CHAPTER 6: SOLUTIONS

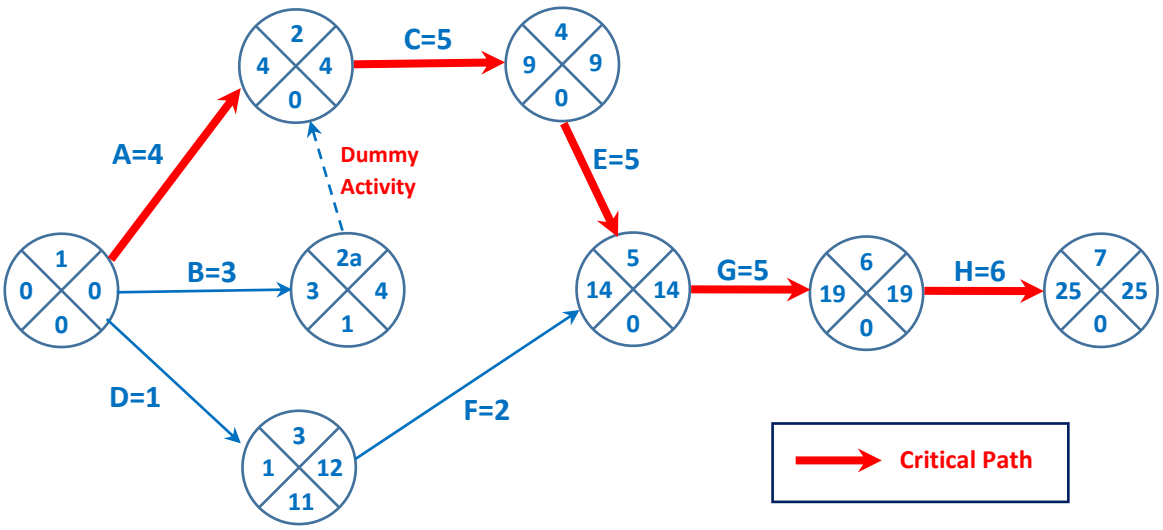
QUESTION 1:

1. Consider the following list of tasks with dependencies and estimated durations reflected in table Draw a CPM network (activity-on-arrow diagram) to illustrate the interaction of activities. Include all the values in the nodes. Indicate the critical path on the diagram (14)

2. Write down the critical path(s) using the letters of the tasks and calculate and write down the duration of the project. How many paths are there in total? Identify them all and write them down. (3)

Task	Precedents	Duration (weeks)
A	None	4
B	None	3
C	A, B	5
D	None	1
E	C	5
F	D	2
G	E, F	5
H	G	6

1.



2. Critical path **(= longest path, with a slack of zero):** A-C-E-G-H = 25 weeks
There are 3 possible paths.

3 POSSIBLE PATHS	DURATION
A-C-E-G-H (Critical path)	**4 + 5 + 5 + 5 + 6 = 25**
B-C-E-G-H	3 + 5 + 5 + 5 + 6 = 24
D-F-G-H	1 + 2 + 5 + 6 = 14

QUESTION 2:

Draw a complete Activity-on-arrow network diagram. Include the event number, earliest date, latest date and slack on each node by completing both a forward and backward pass. Clearly indicate the total duration and critical path. (15)

Task	Precedents	Duration (days)
A	None	8
B	None	10
C	None	8
D	A	10
E	A	16
F	D, B	17
G	C	18
H	C	14
I	F, G	9

