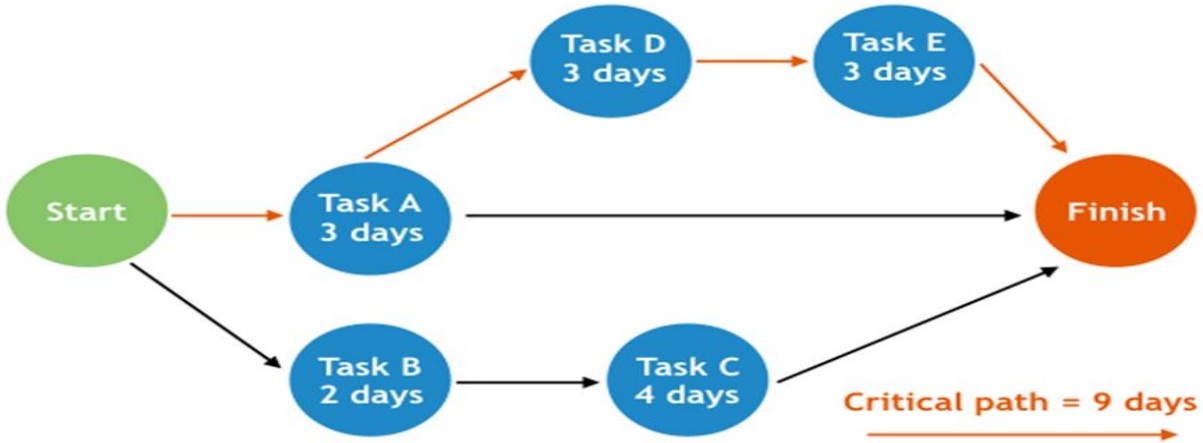
Al-Mustaqbal University
Department: Medical Instrumentation Techniques Engineering
Class: 4th
Subject: Project Management
Lecturer: Lec. Hameed Nida Hameed
1st term / Lecture: Critical

