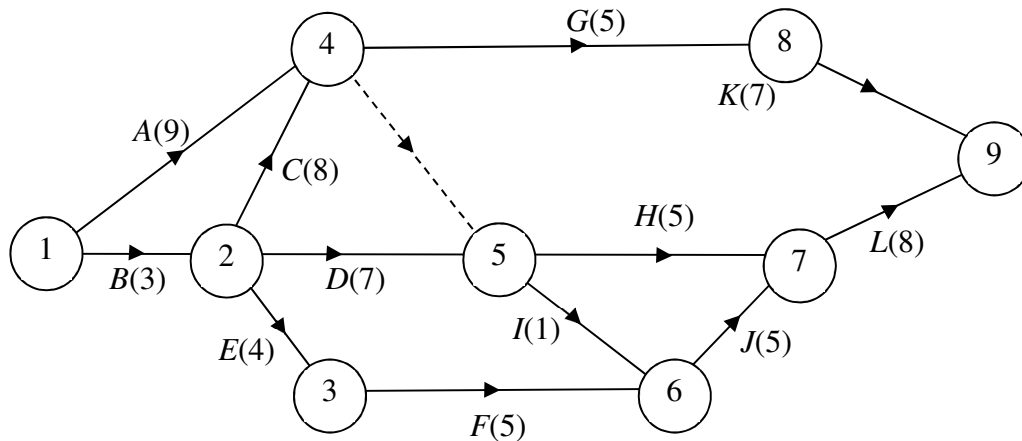


1.

Figure 1

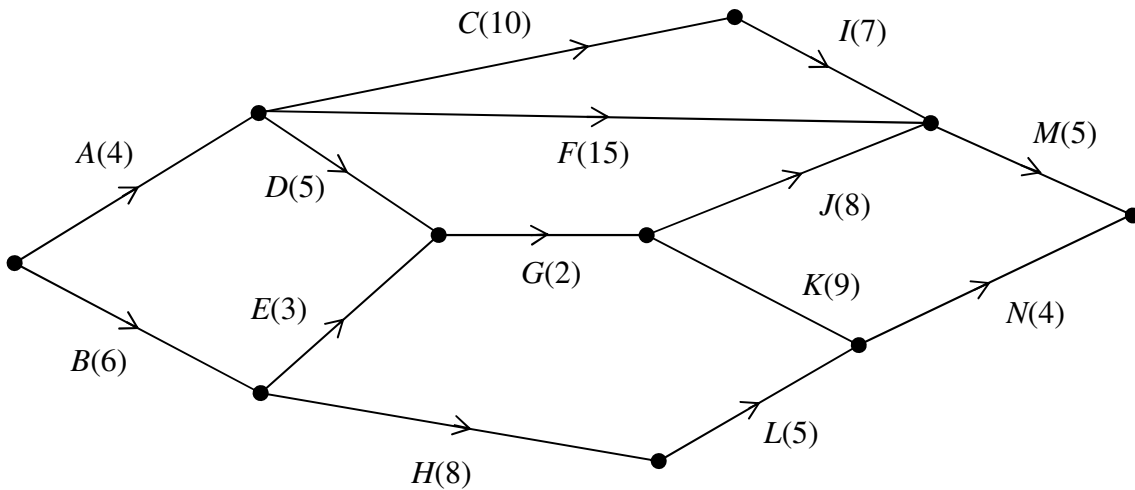


A project is modeled by the activity network shown in Fig. 1. The activities are represented by the arcs. The number in brackets on each arc gives the time, in hours, to complete the activity. The numbers in circles give the event numbers. Each activity requires one worker.

- (a) Explain the purpose of the dotted line from event 4 to event 5 (1)
- (b) Calculate the early time and the late time for each event. Write these in the boxes in the answer book. (4)
- (c) Determine the critical activities. (1)
- (d) Obtain the total float for each of the non-critical activities. (3)
- (e) On the grid in the answer book, draw a cascade (Gantt) chart, showing the answers to parts (c) and (d). (4)
- (f) Determine the minimum number of workers needed to complete the project in the minimum time. Make your reasoning clear. (2)

2.

Figure 2



The network in Figure 2 shows the activities involved in a process. The activities are represented by the arcs. The number in brackets on each arc gives the time, in days, taken to complete the activity.

- Calculate the early time and late time for each event, showing them on the diagram in the answer book. **(4)**
- Determine the critical activities and the length of the critical path. **(2)**
- On the grid in the answer book, draw a cascade (Gantt) chart for the process. **(4)**
Each activity requires only one worker, and workers may not share an activity.
- Use your cascade chart to determine the minimum numbers of workers required to complete the process in the minimum time. Explain your reasoning clearly. **(2)**
- Schedule the activities, using the number of workers you found in part (d), so that the process is completed in the shortest time. **(3)**