ENIGNEERING MANEGMENT

PROGECT SCHEDULING

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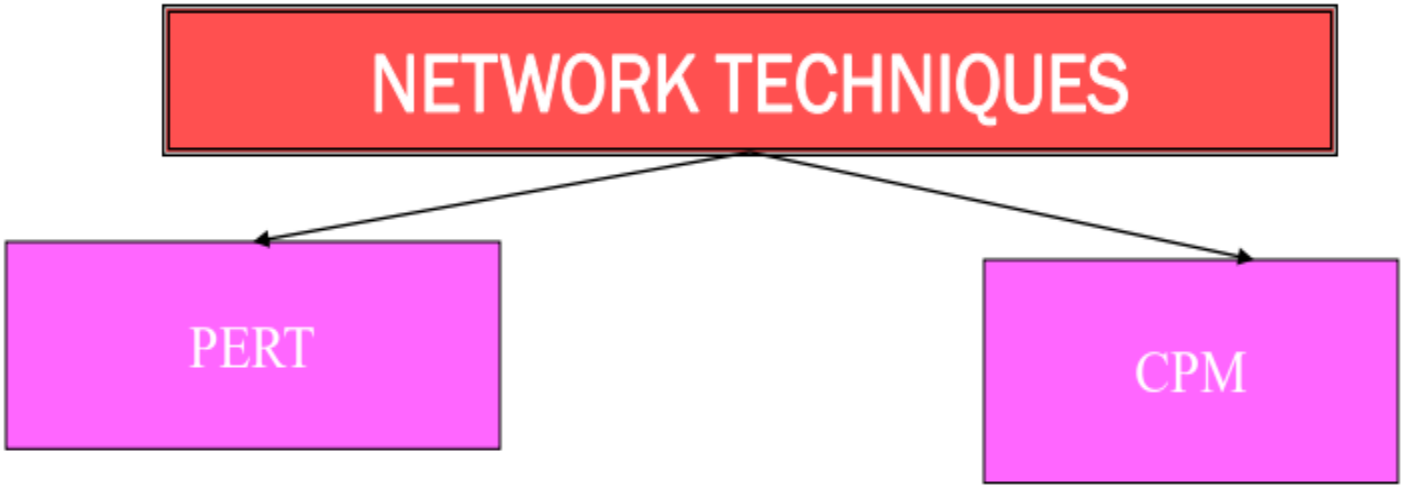
Project Scheduling

- Schedule converts action plan into operating time table
- Basis for monitoring and controlling project
- Scheduling more important in projects than in production, because unique nature



A PERT chart is a project management tool used to schedule, organize, and coordinate tasks within a project. PERT stands for *Program Evaluation Review Technique*, a methodology

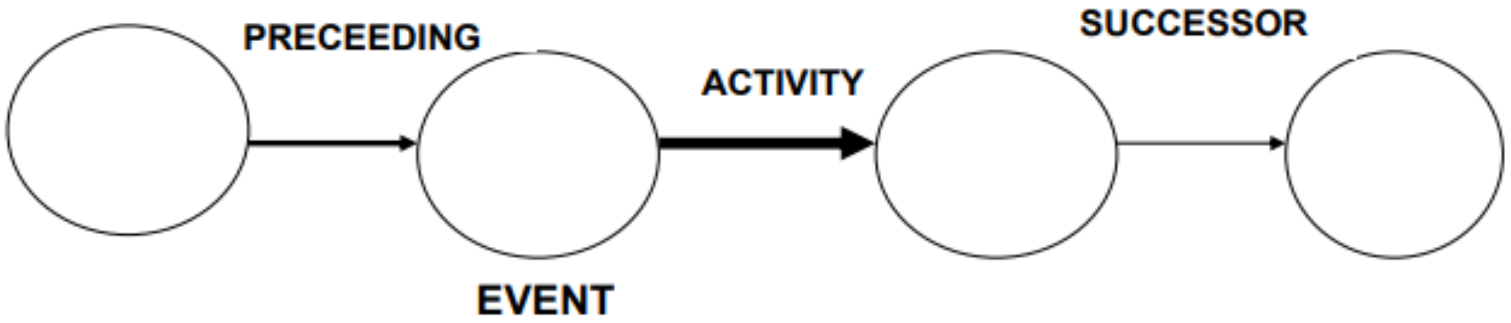
CPM is a project network analysis technique used to predict total project duration