Lec7- Critical Path Method - Examples

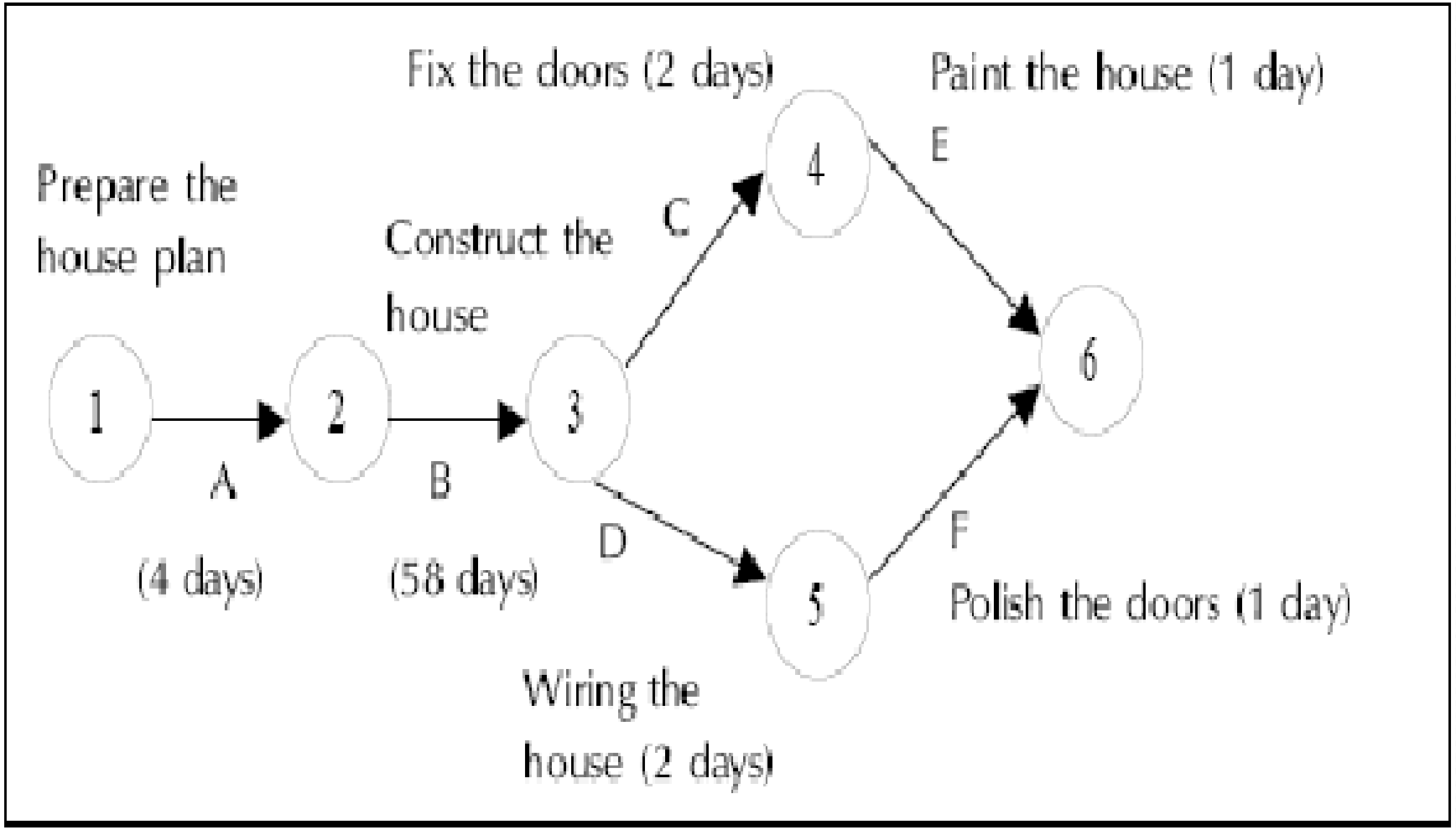


E-mail: hameed.nida.hameed@uomus.edu.iq

Ex 2: *Draw a network for a house construction project. The sequence of activities* with their predecessors are given in Table , below.

Name of the activity	Starting and finishing event	Description of activity	Predecessor	Time duration (days)
A	(1,2)	Prepare the house plan	--	4
B	(2,3)	Construct the house	A	58
C	(3,4)	Fix the door / windows	B	2
D	(3,5)	Wiring the house	B	2
E	(4,6)	Paint the house	C	1
F	(5,6)	Polish the doors / windows	D	1

Solution:

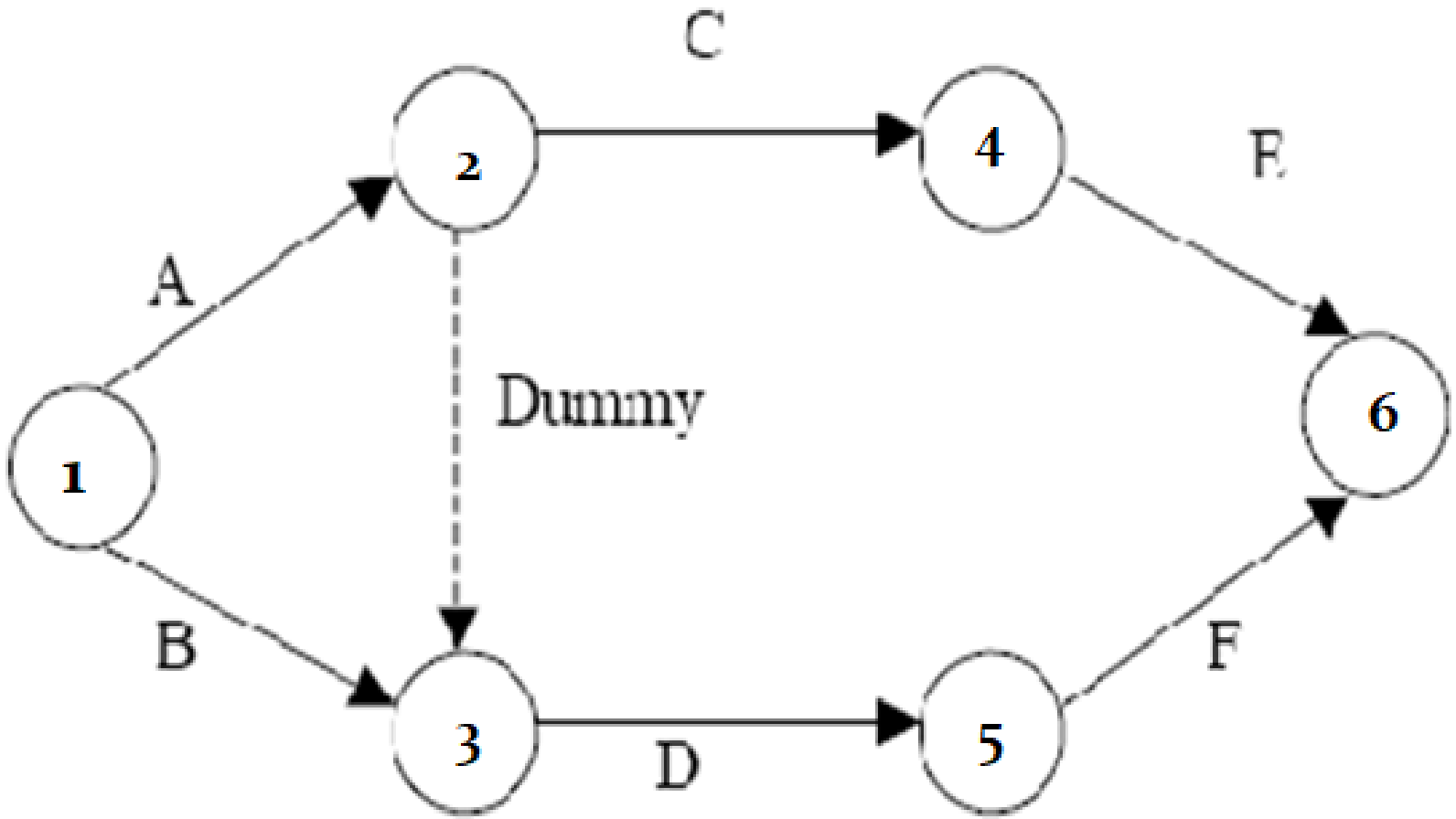

Fix the doors (2 days)
Paint the house (1 day)
E
Prepare the house plan
Construct the house
C
4
1
2
3
6
A
B
D
F
(4 days)
(58 days)
5
Polish the doors (1 day)
Wiring the house (2 days)

C.P = ?

Ex 3: consider the project given in the table below , Draw the network for the project.

Activity	Description	Predecessor
A	Purchase of Land	-
B	Preparation of building plan	-
C	Level or clean the land	A
D	Register and get approval	A, B
E	Construct the building	C
F	Paint the building	D

