



MARCH 2017

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.
 - a) Identify and describe the main criteria for project selection models. [12]
 - b) Briefly describe FOUR numeric and FOUR non-numeric types of project selection models. [8]
- 2.
 - a) Define the terms **monitoring** and **controlling**, in the context of project management. [10]
 - b) Discuss the THREE types of control that can be exercised on projects. [10]
- 3. Discuss the problems that a project manager might face in dealing with networks for large projects. [20]
- 4. What benefits do computers bring to project management? [20]

SECTION B

- 5. As part of your role as project manager, you are required to assess the viability and benefits of two projects, A and B. The following information is available to you:

The initial capital outlays, in £m, for each of the projects are estimated as:

Project A	20.00
Project B	23.00

The company's financial director has estimated the yearly revenues, in £m, for each of the projects over a period of 9 years to be:

YEAR	Project A	Project B
1	2.00	1.00
2	4.50	3.50
3	5.75	6.00
4	7.50	8.50
5	9.00	10.00
6	9.50	10.00
7	8.50	9.50
8	7.00	8.50
9	5.00	7.00

He also expects that in the present financial climate, interest rates will vary over this period. Estimates of this rate variation are as follows:

Year	Rate
1, 2 and 3	2%
4 and 5	5%
6, 7, 8 and 9	4%

Calculate the net present value of EACH of the projects, and advise the company which of the two projects should be chosen.

[20]

6. The following table shows the activity list and activity durations (weeks) for a project involving the installation of a new computer system:

Activity	Optimistic (O)	Most Likely (L)	Pessimistic (P)
A	13	15	17
B	18	19	20
C	15	15	15
D	14	16	19
E	4	6	10
F	5	6	7
G	7	8	10
H	6	8	9
I	10	12	14
J	12	14	18

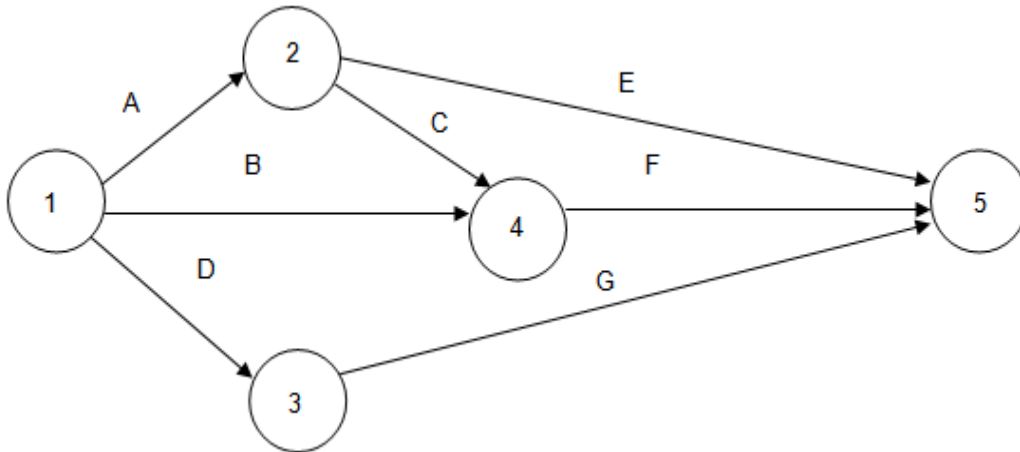
- a) Calculate the expected duration for critical path activities A-F-J, and the expected project duration. [5]
 b) Calculate the project standard deviation. [8]
 c) The contract for this project states that penalty clauses will be activated if the project duration is greater than 37 weeks. How likely is it that the penalty clauses will be activated? [7]
7. The following information has been extracted from a project to develop a new shopping mall.

Activity	Duration (weeks)	Predecessors	Cost (£000)
A	6	---	100
B	5	---	75
C	7	---	180
D	3	A	250
E	5	D	100
F	4	B,C	100
G	5	C	200
H	2	E,F,G	50

- a) Calculate the scheduled completion time and identify the critical path for this project. [6]
 b) Assuming that each activity starts as early as possible, construct a Gantt for this project. [10]
 c) Assuming that each activity starts as early as possible, draw a graph showing the cumulative costs over the lifetime of the project. [4]

8. Using the network below and the additional information provided in the table, find:
- the crash cost per day per activity
 - which activities should be crashed to meet a project deadline of 9 days at minimum cost
 - the new cost

[5]
[13]
[2]



Activity	Normal Time (Days)	Normal Cost (£000)	Crash Time (Days)	Crash Cost (£000)
A	4	5	3	8
B	2	3	2	3
C	3	4	2	6
D	4	6	2	11
E	5	8	3	10
F	4	2	3	3
G	2	3	1	6

Relevant Formulae:

Question 5:

NPV (Project) = $A_0 + \sum (F_t / (1 + \kappa + \alpha)^t)$, where

- A₀: initial cash investment (negative because it is an outflow)
- F_t: net cash flow in period t
- κ: required rate of return
- α: predicted rate of inflation (deflation)

Question 6:

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 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