NETWORK

- Graphical portrayal of activities and event
- Shows dependency relationships between tasks/activities in a project
- Clearly shows tasks that must precede (precedence) or follow (succeeding) other tasks in a logical manner
- Clear representation of plan – a powerful tool for planning and controlling project

DEFINITION OF TERMS IN A NETWORK

- **Activity** : any portions of project (tasks) which required by project, uses up resource and consumes time – may involve labor, paper work, contractual negotiations, machinery operations Activity on Arrow **(AOA)** showed as arrow, (**AON**) – Activity on Node
- **Event** : beginning or ending points of one or more activities, instantaneous point in time, also called 'nodes'
- **Network** : Combination of all project activities and the events



Emphasis on Logic in Network Construction

- Construction of network should be based on logical or technical dependencies among activities
- Example - before activity 'Approve Drawing' can be started the activity 'Prepare Drawing' must be completed
- Common error – build network on the basis of time logic (a feeling for proper sequence) see example below

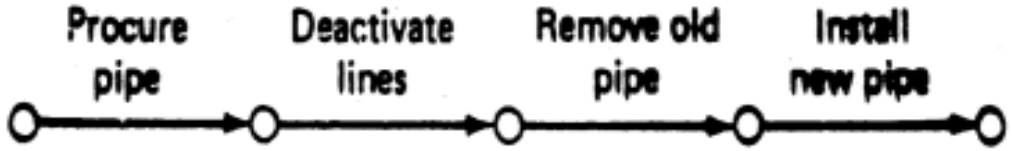


Figure 2-5a

WRONG !!!