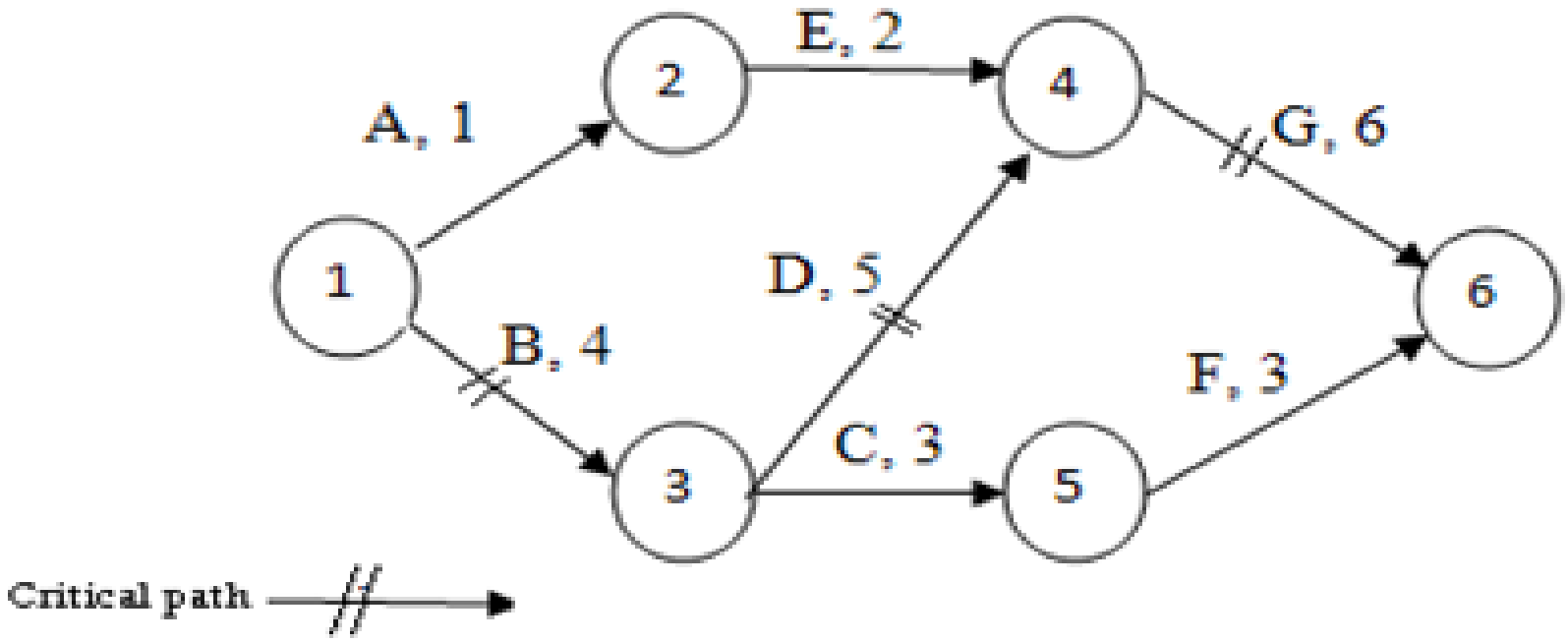
Ans:



Ex4: **Determine the critical path by using CPM of the following Table (project).**

Activities	Path	Duration (weeks)	Description
A	1 – 2	1	Description for each activity
B	1 – 3	4	
C	3 – 5	3	
D	3 – 4	5	
E	2 – 4	2	
F	5 – 6	3	
G	4 – 6	6	

Ans:

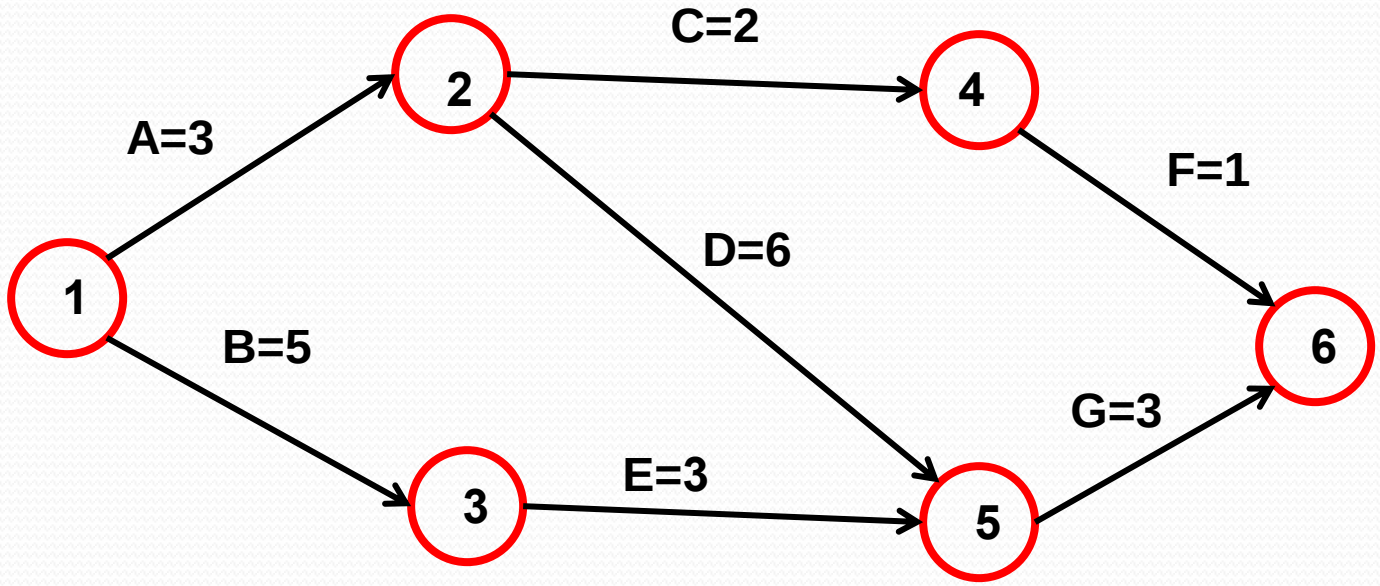


Critical path = 4+ 5+ 6= 15 weeks

Ex 5: **Draw the network and determine critical path for the project shown in the table below:**

Activity	Predecessor	Duration (day)
A	-	3
B	-	5
C	A	2
D	A	6
