



DECEMBER 2016

PROJECT MANAGEMENT

**Instructions to candidates:**

- a) Time allowed: Three hours (plus an extra ten minutes' reading time at the start – do not write anything during this time)
- b) Answer any FIVE questions with TWO from Section A and THREE from Section B
- c) All questions carry equal marks. Marks for each question are shown in [ ]
- d) Non-programmable calculators are permitted in this examination

**SECTION A**

- 1. Identify and briefly discuss the most popular attributes, skills and qualities of a successful project manager. [20]
- 2. a) Identify the advantages of top-down budgeting AND also the advantages of bottom-up budgeting. [12]  
b) Distinguish between direct and indirect costs, giving at least THREE examples of EACH. [8]
- 3. Identify and briefly describe the NINE **key team roles** as identified by Belbin. [20]
- 4. a) Define the terms **monitoring** and **controlling**, in the context of project management. [8]  
b) Discuss the THREE types of control that can be exercised on projects. [12]

**SECTION B**

- 5. A company wishes to redesign its main office layout. The following table shows the main activities involved with this project, along with the estimated activity durations:

Activity duration (days)

Activity	Optimistic (O)	Most likely (L)	Pessimistic (P)
A	5	7	9
B	3	4	5
C	6	6	6
D	2	4	6
E	1	1	1
F	2	3	4
G	5	6	7
H	2	4	8

- a) Calculate the expected durations for critical path activities A–B–D–H. [5]
- b) Calculate the expected duration for the project. [2]
- c) Calculate the standard deviation of the project duration. [5]
- d) What is the probability of the project being completed in less than 20 days? [4]
- e) What is the probability of the project being completed in more than 22 days? [4]

6. An automobile manufacturer is developing a new model of car, and the following table shows some of the information involved in this project:

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

- a) Construct a network diagram for this project.  
 b) Calculate the scheduled completion time and identify the critical path.  
 c) Calculate the slack (float) time for ALL activities.  
 d) How will the project be affected if the duration of activity C is increased by 5 days?

[8]  
 [5]  
 [4]  
 [3]

7. The following information is extracted from a new housing development project:

Activity	Duration	Predecessors	Resources
A	4 weeks	----	1 Real Estate Consultant 1 Survey Team 2 Access Permits 1 Legal Advisor 4 Legal Assistants
B	3 weeks	----	£62,000
C	6 weeks	----	2 Architects 1 Financial Analyst 1 Drill Rig/Crew 8 Soil Tests 3 Civil Engineers
D	3 weeks	B	£29,500
E	3 weeks	A, D	£42,600
F	2 weeks	B	£36,200
G	3 weeks	E	1 Architect 4 CAD/CAM Operators 3 Interior Decorators 2 Landscape Designers 2 Modelling Kits