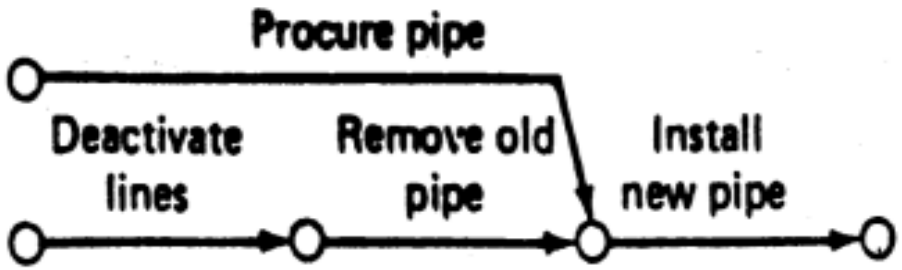
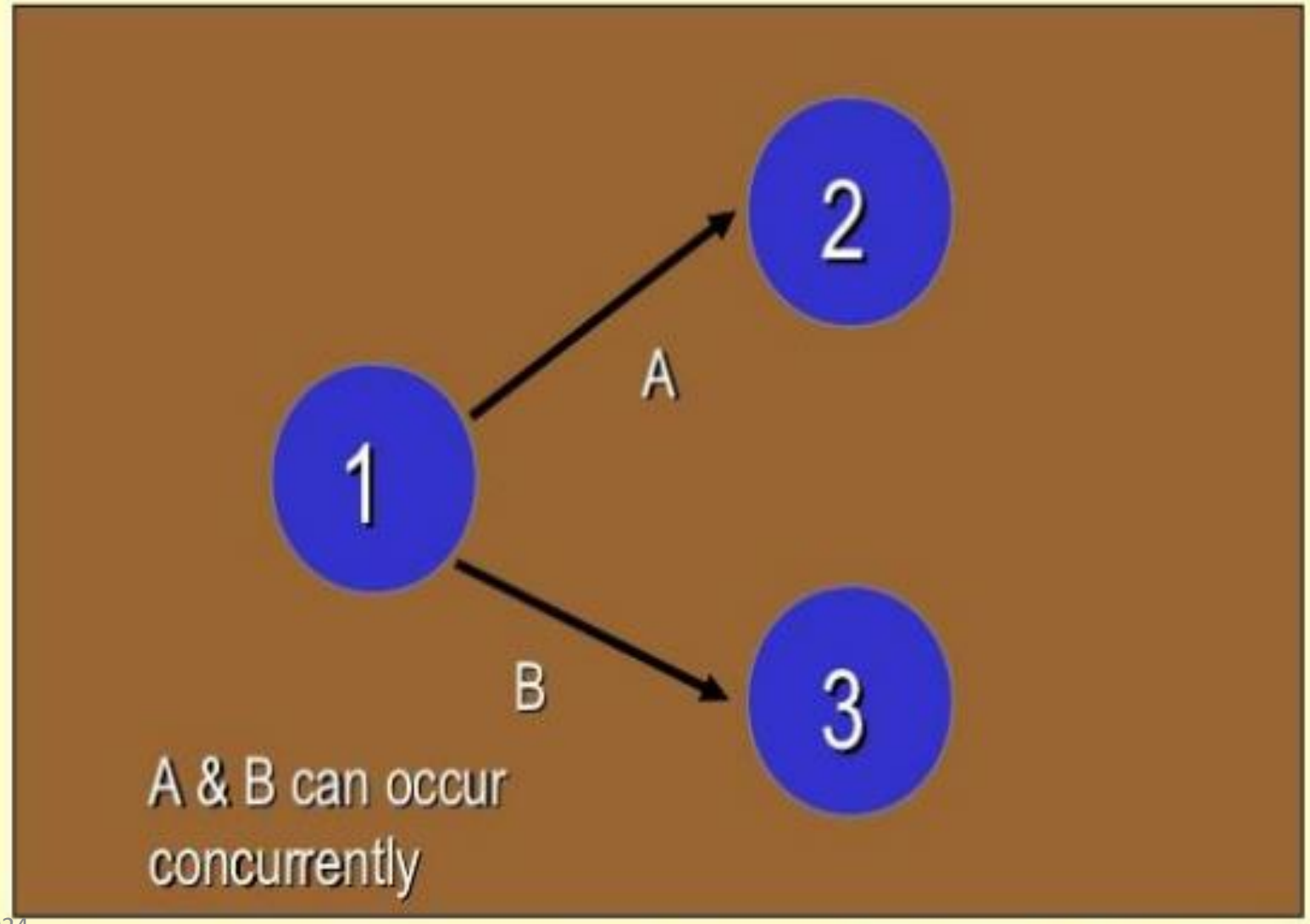