E	B	3
F	C	1
G	D,E	3

Activity	Predecessor	Duration (day)
A	-	3
B	-	5
C	A	2
D	A	6
E	B	3
F	C	1
G	D,E	3



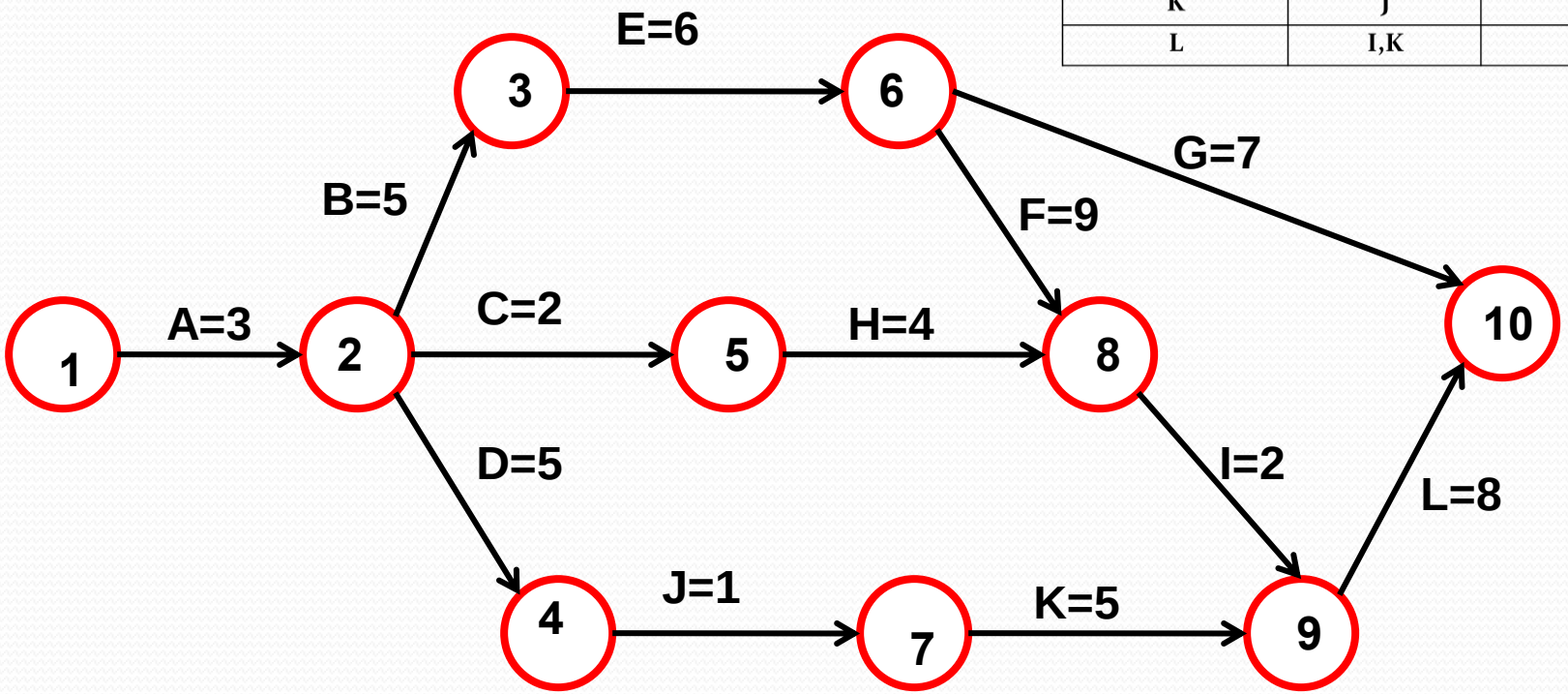
1. A – C – F = 3 + 2+ 1 = 6
2. A – D – G = 3 + 6 + 3 = 12 ⟹ C.P.
3. B – E – G = 5 + 3 + 3 = 11

