



# UNIVERSITY OF RUHUNA

## Faculty of Engineering

Mid-Semester 8 Examination in Engineering: November 2014

Module Number: CE8328

Module Name: Construction Management

[Two Hours]

[Answer all question, each question carries five marks]

Q1.

- a) Time, cost and other resources are the main constraints to a construction project. Discuss the interrelation of above three factors and how each factor affects to the total quality of the project. [2 Marks]
- b) Name the three main stages in a construction project life cycle and list different functions to be completed in each stage. [2 Marks]
- c) Briefly explain the following terms applicable in construction planning.
  - i. Logic dummy
  - ii. Identity dummy[1 Mark]

Q2.

- a) Discuss the advantages and disadvantages of using Network on Arrow method as a planning and scheduling technique over traditional Bar Chart method. [1 Mark]
- b) Remove the redundant dummies from the four arrow diagrams shown in Figure Q2 without changing the logical relationships. [1 Mark]
- c) Draw the network diagram using the Network on Node method for the information shown in the Table Q2. Analyze the network to calculate early start time, early finish time, late start time, late finish time and total float of activities. [3 Marks]

Q3.

- a) Explain the following factors related to allocation of resources for a construction projects with examples.
  - i. Is it always possible to provide the required resources?
  - ii. Is it always necessary to provide the required resources?
  - iii. Is it practical to provide resources as indicated by a normal histogram?[2 Marks]
- b) What are the important decisions that can be taken based on resource aggregation charts? [1 Mark]

- c) Draw the corresponding Time Scale bar chart for the network diagram shown in the Figure Q3.

[2 Marks]

Q4.

The Faculty of Engineering wants to renovate its staff quarters and awarded the contract to a private construction company. As the first phase it is decided to renovate only 10 identical quarters. The contractor with his agreement informed that the completion rate is one house per week. The main task to be completed to complete one housing unit is shown in Table Q4 together with necessary man hours and available labours. All the labours work 8 hours per day and 6 days per week. Assume that you are the planning engineer of the company and you decided to prepare a plan using Line of Balance technique.

- a) Carry out the necessary calculations in tabular form and plot a line of balance schedule for information shown in Table Q4 (Use the graph sheet provided). In your plot, clearly indicate the start and finish time for each activity for first and last units and the expected total project duration.

[3 Marks]

- b) Assume that, at the end of the 100<sup>th</sup> day, the contractor wants to start a new project and decided to divert labours from last two activities to his new project elsewhere by two labours from activity F and one labour from activity G. What is the effect to total project duration with this change?

[2 Marks]