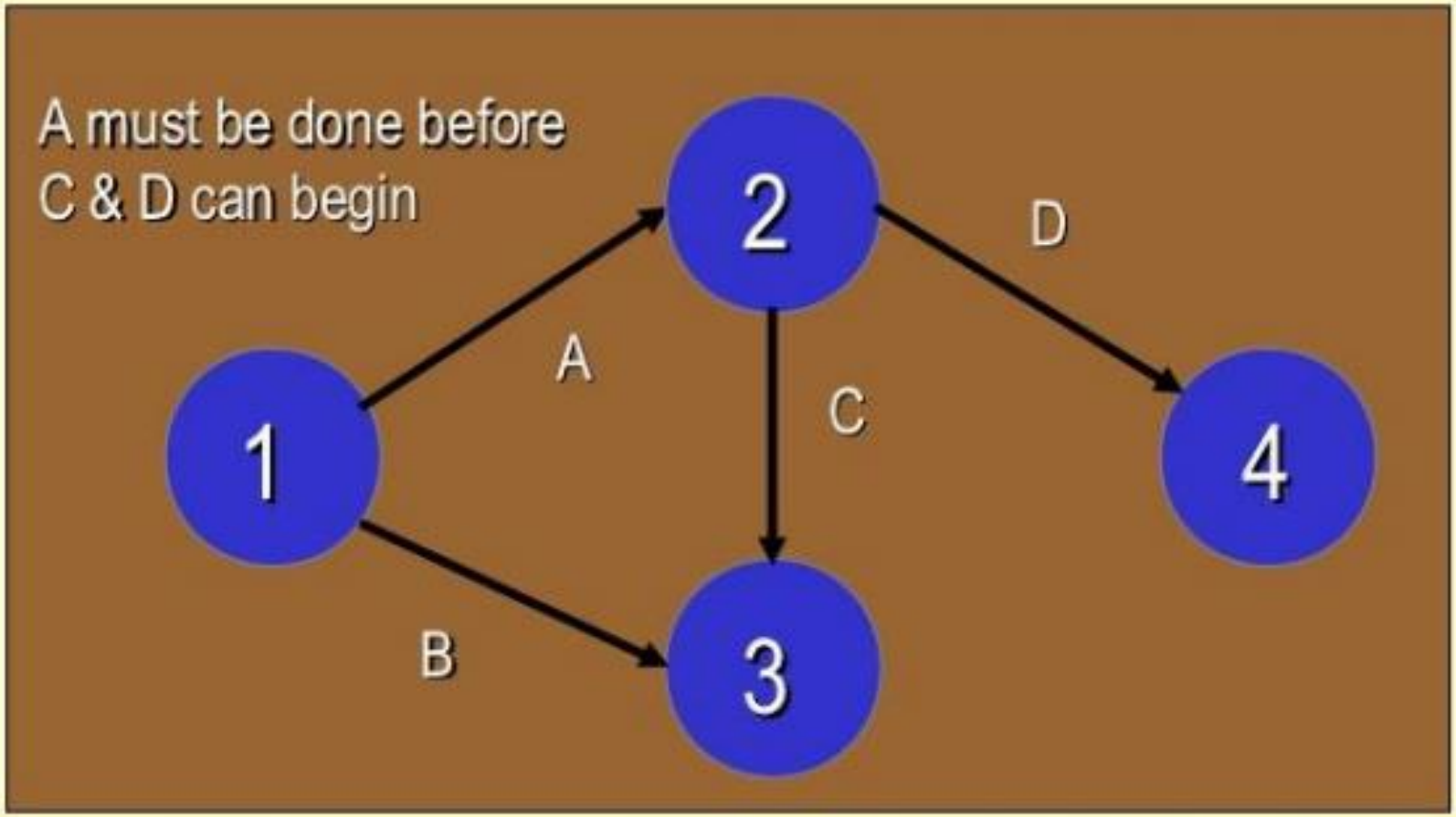
Figure 2-5b

CORRECT ✓

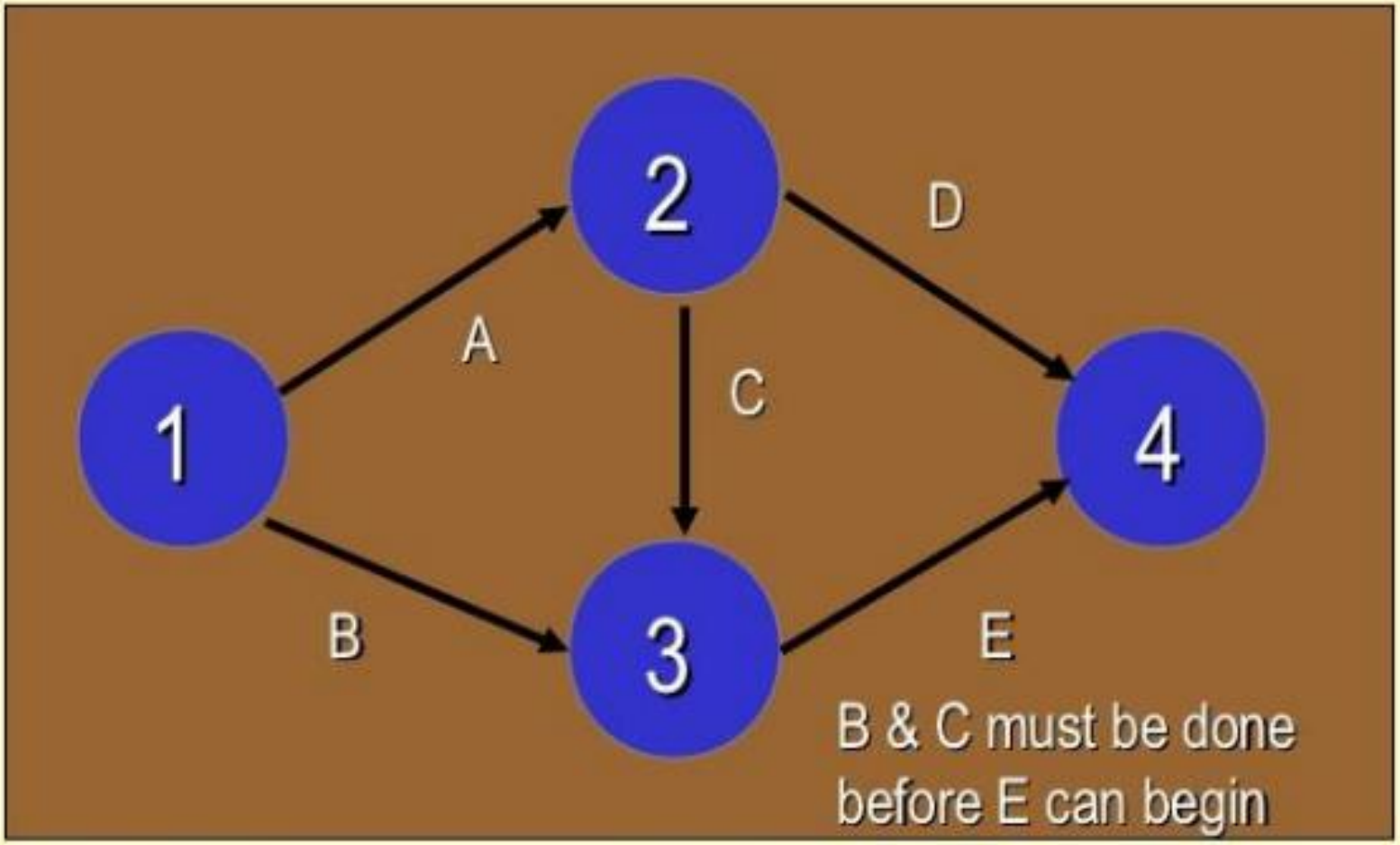
Activity Relationships



Activity Relationships



Activity Relationships



Critical Path Method (CPM)

- CPM is a project network analysis technique used to predict total project duration
- A critical path for a project is the series of activities that determines the *earliest time* by which the project can be completed
- The critical path is the *longest path* through the network diagram and has the least amount of slack

Critical Path Analysis

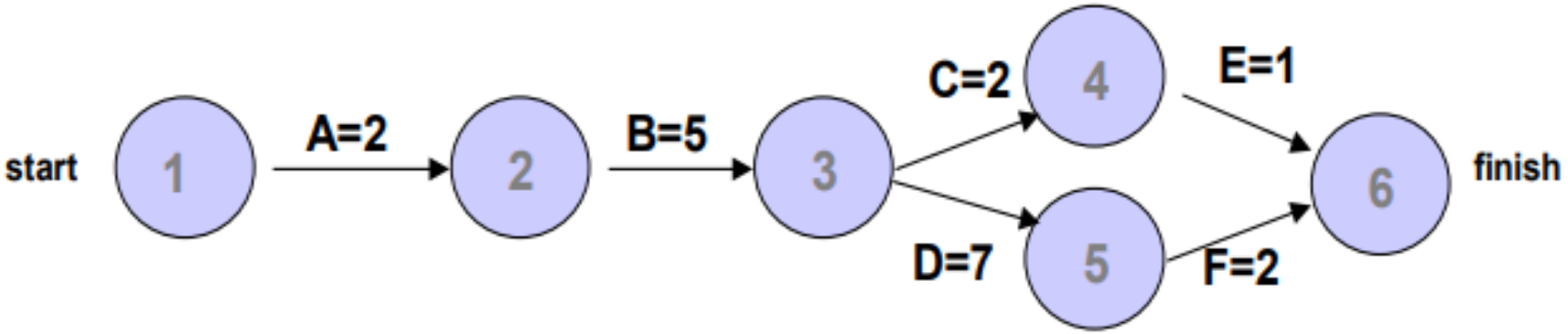
- Provides activity information
  - Earliest (ES) & latest (LS) start
  - Earliest (EF) & latest (LF) finish
  - Slack (S): Allowable delay
- Identifies critical path
  - *Longest* path in network
  - *Shortest* time project can be completed
  - Any delay on critical path activities delays project
  - Critical path activities have 0 slack

Finding the Critical Path

- First develop a good project network diagram
- Add the durations for all activities on each path through the project network diagram
- The longest path is the critical path

Simple Example of Determining the Critical Path

- Consider the following project network diagram. Assume all times are in days.



