



ICM

SEPTEMBER 2015

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

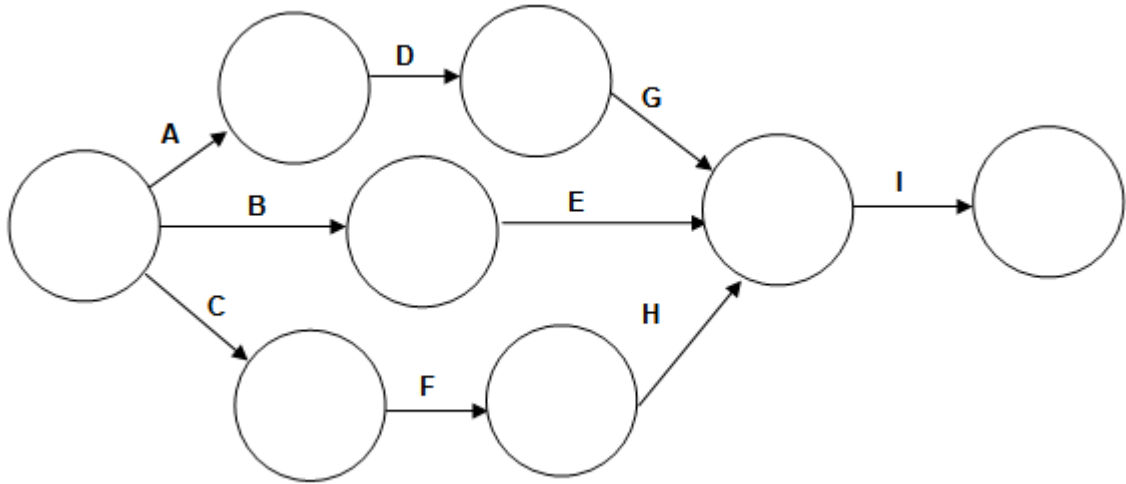
- 1. Discuss the problems that a project manager might face in dealing with networks for large projects. [20]
- 2. Identify and briefly discuss the most popular attributes, skills and qualities of a successful project manager. [20]
- 3. A project costs money during every day of its existence. Discuss the main categories of costs likely to be incurred. [20]
- 4. 'Operations and projects differ primarily in that operations are ongoing and repetitive while projects are temporary and unique.' Discuss this statement, making particular reference to the distinctive characteristics of a project. [20]

continued overleaf

SECTION B

5. Using the following network diagram and the additional crashing information, find:
- a) the critical path and project duration
 - b) the crash cost per day for those activities that can be crashed
 - c) how the project can be completed to meet a deadline of 15 days at minimum cost
 - d) the new project cost

[5]
[5]
[8]
[2]



Activity	Normal Time (days)	Crash Time (days)	Normal Cost (£)	Crash Cost (£)
A	6	4	400	800
B	4	3	200	300
C	3	-	100	-
D	4	3	300	600
E	7	4	600	900
F	8	-	800	-
G	6	4	600	900
H	1	-	200	-
I	2	-	300	-

6. The following information relates to a small project to prepare the marketing strategy for a new model of tablet computer:

Activity	Duration (days)	Immediate Predecessor(s)
A	2	-
B	1	A
C	3	A
D	2	B
E	2	C
F	3	D,E

- a) Determine the project duration and critical path. [5]
 b) It has been discovered that some of the project activity durations are subject to variation as follows:

Activity	Optimistic (O)	Most Likely (L)	Pessimistic (P)
A	1	2	3
C	2	3	4
F	2	3	5

Determine:

- i the expected project duration [2]
 ii the standard deviation of the project duration [6]
 c) What is the probability that the project will take more than 11 days to complete? [7]

7. 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	22.00
Project B	24.00

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:

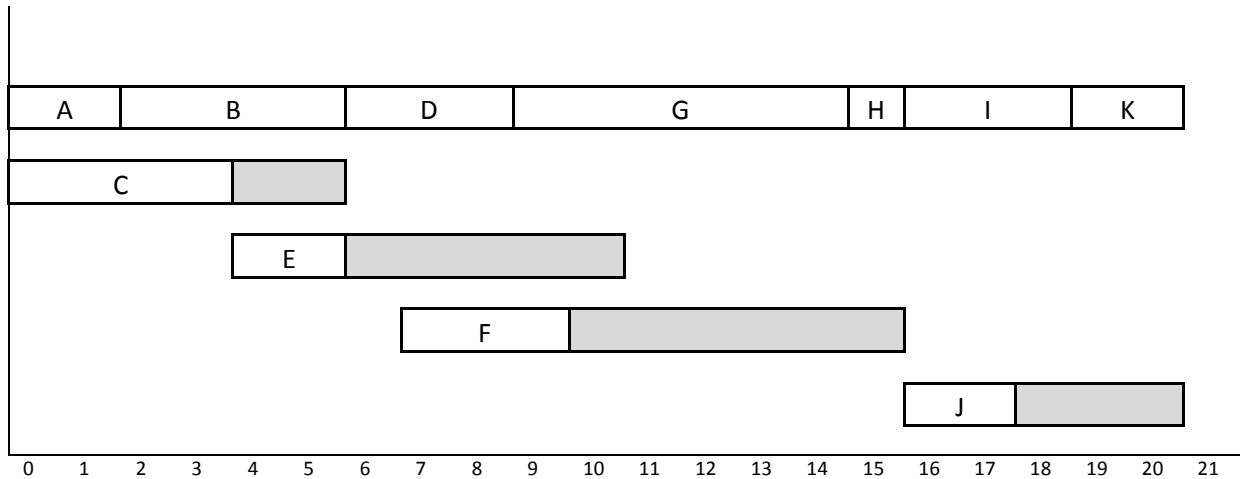
YEAR	Project A	Project B
1	2.00	1.00
2	4.50	3.50
3	5.75	6.00
4	7.50	8.50
5	9.00	10.00
6	9.50	10.00
7	8.50	9.50
8	7.00	8.50
9	5.00	7.00

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	3%
4 and 5	4%
6, 7, 8 and 9	5%

Calculate the net present value of EACH of the projects, and advise the company which of the two projects should be chosen. [20]

8. The following Gantt chart represents the sequencing of the activities (A to K) of a project to relocate the staff and equipment of the personnel department of a large university into a new building:



(N.B. The total float for each activity is represented by the shaded areas.)

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

Activity	Manpower	Cost (£000)
A	1	4
B	2	6
C	3	6
D	3	8
E	2	9
F	2	2
G	2	8
H	2	3
I	2	5
J	4	6
K	1	3

- 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]
- Assuming that there are 5 employees available to carry out the project, and all employees can work on all activities, show how the project can be completed within 21 weeks. [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]

Relevant Formulae:

Question 6:

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

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

Uncertainty of Project Completion Time:

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

D: desired project completion time

U: the 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

Question 7:

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

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)