

Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway
FIRST SEMESTER EXAMINATIONS, 2000

B.E. Degree Examination

Project Management

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Time allowed: *Three* hours

Attempt *Five* Questions

The following should accompany this examination paper:

One sheet of the Standardised Normal Distribution

One sheet of Random Numbers

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1. a) With the aid of neat sketches, compare and contrast the projectised organisational structure with the functional organisational structure and the matrix organisational structure under the following headings:
- i) functions and authority of the project manager
 - ii) functions and authority of the functional manager
 - iii) percentage of the project team assigned full-time to the project
 - iv) communication within the project team
 - v) problems which may occur
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- b) A project manager has been appointed to develop a plan for a project. Outline the process that the project manager should follow to develop the following:
- i) work breakdown structure
 - ii) organisational breakdown structure
 - iii) responsibility accountability matrix

PTO

2. A project manager proposes two alternative schemes, A and B for an existing arrangement. The estimated operating costs for the existing arrangement for the next four years is shown in column 2 of the table. The expected operating costs associated with alternatives A and B are shown in columns three and four of the table. The first alternative A requires an initial capital investment of £100,000 and alternative B requires an initial capital investment of £200,000 as shown. If 10% is the minimum rate of return for any investment, calculate the internal rate of return for each alternative and make a recommendation to the project manager.

YEAR	EXISTING	ALT. A	ALT. B
0	-	-100,000	-200,000
1	-200,000	-170,000	-140,000
2	-190,000	-160,000	-120,000
3	-170,000	-140,000	-110,000
4	-160,000	-120,000	-100,000

3. a) Write a short note on project control and cost control in project management.
b) Draw a network diagram for data given below:

ACTIVITY	SUCCESSOR	DURATION (Days)
A	B,E,F	6
B	D	8
C	H,I	8
D	G	12
E	G	9
F	K	8
G	C	8
H	-	1
I	-	2
J	E,F	10
K	-	24

- c) Evaluate the EST, EFT, LST, LFT, TF and FF for each activity.
d) Identify the critical path from the calculations in (c).
4. a) Compare and contrast quality and value for an engineering project.
b) In an embankment project the density of the material is inspected by coring block specimens. The mean density of good and poor quality results are 95% and 91% respectively, of maximum attainable. Records show that there is a standard deviation of 2% for the kind of work concerned. Determine the sampling plan if the consumers risk is 5% and the producers risk is 7.5%. The distribution of mean may be assumed to be Normally distributed and the standard deviation of the mean is σ/\sqrt{n} . PTO

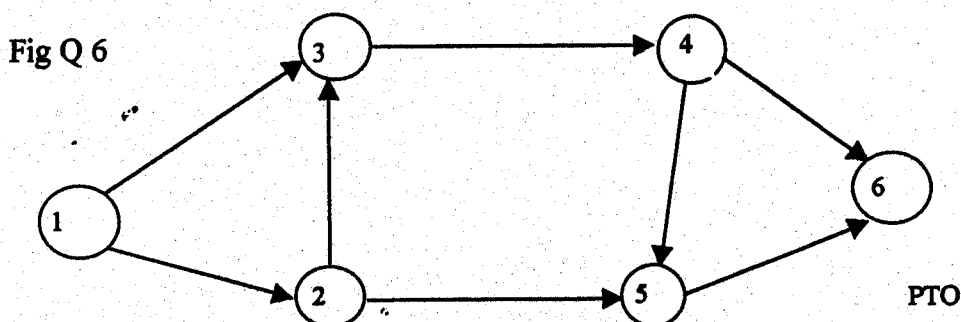
5. A company is striving to complete a project before the end of the current financial year. If the project is completed before this target date then the company will benefit from a large bonus to be made by the client. The end of the financial year is now 28 weeks away. A decision is made by the project manager to use PERT techniques in order to plan, schedule and control the remainder of the project. Information about the eleven remaining activities is given in the table. Durations are given in weeks. What is the probability that the company will get the large bonus?

Note: The critical path for this network may be found from inspection and the duration of the remainder of the project may be assumed to be Normally Distributed.

ACTIVITY NODES	OPTIMUM DURATION (O)	MOST LIKELY DURATION (L)	PESSIMISTIC DURATION (P)
1 - 2	3	8	13
1 - 3	2	5	8
1 - 4	3	8	10
2 - 5	4	7	10
3 - 6	2	3	8
4 - 6	7	9	10
4 - 8	4	6	9
5 - 7	6	9	12
6 - 9	5	7	11
7 - 9	2	5	14
8 - 9	4	6	9

Note: $E[t] = (O+4L+P)/6$ and $VAR[t] = \{(P-O)/6\}^2$

6. a) Write a short description of the Monte Carlo method of simulation.
b) Use the Monte Carlo technique to simulate the project shown. The durations of the activities in the network are random and statistically independent. The probabilities associated with each activity are shown in the table below. The table of random numbers given with this examination paper may be used.



Activity	Duration (Days)	Probability
1 - 2	1	0.2
	2	0.4
	3	0.4
1 - 3	3	0.5
	4	0.5
2 - 3	2	0.8
	3	0.2
2 - 5	2	0.1
	3	0.9
3 - 4	1	0.7
	2	0.3
4 - 6	4	0.7
	5	0.3
4 - 5	1	0.6
	2	0.4
5 - 6	1	1.0

END.