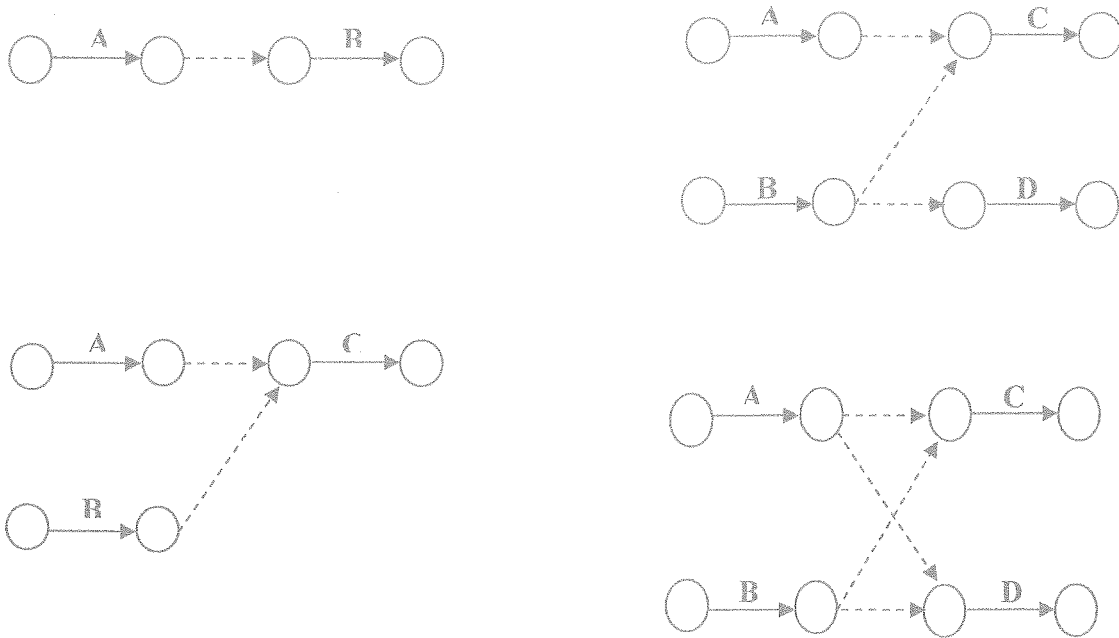


Figure Q2: Arrow Network Diagrams

Table Q2: Details of activities, durations and relationships

Activity	Predecessor	Duration (Days)
A	At project start	10
B	At project start	8
C	At project start	5
D	Can start after A finish	9
E	Can start 3 days of A starts and after B finish	12
F	Can start after E finish	3
G	Can finish after 3 days of D finish	10
H	Can start after C, F and G finish	12
I	Can start with H	15
J	Can start after H finish	5
K	Can start after I and J finish	5

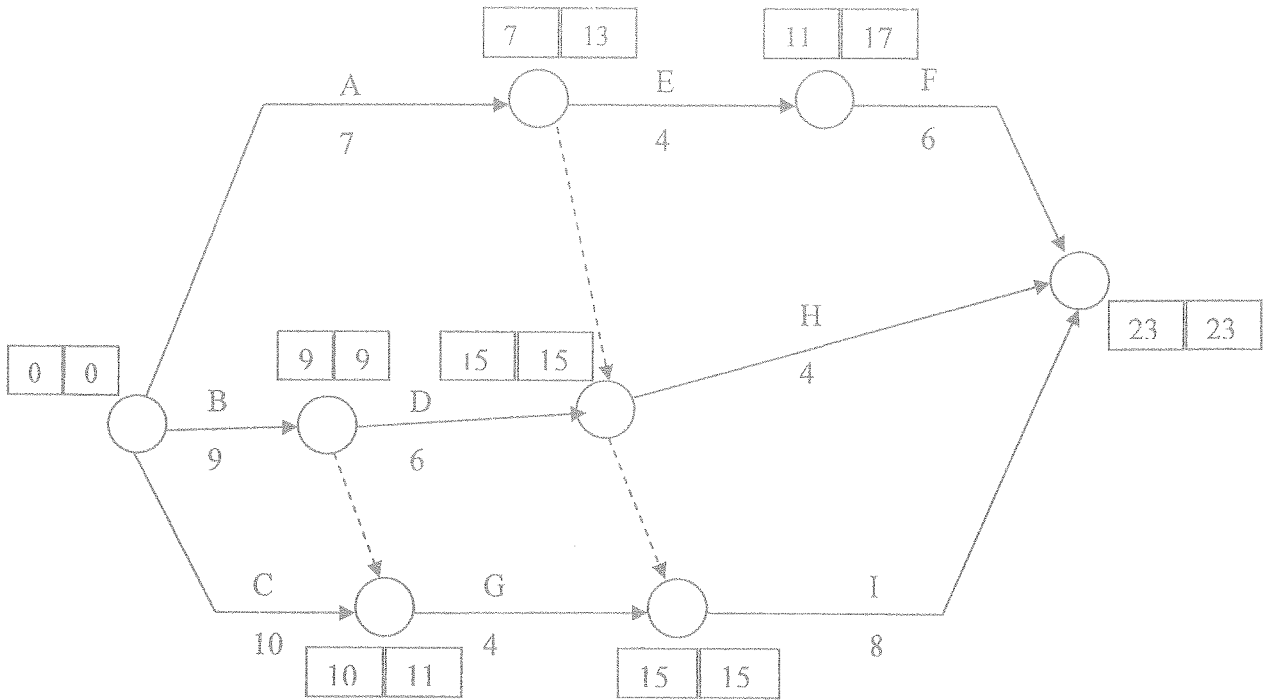


Figure Q3: Network Diagram

Table Q4- Project information for the Housing Scheme project

Activity	Man hours	Optimum gang size
Demolition work (A)	160	5
Replacing doors and windows (B)	240	4
Plumbing (C)	200	4
Electrical Work (D)	150	3
External wall painting (E)	175	4
Internal wall painting (F)	180	4
Floor Painting (G)	75	2
Project starts with activity A. Activity B follows A. Both C and D can start together but after B. E starts after both C and D. Activity F follows E and activity G follows F. Minimum buffer time for all activities is 5 days		