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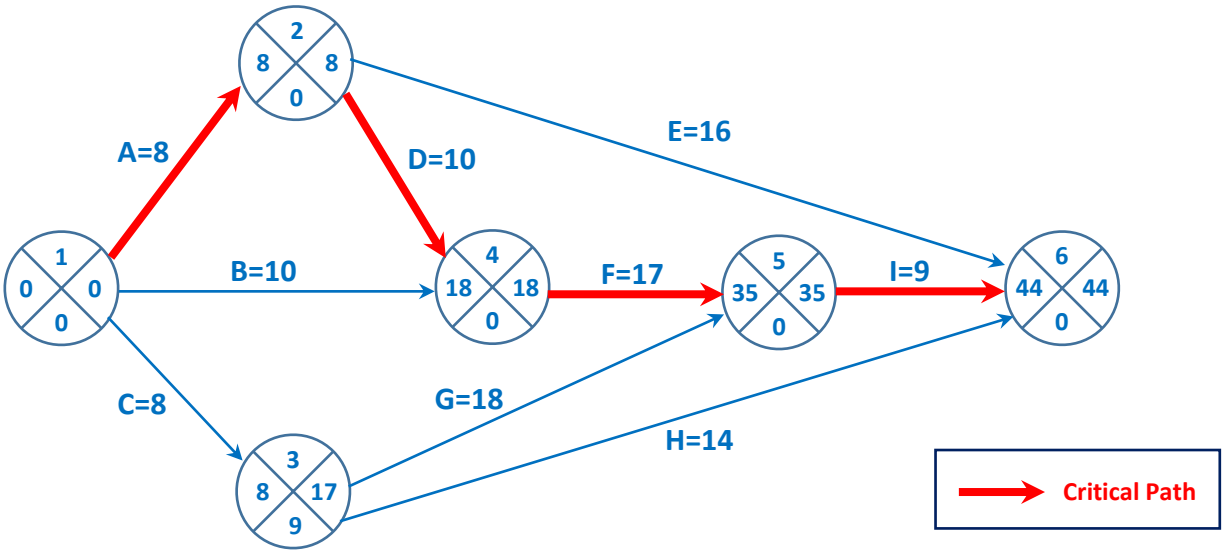


2. Critical path **(= longest path, with a slack of zero):** A-D-F-I = 44 days

QUESTION 3:

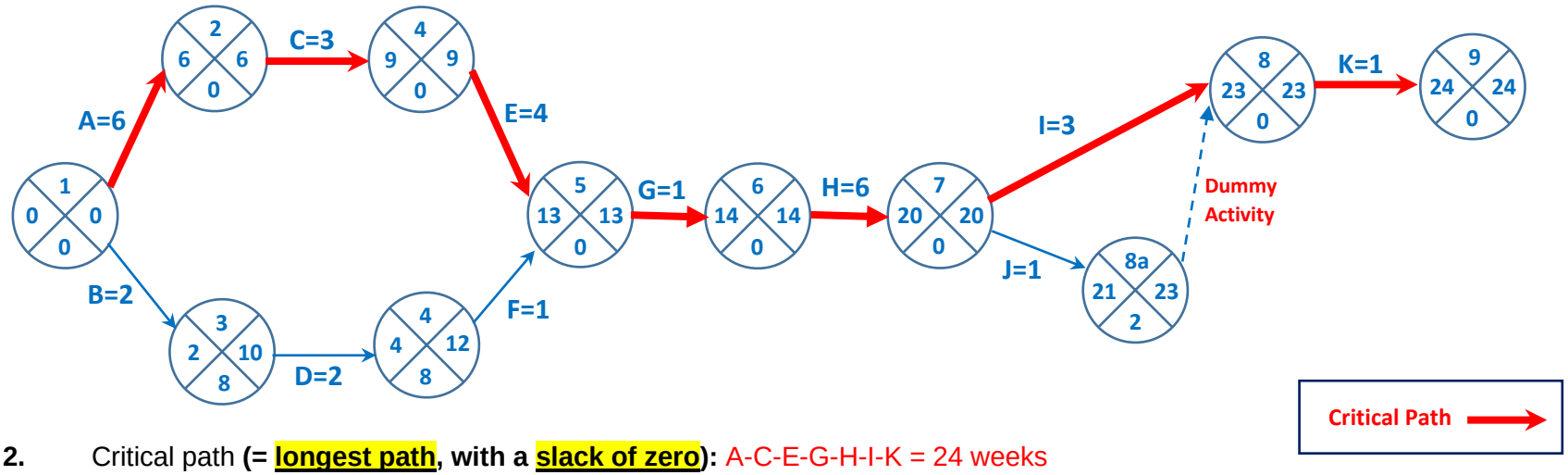
1. Consider the following list of tasks with dependencies and estimated durations reflected in table **Draw a CPM network (activity-on-arrow diagram**) to illustrate the interaction of activities. Include all the values in the nodes. Indicate the critical path on the diagram.(16)