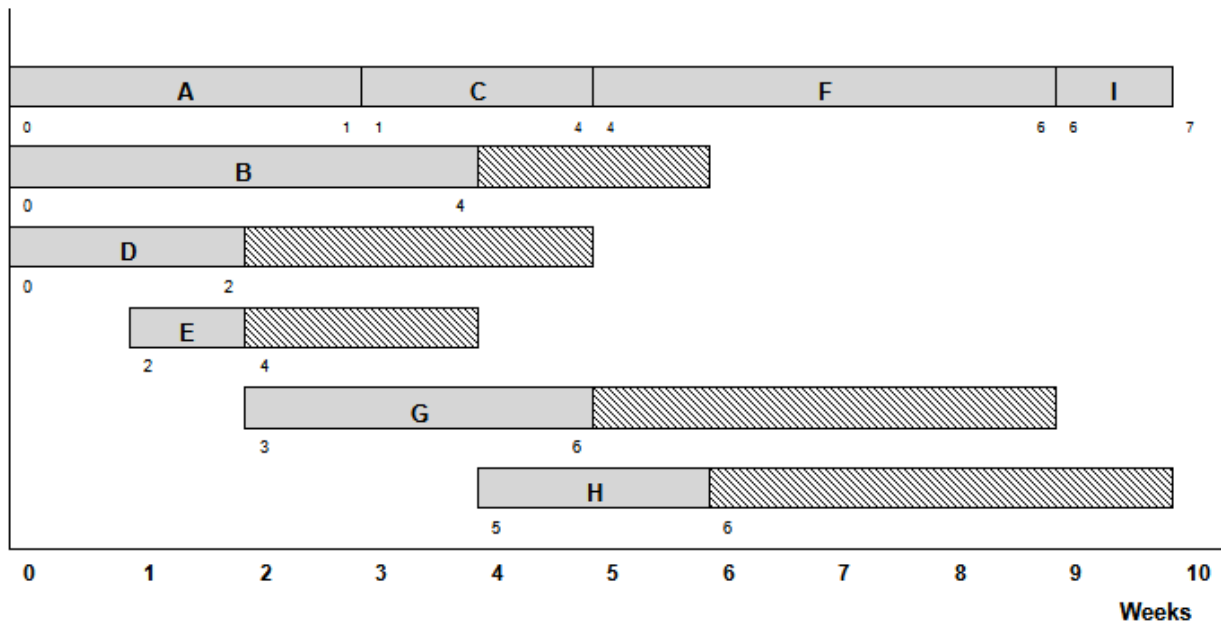
Resource Costs:

Real Estate Consultant:	£60/hour	Survey Team:	£1,000/day
Financial Analyst:	£65/hour	Drill Rig/Crew:	£750/day
Access Permit:	£400	Legal Advisor:	£100/hour
Legal Assistant:	£30/hour	Soil Tests:	£150 each
Civil Engineer:	£75/hour	Architect:	£80/hour
CAD/CAM Engineer:	£50/hour	Interior Decorator:	£45/hour
Landscape Designer:	£60/hour	Modelling Kit:	£3,000

The project is working a standard 8-hour day, 5 days a week. Day rates apply on working days only. Calculate:

- the budget for activities A, C and G [10]
- the baseline budget for the project [2]
- The Project Manager discovers a scheduling conflict and decides to complete Activity G in 2 weeks instead of the scheduled 3 weeks. This will entail working 60-hour weeks for each of the two weeks. Personnel are currently paid a premium of 40% for overtime hours, defined as hours worked in excess of 40 in a given week. Recalculate the budget for Activity G in light of this information. What is the effect of this action on the overall budget? [8]

8. The activities of a small project can be represented by the following Gantt chart, based on their earliest start times (ESTs):



**Note:** The float (or slack) time of an activity is represented by the shaded portion of the bar.

The resource requirements of the project are given in the following table:

Activity	Manpower	Cost (£000)
A	1	14
B	2	12
C	1	12
D	1	17
E	2	10
F	1	14
G	2	8
H	1	10
I	1	5

- Draw a simple bar chart showing the manpower profile over the lifetime of the project, based on the earliest start times of the activities. [7]
- Health and safety regulations dictate that the maximum number of people working on the project at any given time is 5. Produce a second bar chart showing how your profile can be smoothed to achieve this requirement. [8]
- Assuming that all activities start as early as possible, and are paid for when they start, draw a graph showing the cumulative cost of the project over its lifetime. [5]

**Relevant Formulae:**

Question 5

Expected Activity Duration:  $\frac{O + 4L + P}{6}$

Activity Std. Dev:  $\frac{P - O}{6}$

Uncertainty of Project Completion Time:

$$Z = \frac{(D - U)}{\sqrt{\text{Var}}}$$

D: desired project completion time

U: the critical time of the project; the sum of the TEs for activities on the Critical Path

Var: the variance of the critical path; the sum of the variances of activities on the Critical Path

Z: the number of standard deviations of a normal standard distribution