

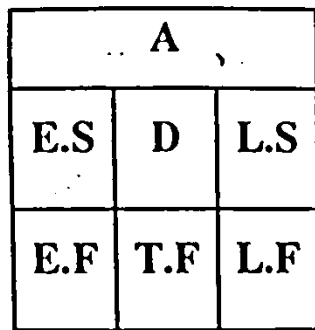
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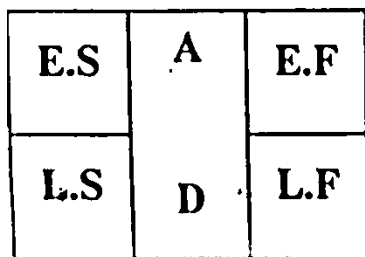
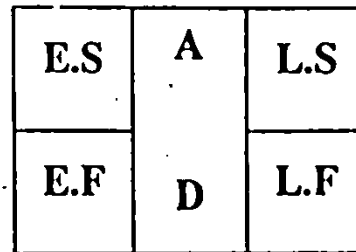
Activity-On-Node (A-O-N) Network Planning Technique

❖ What is the A-O-N Network (Precedence Diagram)?

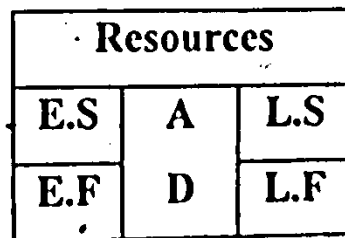
The Activity-on-Node, or Precedence Diagram uses similar logic to Activity-on-Arrow (A-O-A), but it is represented differently. With this technique, the activity is represented by a box or node, with the arrows showing logic relationship between boxes as shown below:



Or



Or



❖ A-O-N Network Diagram Specification:

- There is no dummy activity.
- All the information that wanted to any activity is written on the box (node) area.
- The time overlapping problem for activities is solved by this technique.
- The delay time for activities can be solved without needing to return to the plan details.

❖ The Activity Early Start (E.S)

It is the earliest time that an activity can start with.

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❖ **The Activity Early Finish (E.F)**

It is the earliest time that an activity can finish with.

$$E.F = E.S + \text{Duration (D)}$$

❖ **The Activity Late Finish (L.F)**

It is the latest time that an activity can finish with.

❖ **The Activity Late Start (L.S)**

It is the latest time that an activity can start with.

$$L.S = L.F - \text{Duration (D)}$$

❖ **The Activity Total Float (T.F)**

The float for an activity is the amount that its duration can slip without causing the project to be delayed. Any activity with a zero float is on the critical path (C.P).

$$T.F = L.F - E.F \quad (\text{or}) \quad = L.S - E.S$$

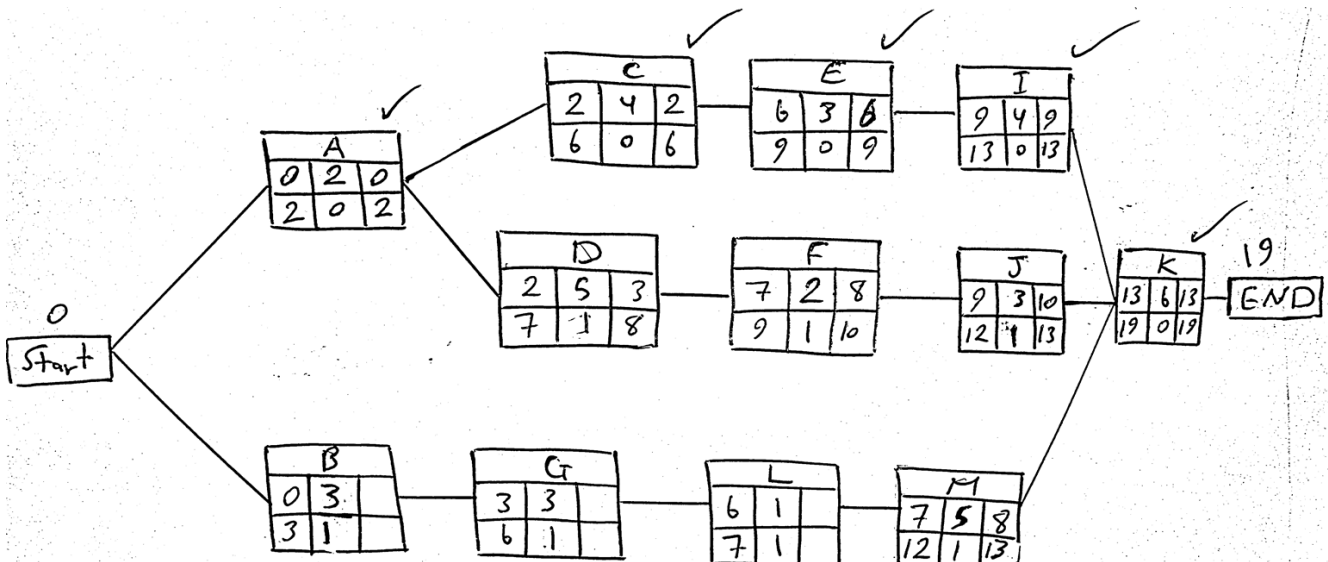
Critical path (C.P) is the path that has the longest duration where activities have zero float