2. Write down the **critical path(s)** using the letters of the tasks and calculate and write down the duration of the project. How many paths are there in total? Identify them all and write them down. (3)

Task	Precedents	Duration (weeks)
A	None	6
B	None	2
C	A	3
D	B	2
E	C	4
F	D	1
G	E, F	1
H	G	6
I	H	3
J	H	1
K	I, J	1

4 POSSIBLE PATHS	DURATION
A-C-E-G-H-I-K (Critical path)	**6 + 3 + 4 + 1 + 6 + 3 + 1 = 24**
A-C-E-G-H-J-K	6 + 3 + 4 + 1 + 6 + 1 + 1 = 22
B-D-F-G-H-I-K	2 + 2 + 1 + 1 + 6 + 3 + 1 = 16
B-D-F-G-H-J-K	2 + 2 + 1 + 1 + 6 + 1 + 1 = 14

1.



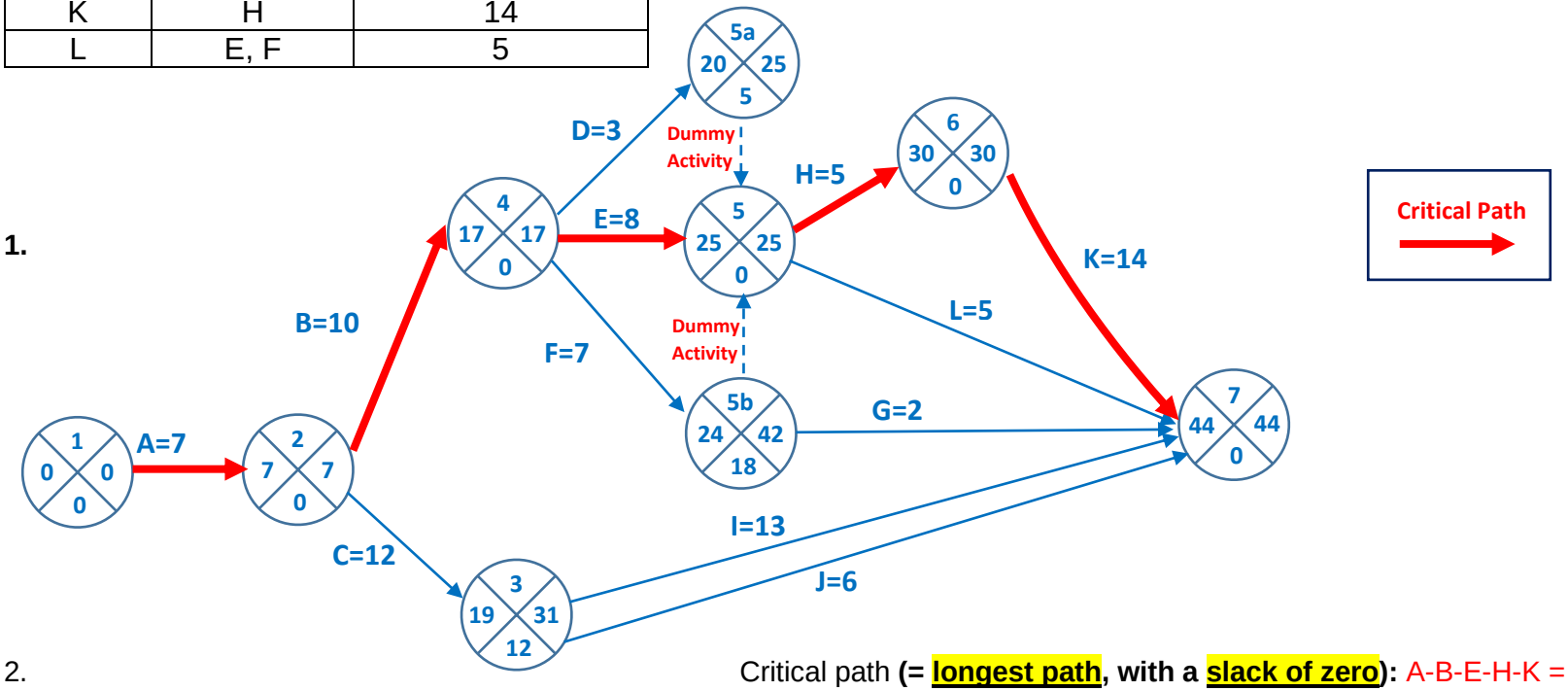
2. Critical path **(= longest path, with a slack of zero):** A-C-E-G-H-I-K = 24 weeks
There are 4 possible paths.