Ex 6: Draw the network and determine the duration required to complete the project below:

Activity	Predecessor	Duration (day)
A	-	3
B	A	5
C	A	2
D	A	5
E	B	6
F	E	9
G	E	7
H	C	4
I	F,H	2
J	D	1
K	J	5
L	I,K	8

Activity	Predecessor	Duration (day)
A	-	3
B	A	5
C	A	2
D	A	5
E	B	6
F	E	9
G	E	7
H	C	4
I	F,H	2
J	D	1
K	J	5
L	I,K	8

Ans:



Paths:

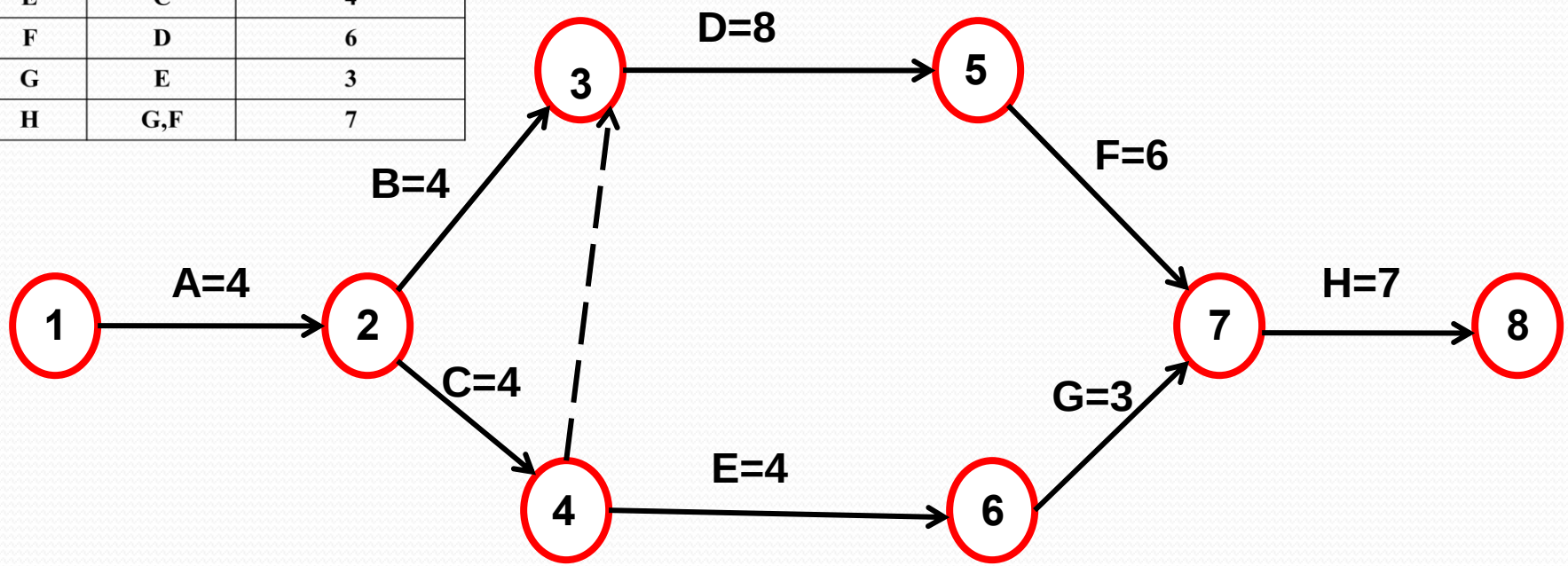
1. A – B – E – G = 3 + 5 + 6 + 7 = 21
2. A – B – E – f – I – L = 3 + 5 + 6 + 9 + 2 + 8 = 33
3. A – C – H – I – L = 3 + 2 + 4 + 2 + 8 = 19
4. A – D – J – K – L = 3 + 5 + 1 + 5 + 8 = 22

C.P. = Path 2 (A-B-E-F-I-L)
Required Duration to Complete the Project = 33 Day

Ex 7: **Draw the network and determine the critical path and duration required to complete the project below:**

Activity	Predecessor	Duration (months)
A	-	4
B	A	4
C	A	4
D	B,C	8
E	C	4
F	D	6
G	E	3
H	G,F	7

Activity	Predecessor	Duration (months)
A	-	4
B	A	4
C	A	4
D	B,C	8
E	C	4
F	D	6
G	E	3
H	G,F	7



- Paths:

1. A – B – D – F – H = 4+4+8+6+7 = 29
2. A – C – D – F – H = 4+4+8+6+7 = 29
3. A – C – E – G – H = 4+4+4+3+7 = 22

- There are Two Critical Paths in this Project : 1 and 2
- Period required to complete the project = 29 month

- إن طريقة تحديد المسارات وحساب أوقاتها لتحديد النشاط الحرج غير عملية مع المخططات الشبكية الكبيرة لكثرة عدد المسارات واحتمال الخطأ .
- لذلك الطريقة الأمثل هي اعتماد تحديد نوعين من الأوقات هما :