❖ **Examples of A-O-N Network Diagrams**

Ex-1/ Find the project's total duration. Use the following details to draw the A-O-N Network Diagram:

Activity	A	B	C	D	G	E	F	L	I	J	M	K
Duration (weeks)	2	3	4	5	3	3	2	1	4	3	5	6
Following Activity	C,D	G	E	F	L	I	J	M	K	K	K	---

Solution:



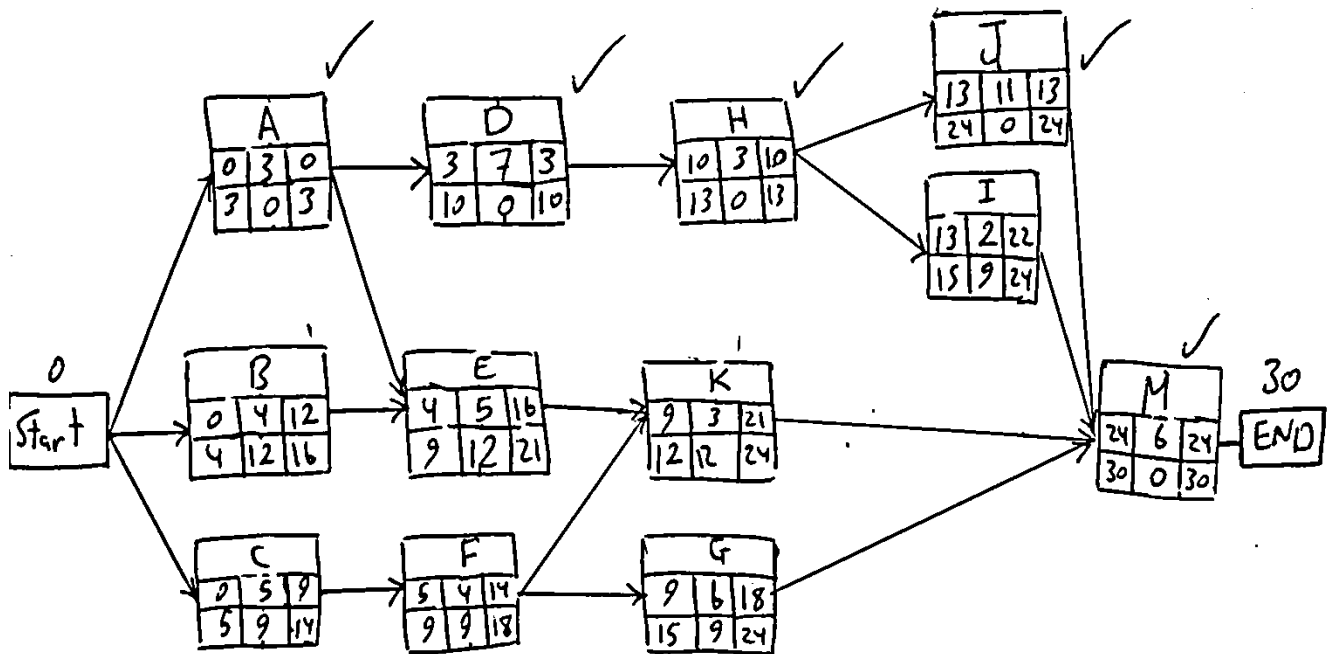
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Project Total Duration is 19 weeks. (C.P= A,D,H,J,M)

Ex-2/ Find the project's total duration and date of completion (assume the project start date is 1/3/2015). Use the following details to draw the A-O-N Network and build its Table:

Activity	A	B	C	D	E	F	H	K	G	I	J	M
Duration (days)	4	5	6	8	3	7	11	4	8	9	4	6
Following Activity	D,E	E	F	H	K	K,G	I,J	M	M	M	M	---

Solution:

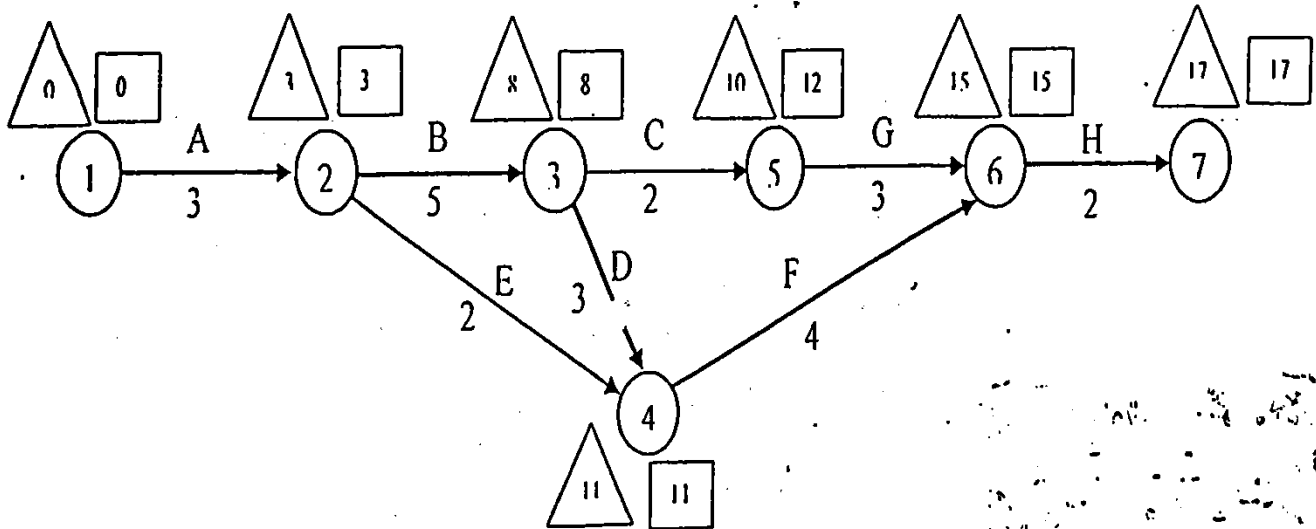


Project Total Duration is 30 days. The date of completion is 1/4/2015
C.P= (A,D,H,J,M)

Ex-3/ Convert the Arrow Diagram (A-O-A) provided below to the Precedence Diagram (A-O-N)

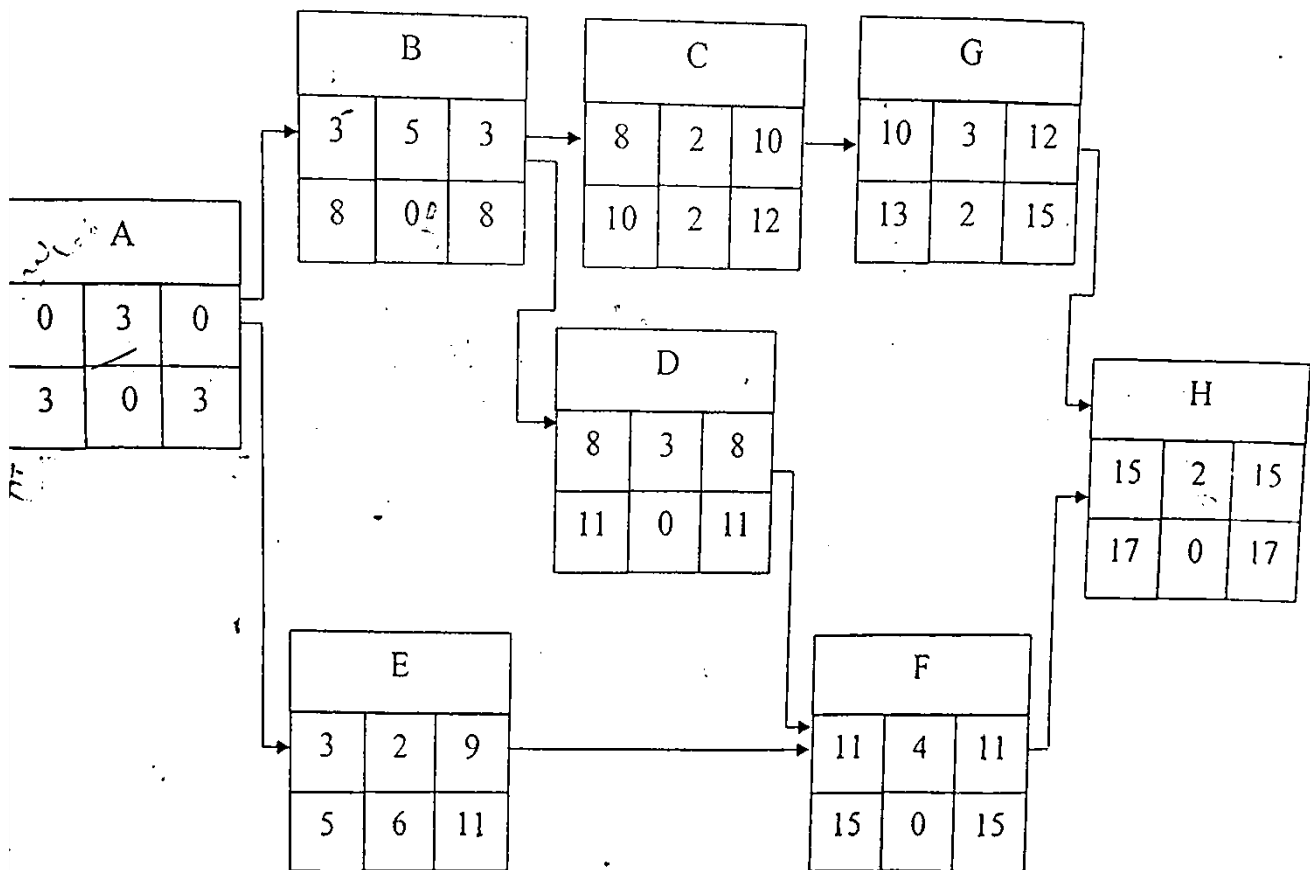
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A-O-A Network Diagram:



Solution:

A-O-N Diagram:

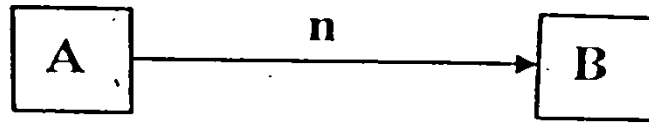


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❖ Relationships Among Activities

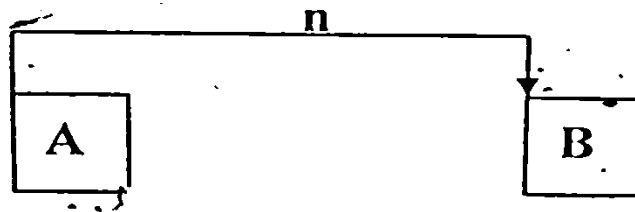
A- Finish to Start (F.S)

The activity (A) finished before starting of activity (B) by (n) period



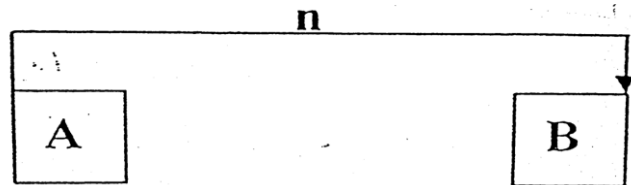
B- Start to Start (S.S)

The activity (A) start before (n) period of start for activity (B)



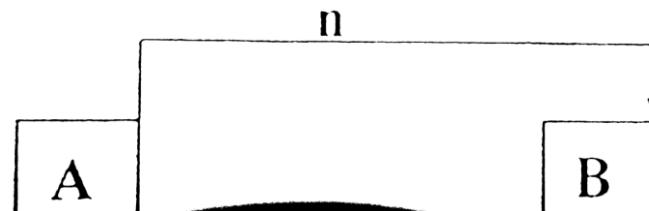
C- Start to Finish (S.F)

The activity (A) start before (n) period of finish for activity (B)



D- Finish to Finish (F.F)

The activity (A) finished before (n) period of finish of activity (B)



Homework

Q1: For activities shown in table below, find the new time of project after updating, if the project manager decided to update the activities of project after (one month), the manager increased the time of activity which locate on the critical path (one weeks).

