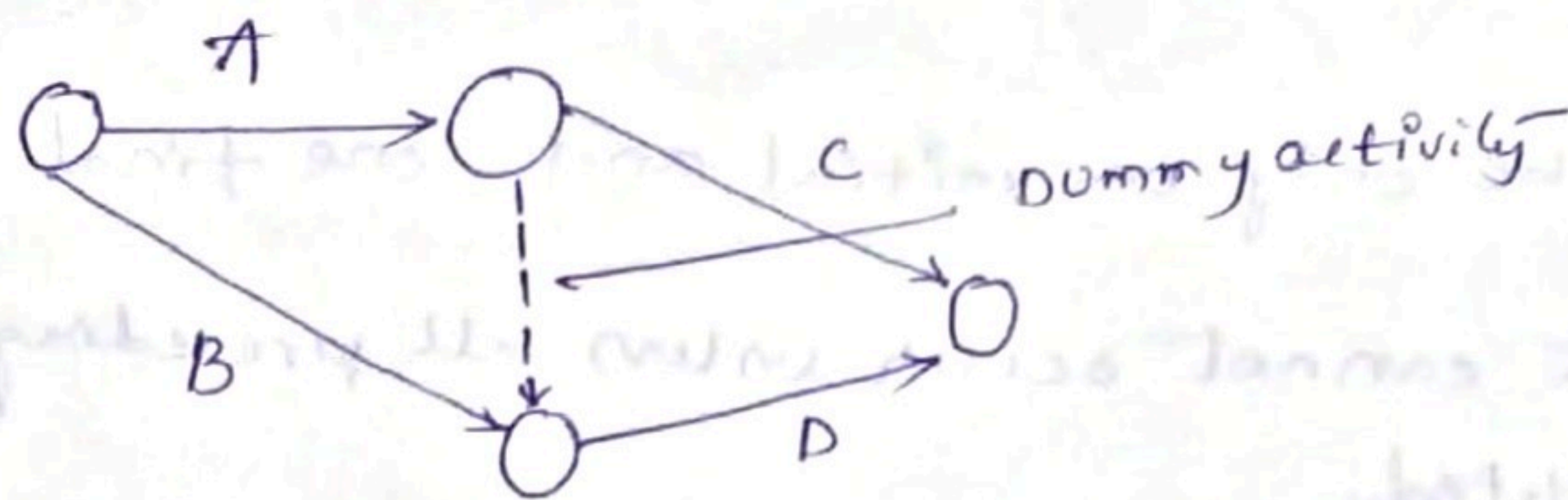
examples of an activity:

1. Excavate trench   2. Mix concrete

3. prepare budget

Dummy:

→ A dummy is a type of operation which neither requires time nor any resource, but it donates dependency among the activities.