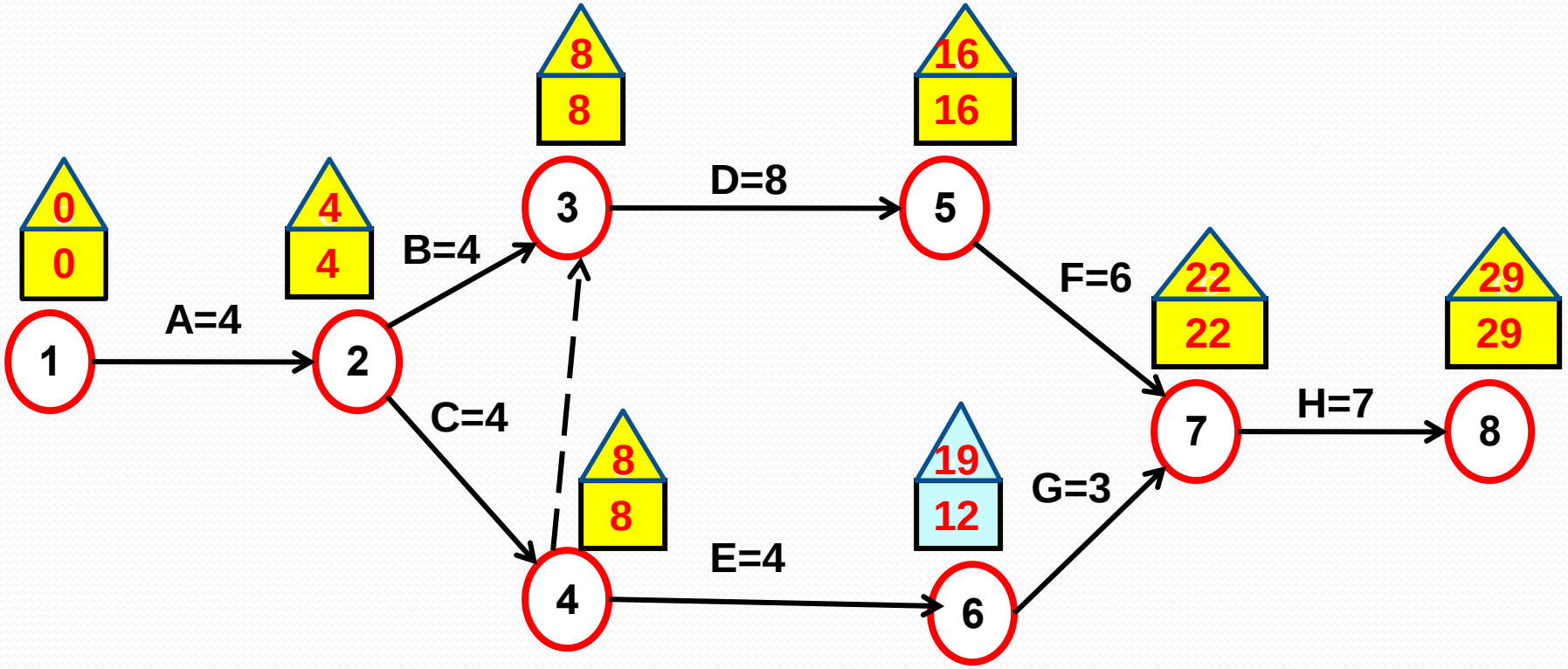
1. الوقت المبكر لبدء الحدث (Earliest Start Time)(Es) .
2. الوقت المتأخر لانتهاء الحدث (Latest Finish Time)(L_F).

- حيث يتم حساب هذه الأوقات لكل حدث والمسار الحرج هو المسار الذي يتساوى فيه الوقتين وذلك باستخدام المعادلات التالية :

$$(E_s)j = \max\left[(E_s)i + (E_T)ij\right]$$

$$(L_F)i = \min\left[(L_F)j - (E_T)ij\right]$$

Ex 8: Determine critical Path according to (E_S) , (L_F) and Duration required to complete the following project using CPM.



- المسار الحرج هو المسار يتساوى فيه (Es) و (L_F) وهما المساران :

1- A – B – D – F - H

2- A – C – Dummy – D – F – H

Duration Req. = 29 T.U.

Ex 9 : H.W Construct a network for a project whose activities and their predecessor relationship are given in table, then determine Es, Lf, CP and required duration to complete the project.

Activity	A	B	C	D	E	F	G	H	I	J	K	L	M
Predecessor	-	-	A	B	B	A	C,D	C,D	C,D	F,G	E,H	J	K
Duration (day)	3	5	2	6	4	4	1	3	6	8	3	2	7

Ex 10 : H.W Draw a network diagram for a project given in table, Then determine Es , Lf , CP and required duration to complete the project.

Activity	A	B	C	D	E	F	G	H	I	J	K	L
Predecessor	-	A	B	A	D	C,E	D	D	H	H	F,H	G,J
Duration (week)	4	7	3	5	2	1	3	6	4	2	5	3