QUESTION 4:

1. Draw a **CPM network** for the list of tasks in the table below to illustrate the interaction of activities. Clearly identify the **critical path** and its duration. (16)

Activity	Precedents	Duration (weeks)
A	None	7
B	A	10
C	A	12
D	B	3
E	B	8
F	B	7
G	F	2
H	D, E	5
I	C	13
J	C	6
K	H	14
L	E, F	5

1.

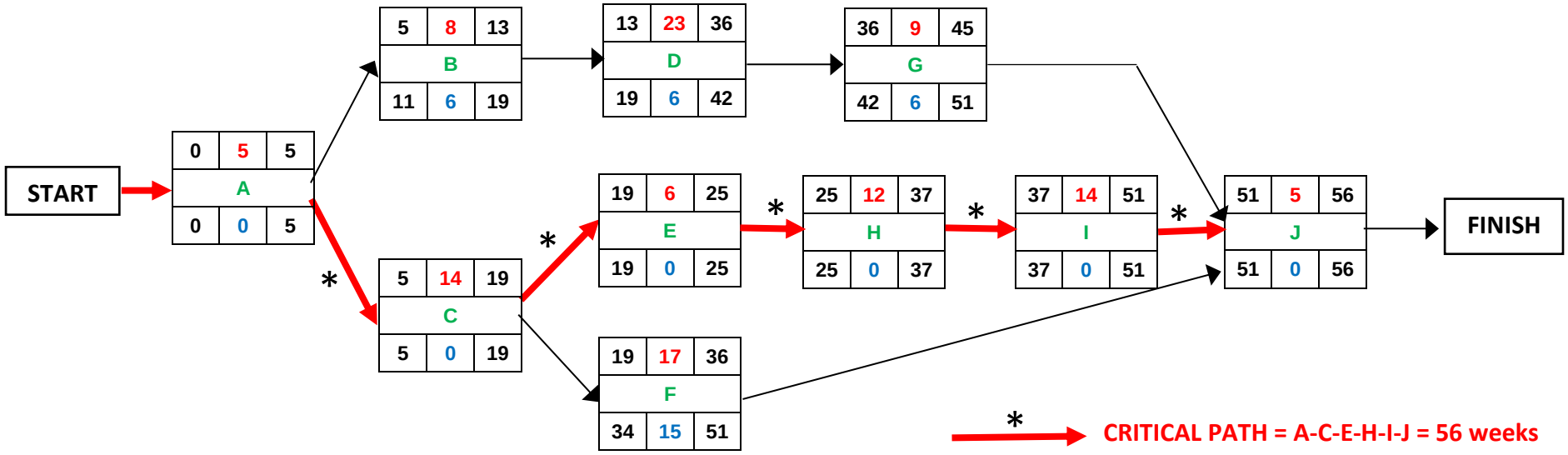


2. Critical path **(= longest path, with a slack of zero):** A-B-E-H-K = 44 weeks

QUESTION 5:

1. Draw an **(activity-on-node)** network diagram for the list of tasks in the table below to illustrate the interaction of activities. (16)
2. Find the critical path (3)
3. What is the duration of all of the critical activities added together? (2)