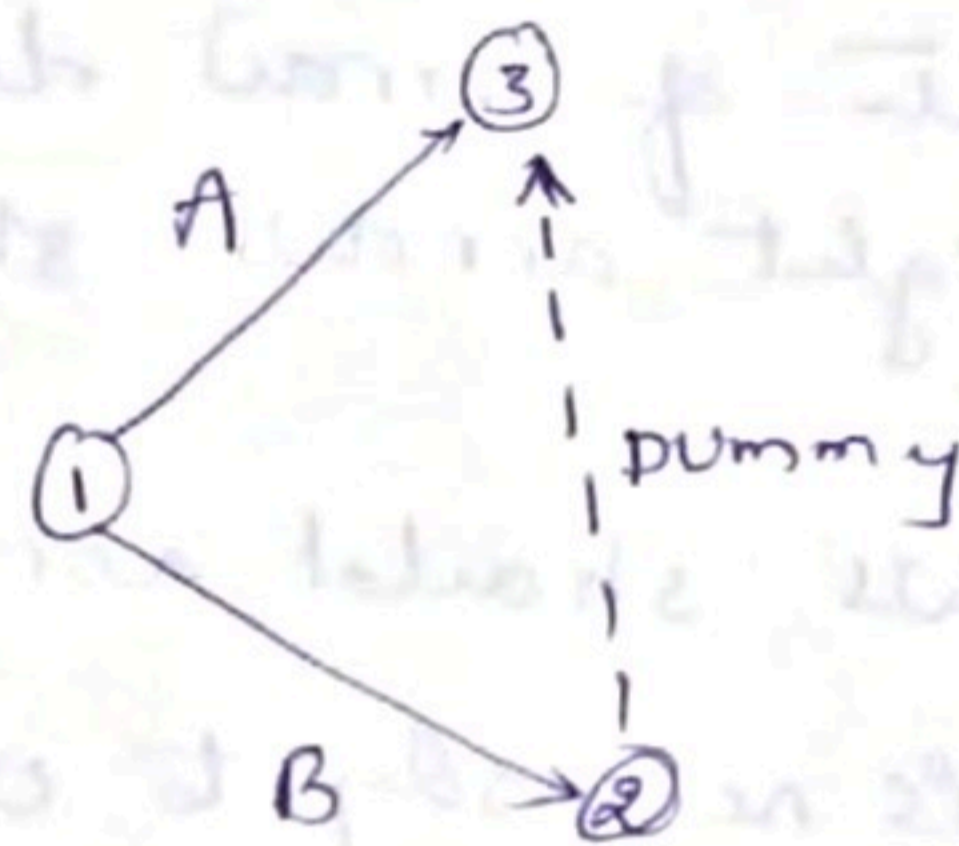→ It is represented by dashed arrow

→ Fig. shows, a dummy activity.

→ Dummy is used to serve following purposes:

1. Grammatical purpose:

→ To prevent two arrows having common beginning and common end.
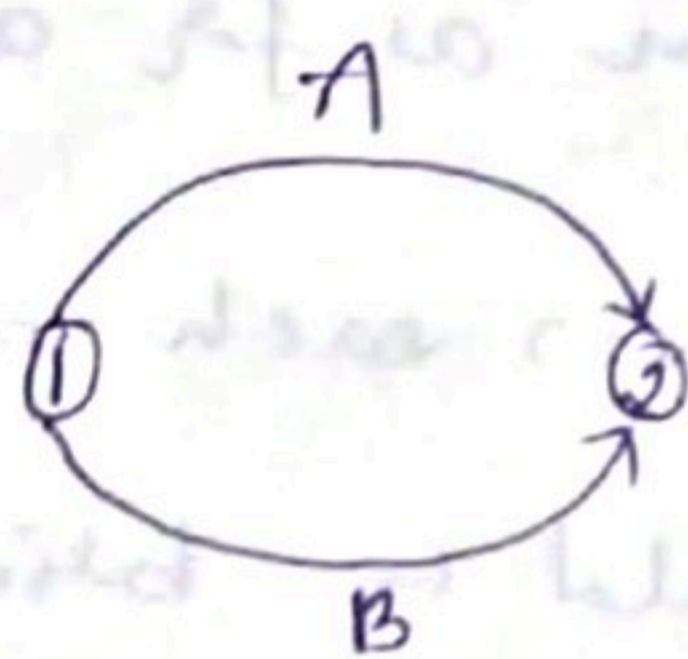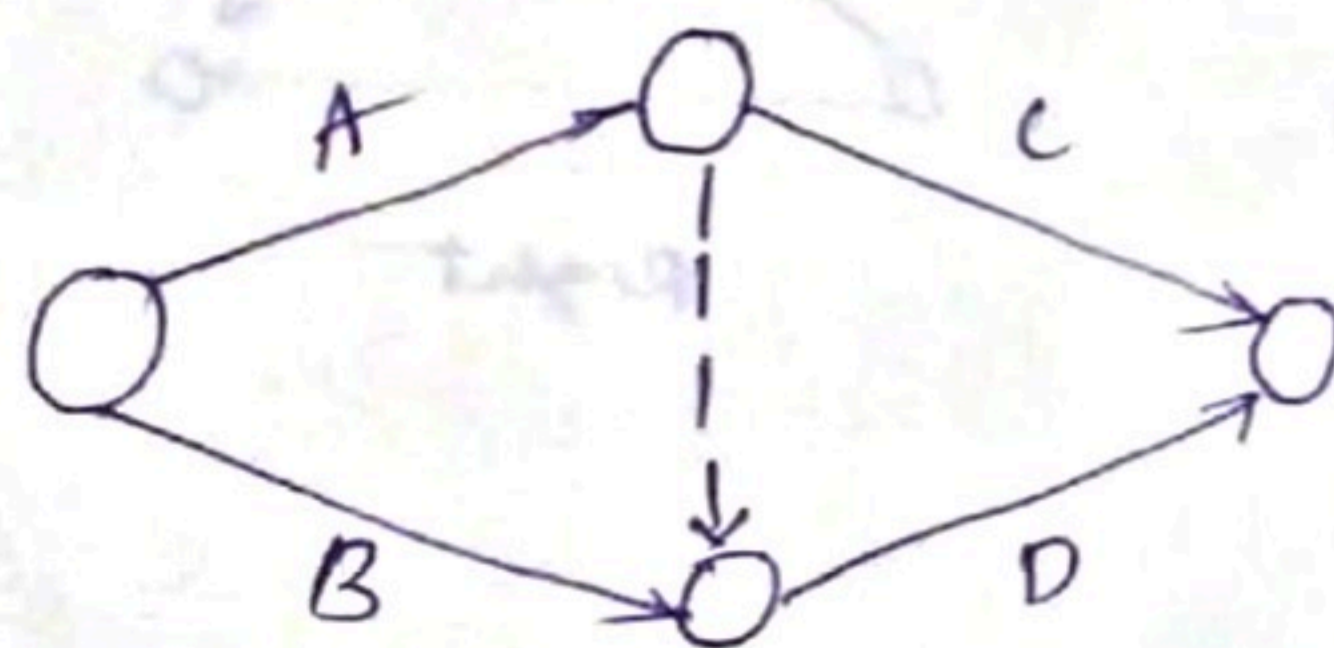