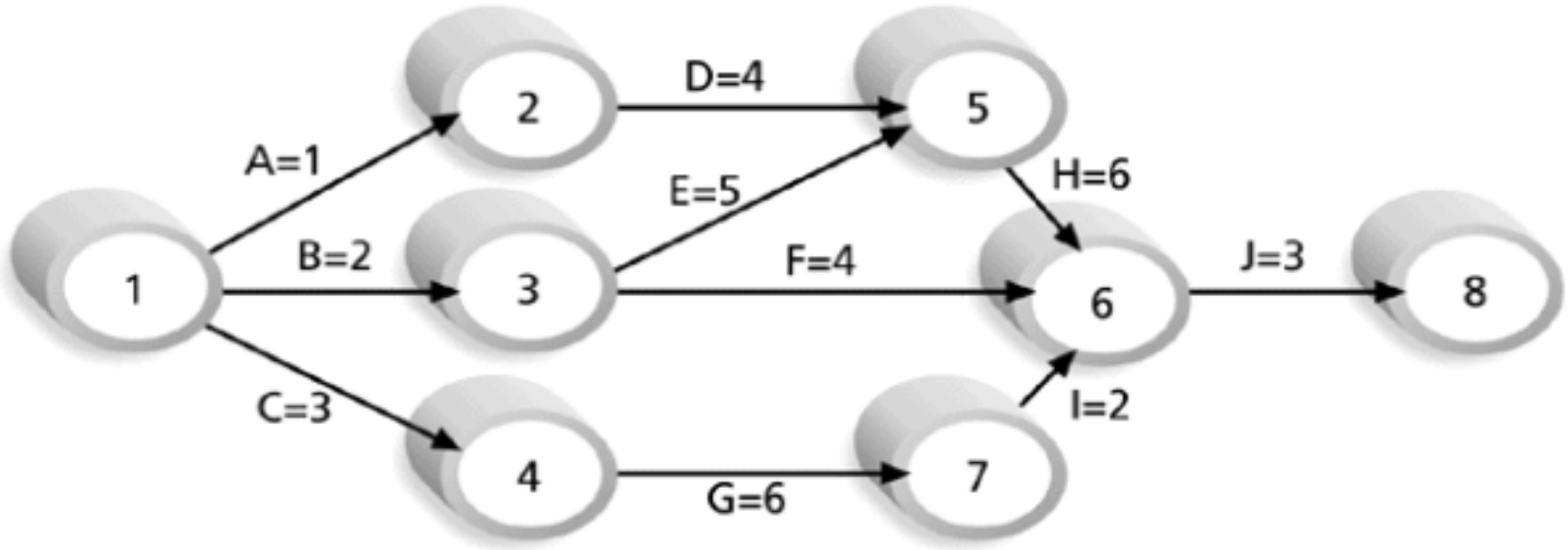
a. How many paths are on this network diagram?

b. How long is each path?

c. Which is the critical path?

d. What is the shortest amount of time needed to complete this project?

Determining the Critical Path for Project X



Note: Assume all durations are in days.

Path 1:	A-D-H-J	Length = 1+4+6+3 = 14 days
Path 2:	**B-E-H-J**	**Length = 2+5+6+3 = 16 days**
Path 3:	B-F-J	Length = 2+4+3 = 9 days
Path 4:	C-G-I-J	Length = 3+6+2+3 = 14 days

Since the critical path is the longest path through the network diagram, Path 2, B-E-H-J, is the critical path for Project X.

More on the Critical Path

- If one or more activities on the critical path takes longer than planned, the whole project schedule will slip *unless* corrective action is taken
  - The critical path is not the one with all the critical activities; it only accounts for time.
  - There can be more than one critical path if the lengths of two or more paths are the same
  - The critical path can change as the project progresses