Activity	A	B	C	D	E	F	K	I	M	S	R	N	J
Duration Days	7	15	8	13	14	16	14	8	11	12	22	20	19
Followed by	D E	F K	D	I J	M	J	J	N R S	N	J	---	---	---

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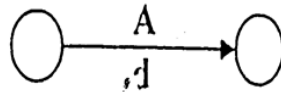
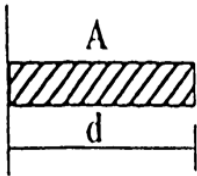
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Logic Relationship Presentation by (Bar Chart), (A-O-A) and (A-O-N)

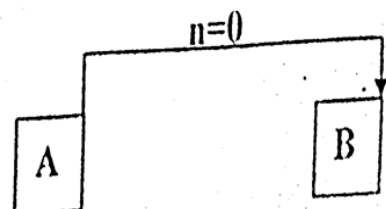
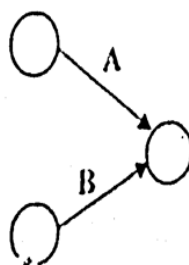
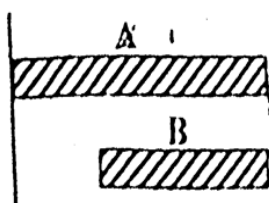
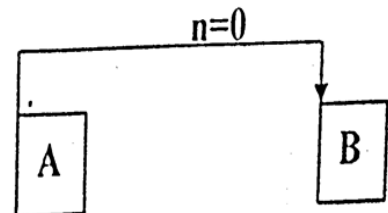
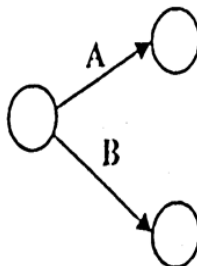
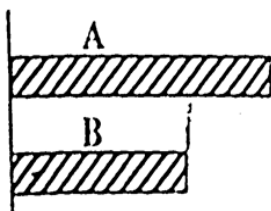
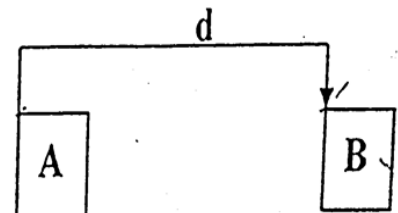
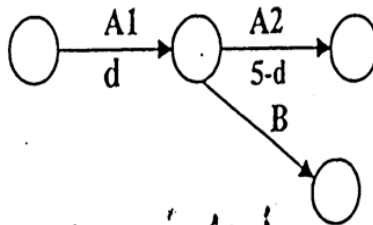
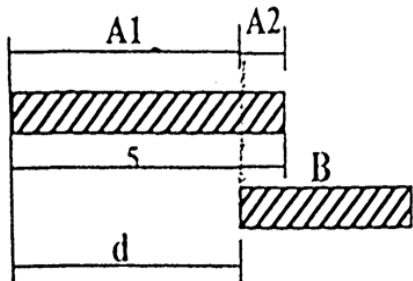
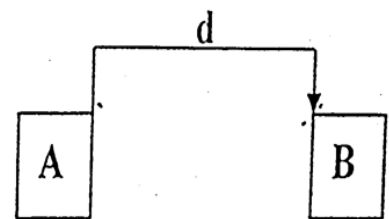
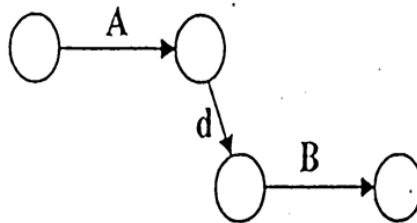
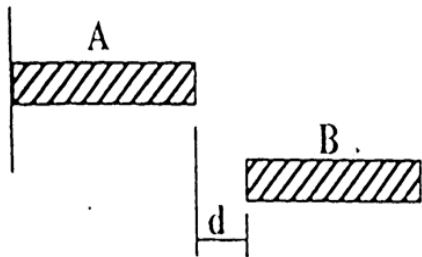
Bar chart

A.O.A

A.O.N



A			event
E.S	d	L.S	
E.F	T.F	L.F	



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Homework

Q1: Determine the duration of project for the activities shown below, and find the critical path by using (A-O-N Diagram)

Activity	A	B	C	D	E	F	O	H	I	J	K	M	N	R
Duration (Weeks)	4	5	6	8	3	7	8	11	3	8	4	8	9	4
Followed by	C,D ,E	D,F	J	J,H	O	K	M	I,K	N	M	R	---	---	---

Q2: For the activities shown below determine:

1. The duration of project
2. The critical path by using (Activity on Node method) - A-O-N

Activity	A	B	C	D	E	F	G	H	I	J	K
Duration (Weeks)	5	7	8	6	3	6	3	6	7	6	8
Followed by	C,D	C,E	F,G	B,E	H,G	I,J	J	J	K	K	---

Q3: Determine the time completion of project for the activities shown below: A-O-N

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Expected duration (weeks)	8	6	6	11	0	14	8	9	0	10	12	12	15	5	5	8
Preceded by	-	-	-	A	A	B	C	C	G	G	D,M	E,F,J	E,F,J	L	I,H	K,N,O