(a) Ambiguous Representation

(b) Grammatically clean Representation.

2. Logical purpose:

→ To show relationship with other activities.

→ Here dummy is required to show that activity D can start after completion activities of A & B both.

Rules of a Network :

1. There can be only one initial and one final event.

2. An event cannot occur unless all preceding activities are completed.

3. An event can not occur twice

4. Number of arrows should be equal to number of activities

5. Time should always flow from left to right

6. Length of arrow does not show any magnitude straight arrows should be taken as far as possible

7. Arrows should normally not cross each other. If it is necessary to cross, one should be bridged over the other.

8. No activity can start until it's tail event has occurred.

Errors in Network :

1. **Looping error :** Loops should not be formed.

Wrong   Right
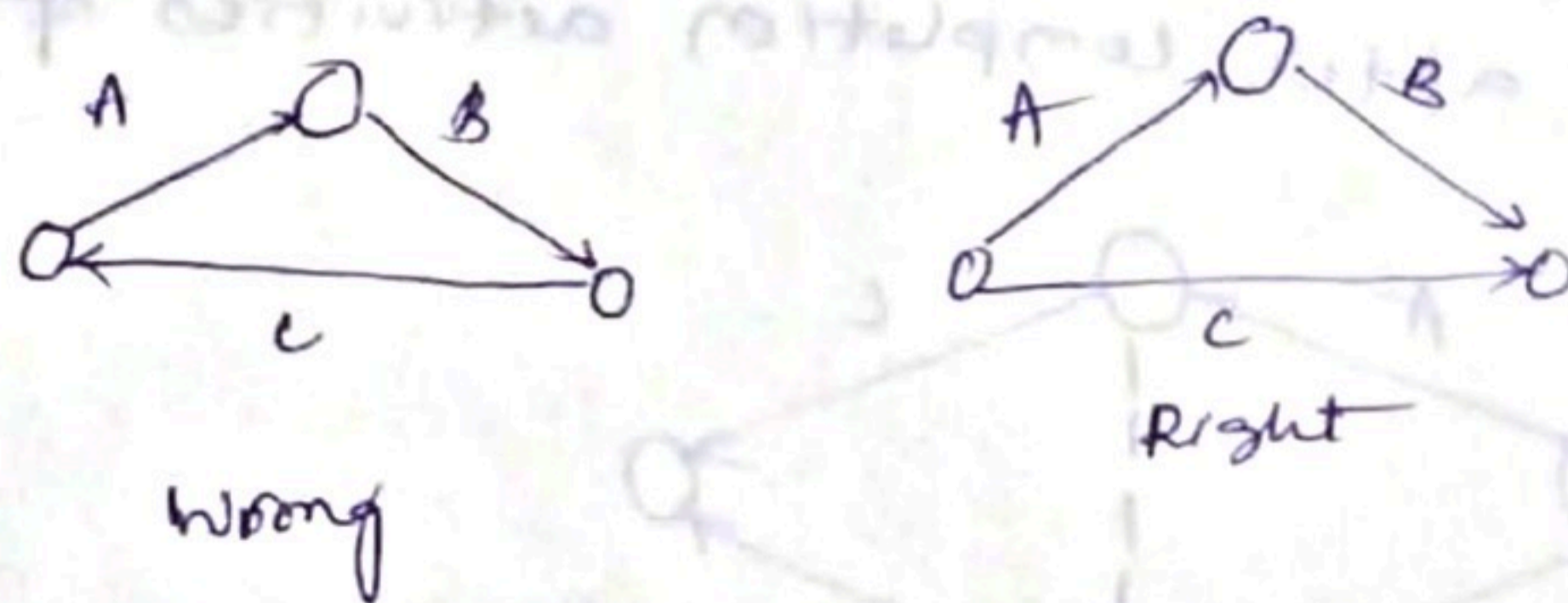
2. **Dangling error :** project is complete only when all its activities are complete but the duration of activity 'R' has no effect on the project time as shown in fig (or) whenever an activity is disconnected from the network it is called dangling error.
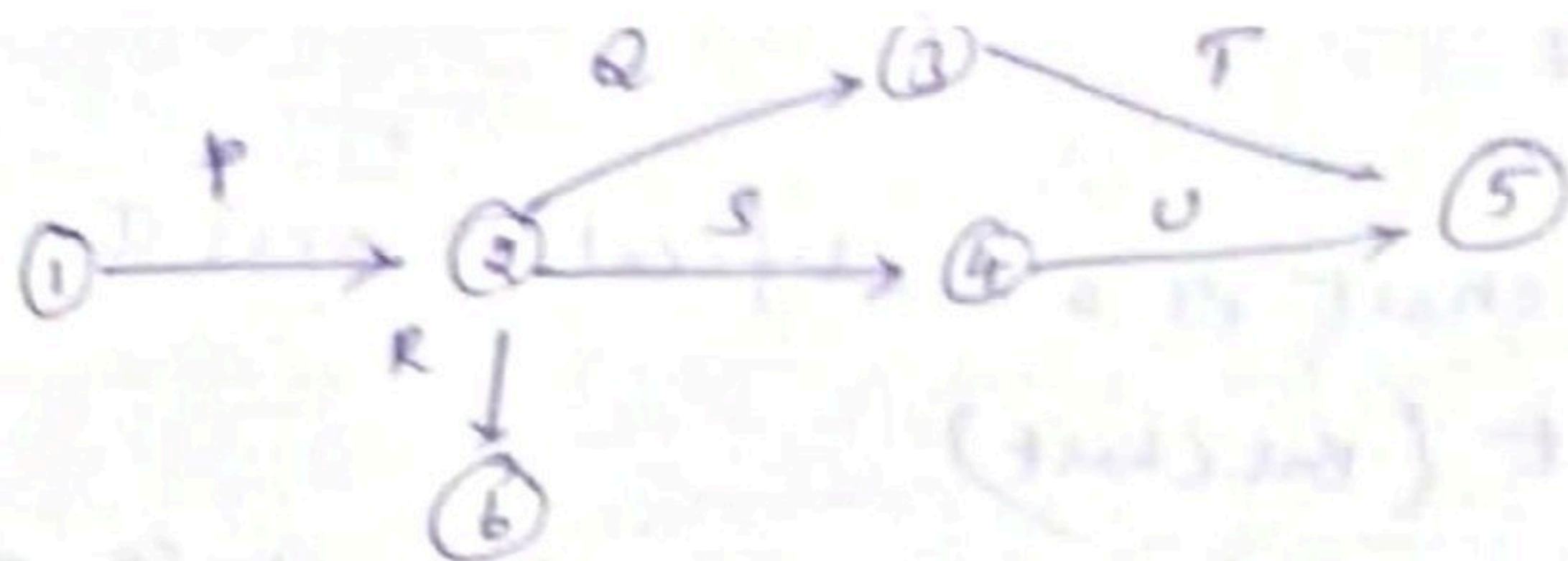
→ To avoid dangling error, the network must be examined in such a manner that all events except initial and final events must have at least one activity entering and one activity leaving them.