Activity	Precedents	Duration (weeks)
A	None	5
B	A	8
C	A	14
D	B	23
E	C	6
F	C	17
G	D	9
H	E	12
I	H	14
J	F, G, I	5

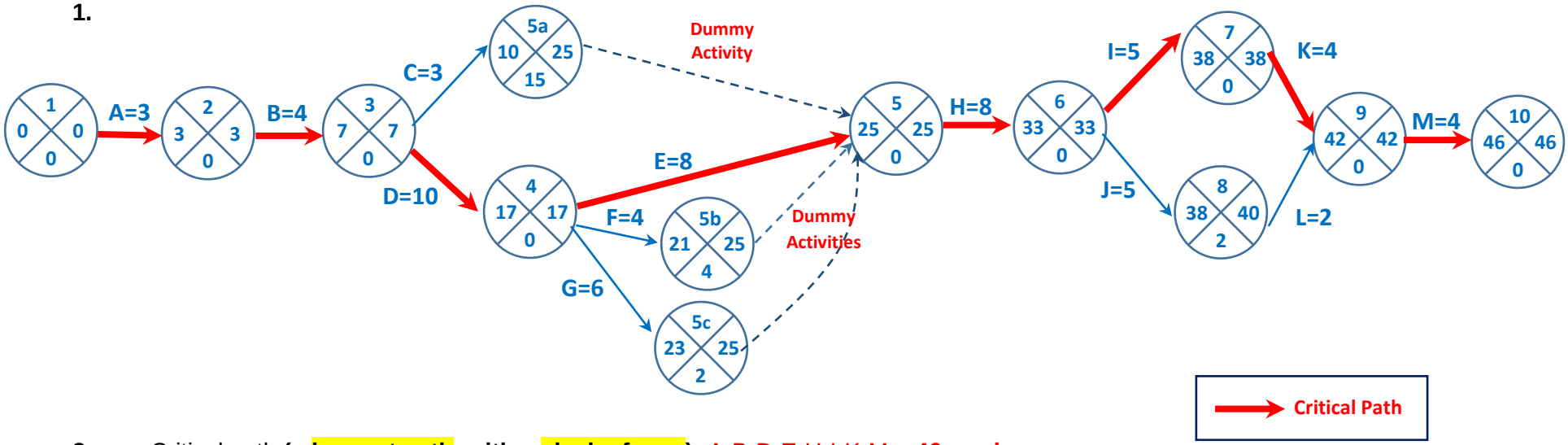


QUESTION 6

1. Consider the following activities with their precedents and durations. Draw a complete **Activity-on-arrow network diagram**. Include the event number, earliest date, latest date and slack on each node by completing both a forward and backward pass. Clearly indicate the total duration and **critical path.** (15)

Activity	Precedents	Duration (weeks)
A	None	3
B	A	4
C	B	3
D	B	10
E	D	8
F	D	4
G	D	6
H	C, E, F, G	8
I	H	5
J	H	5
K	I	4
L	J	2
M	K, L	4

1.



