



JUNE 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 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.
  - a) Describe the different phases of the project life cycle. [10]
  - b) With the aid of a diagram, describe the life cycle of a project in terms of the degree of project completion and required effort. [10]
- 2. Identify and discuss the minimum contents or elements of a Final Project Report. [20]
- 3. Discuss the problems that a project manager might face when dealing with large projects. [20]
- 4. What risks might a company face if a project is not completed on time? [20]

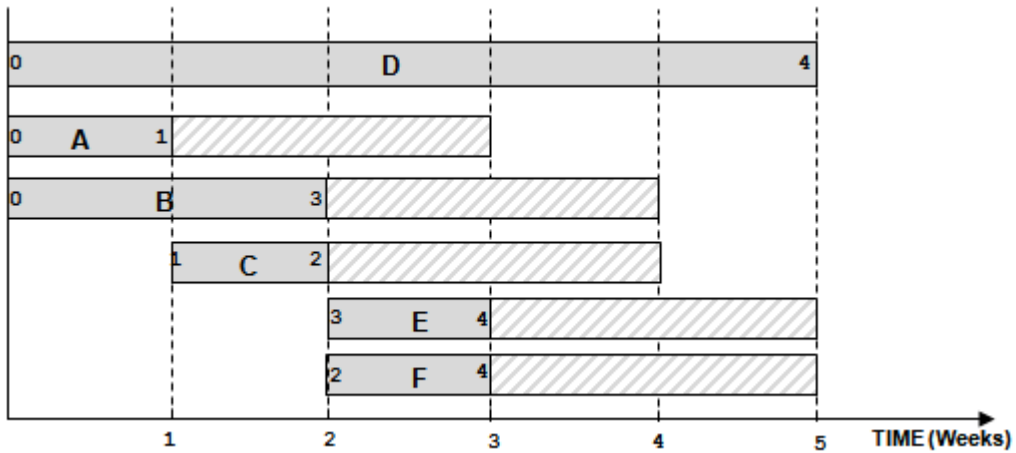
**SECTION B**

- 5. The following information is extracted from a new product development project:

Activity	Predecessor	Time (Weeks)
A	----	7
B	----	9
C	A	10
D	B	6
E	C,B	5
F	E	12
G	D	3
H	F,G	6
I	H	3

- a) Construct a network for the project. [8]
- b) Calculate the scheduled completion time and identify the critical path. [5]
- c) Assuming all activities start as early as possible, construct a Gantt chart for the project. [7]

6. 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	3	10
B	2	8
C	2	6
D	1	10
E	1	8
F	3	12

- 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]
- Based on your answer to part b), and assuming that all activities are paid for when they start, draw a graph showing the cumulative cost of the project over its lifetime. [5]

7. The following information is extracted from a research project:

Activity	Duration	Predecessors	Resources
A	2 weeks	---	£22,000
B	3 weeks	---	£12,000
C	6 weeks	---	1 Electrical Engineer
			2 Research Assistants
			Specialist Equipment
			100 metres test cable
			4 Technicians
D	7 weeks	A	£41,000
E	3 weeks	B	2 Marketing Specialists
			1 Graphic Artist
			1 Lot catalogue supplies
F	2 weeks	C	£8,000
G	4 weeks	F	1 Test Engineer
			1 Electrical Engineer
			2 Computer Operators
			2 Workstations

Resource	Cost	Resource	Cost
Electrical Engineer	£45/hour	Graphic Artist	£30/hour
Marketing Specialist	£37.50/hour	Test Engineer	£50/hour
Research Assistant	£70/hour	Technician	£30/hour
Computer Operator	£30/hour	Test Cable	£1.20/metre
Specialist Equipment	£2,000/day	Catalogue Supplies	£1,500/lot
Workstation	£500/week		

The project is scheduled for a standard 8-hour day and a 40-hour week. Day rates apply on working days only. Project personnel are paid an additional 50% premium for overtime (i.e. over 40 hours per week).

- a) Calculate the budget for activities C, E and G. [8]
- b) Calculate the baseline budget for the project. [2]
- c) Due to the high rental cost of the Specialist Equipment, the Project Manager feels that costs could be significantly reduced by completing Activity C in 5 weeks instead of 6. Personnel working on this activity would be required to work overtime to achieve the desired time reduction. Recalculate the budget for Activity C, and determine how this would affect the budget for the project. [5]
- d) Following the start of the project, the Project Manager discovers that one of the Marketing Specialists is scheduled for a week-long training seminar during Activity E. The Project Manager makes arrangements with a local agency to hire a temporary Marketing Specialist to cover this week, but at double the cost of the original worker. Recalculate the budget for activity E in light of this information. [5]

*continued overleaf*

8. The following table shows the activity list and activity durations (in days) for a particular project:

Activity	Optimistic (O)	Most Likely (L)	Pessimistic (P)
A	4	6	8
B	9	10	11
C	3	5	6
D	2	4	6
E	3	3	3
F	1	2	3
G	4	5	7
H	3	4	5
I	1	1	1
J	2	4	8

- a) If the critical path activities for this project are **A, B, E** and **J**:
- i Calculate the expected duration of the project. [6]
  - ii Calculate the project standard deviation. [7]
- b) The project is considered to be viable if the probability of completion within a deadline of 24 days is at least 80%. Use the above information to comment on the viability of the project. [7]

**Relevant Formulae:**

Question 8:

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

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

Uncertainty of Project Completion Time:

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

D: desired project completion time

U: the expected project duration

Var: the variance of the project = the sum of the variances of the critical activities

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