Wagon wheel errors:

→ As shown in fig, each of the activities P, Q and R cannot start until all the three activities A, B and C are completed.

→ But in reality, this may not be the situation.

→ There is no error visible in the construction of diagram but logical error has crept into it.
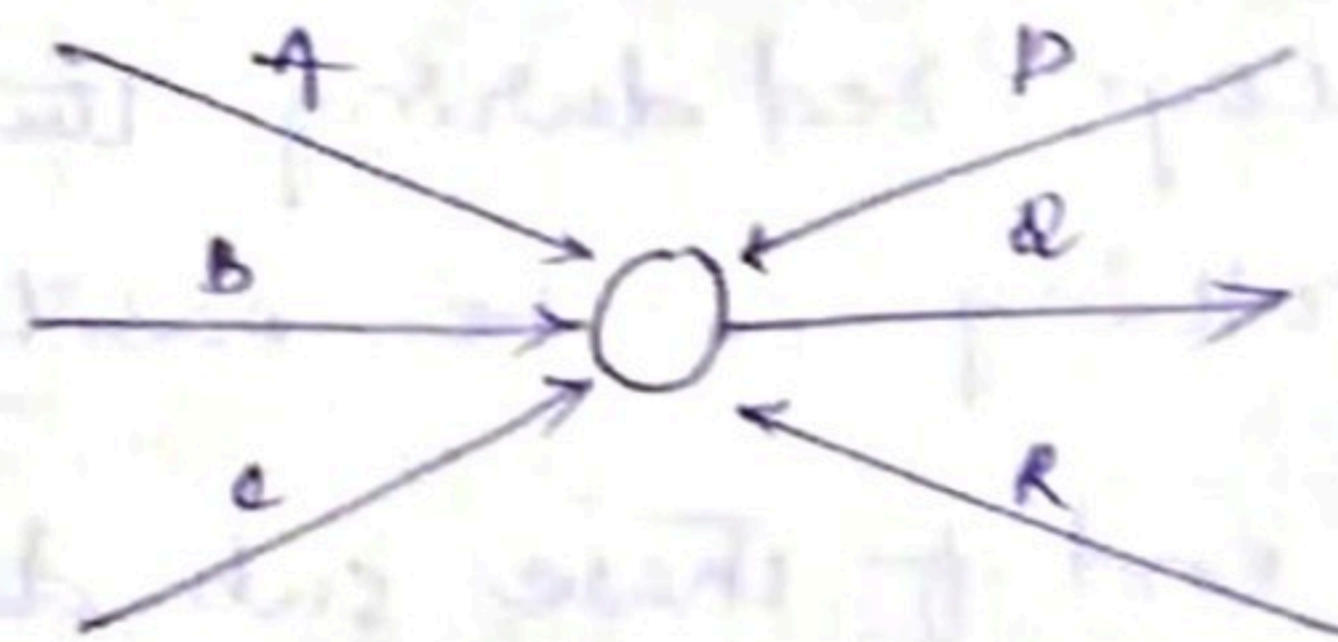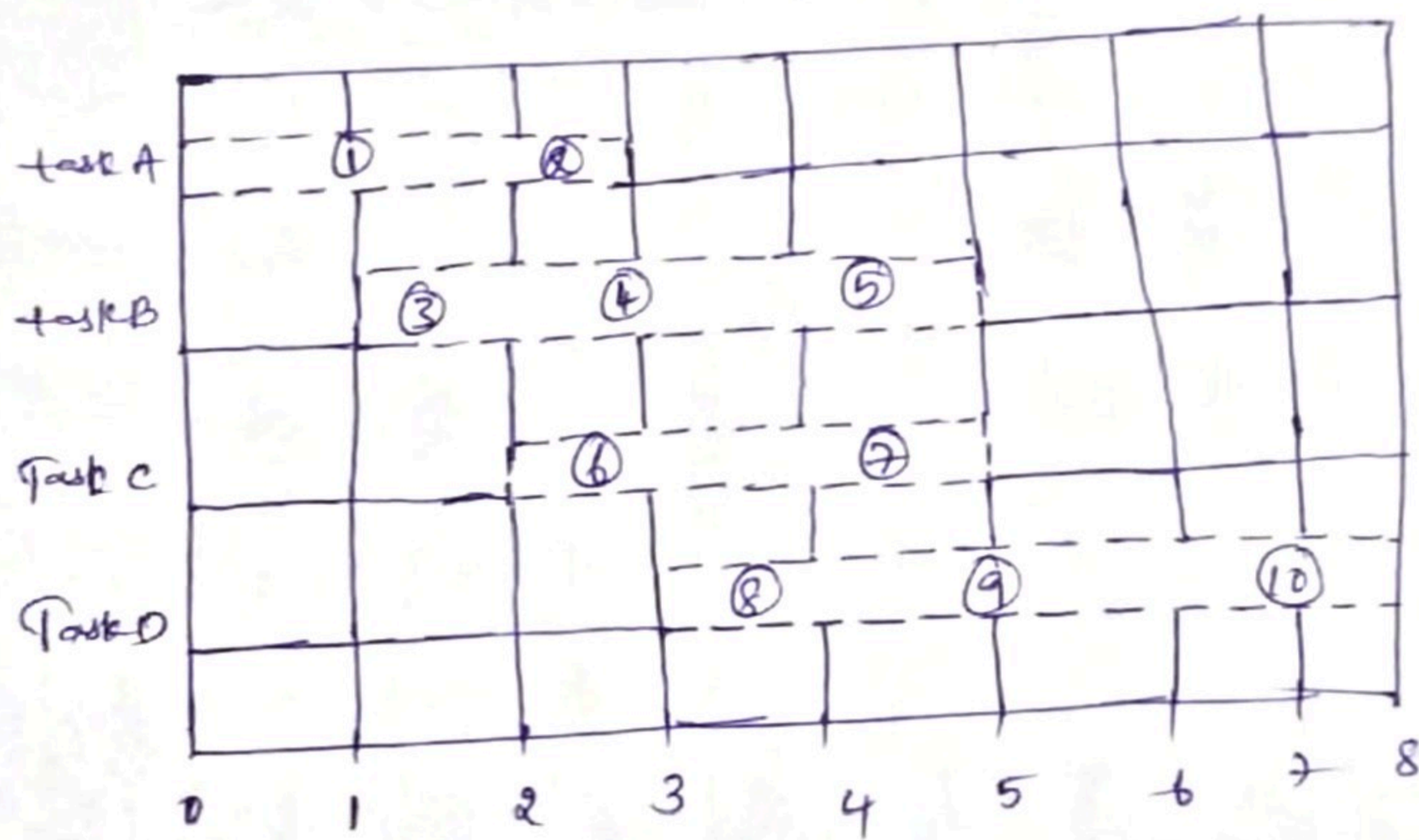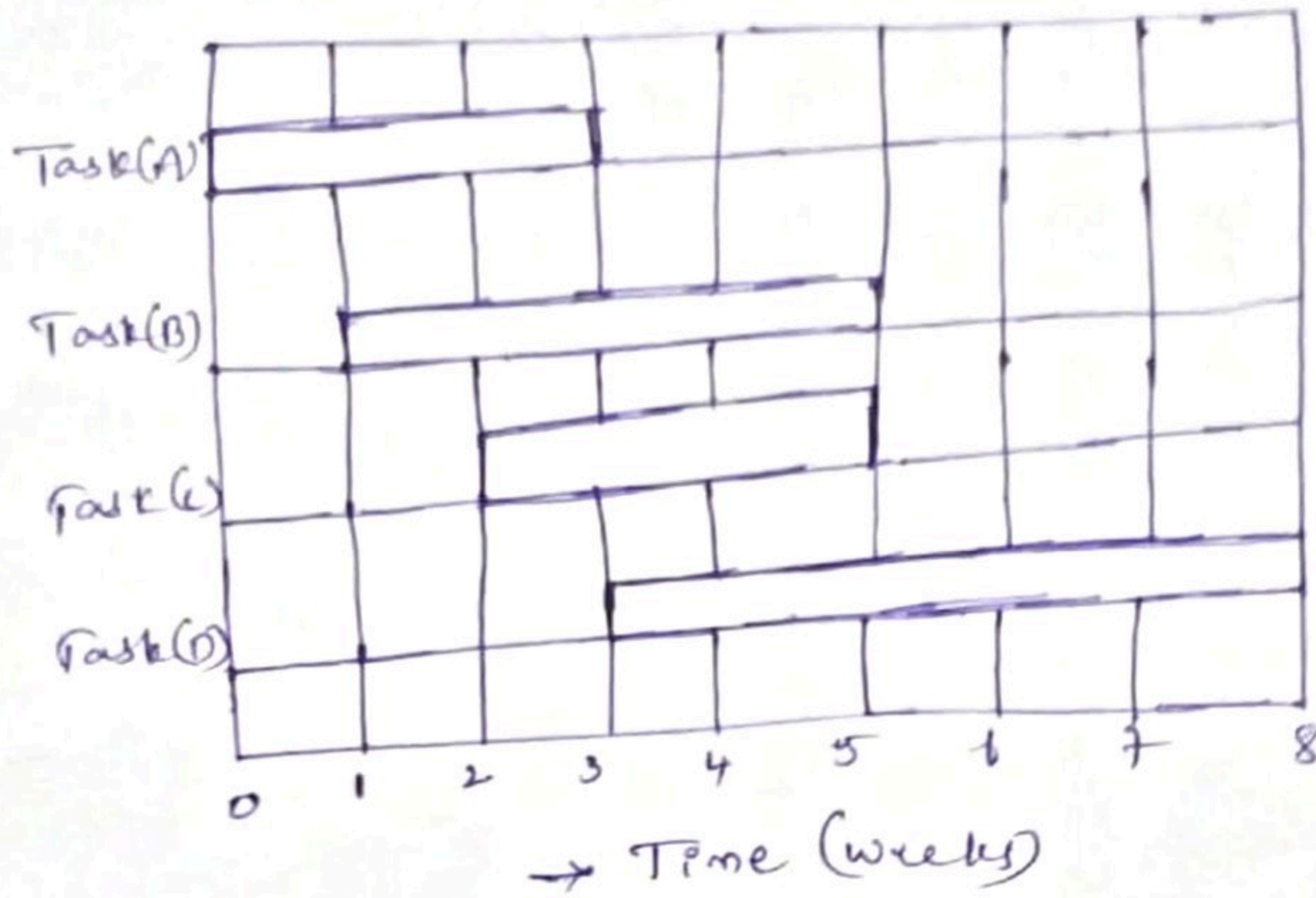
Milestone chart:

1. Milestone chart is a modification over the original Gantt chart (Bar chart)

2. Milestones are key events of a main activity represented by a bar. These are specific points in time which mark the completion of certain portions of the main activity. These points are those which can be easily identified over the main bar.

3. we represents a particular activity as a bar in the chart. if the bar is long, it indicates that it is taking more time. But the fact is when a bar on a bar-charts very long, the details lack in it. If, however, the activity is broken or sub-divided into a number of sub-activities, each one of which can be easily recognized during the progress of the project, controlling can be easily done.

The beginning and end of these sub-divided activities or tasks are termed as milestones (key events).

The below figure shows the difference btw bar chart and milestone chart

Task(A)
Task(B)
Task(C)
Task(D)

0 1 2 3 4 5 6 7 8

→ Time (weeks)

task A
taskB
Task C
Task D

0 1 2 3 4 5 6 7 8

→ the milestones or events in an activity are marked by
circling the milestone no. The milestones indicates
the completion of main events in a particular activity.
Therefore controlling of project becomes possible
with the milestones.

→ The limitations of bar charts is similar to milestone
charts except controlling. controlling is possible in
milestone charts.