2. Critical path **(= longest path, with a slack of zero):** A-B-D-E-H-I-K-M = **46 weeks**

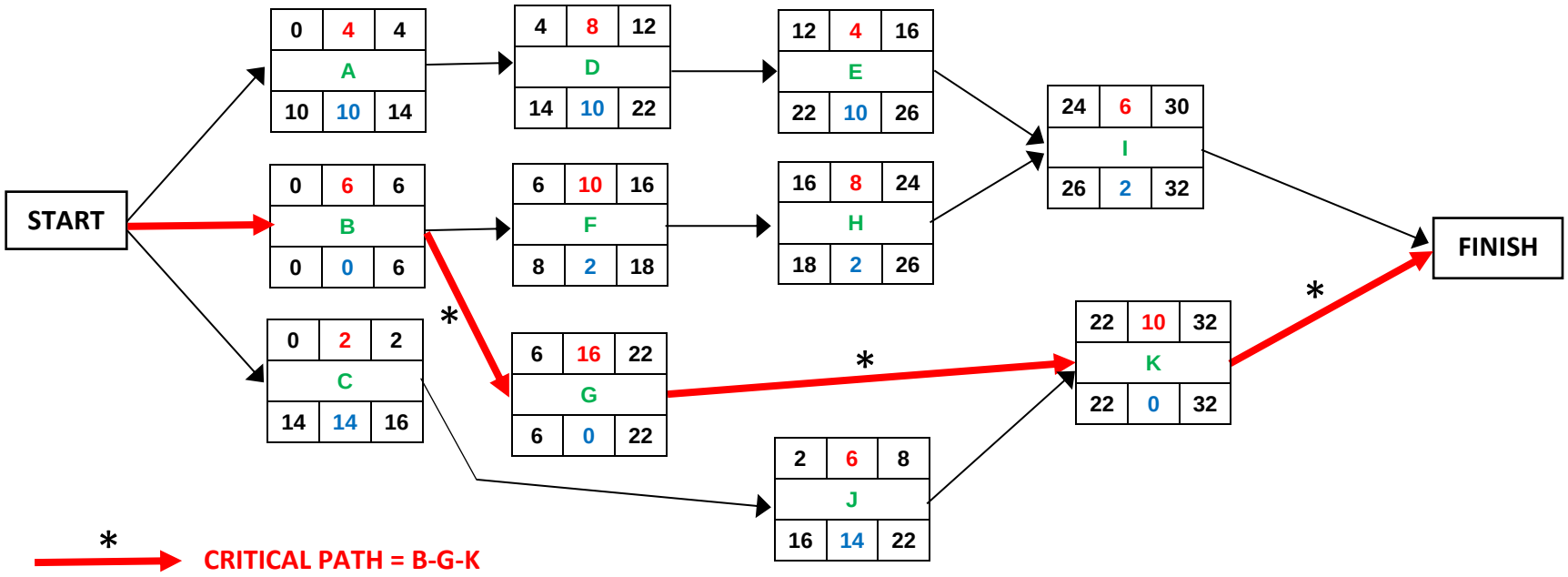
QUESTION 7:

1. **A project activity must be defined to meet certain criteria if not it has to be redefined. What are the criteria?** (4)
    - An activity must have a clearly defined start and end-point, normally marked by the production of a tangible deliverable
    - The required resource of an activity must be forecastable and is assumed to be required at a constant level throughout the duration of the activity.
    - The duration of an activity must be forecastable – assuming normal circumstances, and the reasonable availability of resources
    - Precedence requirements. Some activities might require that others are completed before they can begin

2. **There are three approaches to identifying the activities or tasks that makes up a project. Name and discuss the first two approaches. (6**)
    - **Activity-based approach:** this approach consists of creating a list of the activities that a project would be involved in. This approach is based entirely on structuring of activities and the considered favoured way of generating activity list is by creating Work Break Down structure (WBS). WBS start with identifying the main (or high-level) tasks required to complete a project. The high-level activities are further broken down into a set of lower-level tasks.
    - **Product-based approach:** this approach consists of producing a Product Breakdown Structure (PBS) and a Product Flow Diagram (PFD). PBS depict a relationship that exist between different hierarchy of project products or between project main products and their sub-component products. PFD indicates, for each product, which other products are required as inputs.

3. Consider the following list of tasks with dependencies and estimated durations reflected in the table. Draw a CPM network (activity-on-arrow diagram) to illustrate the interaction

Activity	Duration (Weeks)	Precedents
A	4	-
B	6	-
C	2	-
D	8	A
E	4	D
F	10	B
G	16	B
H	8	F
I	6	E, H
J	6	C
K	10	G, J



4. **Table format**

Activity	Duration (Weeks)	Earliest Start	Earliest Finish	Latest Start	Latest Finish	Float
A	4	0	4	10	14	10
B	6	0	6	0	6	0
C	2	0	2	14	16	14
D	8	4	12	14	22	10
E	4	12	16	22	26	10
F	10	6	16	8	18	2
G	16	6	22	6	22	0
H	8	16	24	18	26	2
I	6	24	30	26	32	2
J	6	2	8	16	22	14
K	10	22	32	22	32	0