Ollscoil na hÉireann, Gaillimh
National University of Ireland, Galway

GX 0050

Semester I Examinations, 2005/2006

Exam Code(s)	4BE121, 4BV121, 4BG121, 4BM121
Exam(s)	B.E. Degree Examination
Module Code(s)	CE419
Module(s)	Project Management
Paper No.	
Repeat Paper	
External Examiner(s)	Professor M. O'Mahony
Internal Examiner(s)	Professor P. O'Donoghue
	Dr. K. McNamara
Instructions:	Answer Five Questions.
Duration	3 Hrs.
No. of Answer books	
Requirements:	
Handout	
MCQ	
Statistical Tables	Yes Cumulative Normal Probability Table.
Graph Paper	Yes
Log Graph Paper	
Other Material	
No. of Pages	3 + 1
Department(s)	Civil Engineering

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FIRST SEMESTER EXAMINATIONS, 2005/2006

B.E. Degree Examination

Project Management

Professor M. O'Mahony

Professor P. O'Donoghue

Dr. K. McNamara

Time allowed: *Three* hours

Attempt *Five* Questions

A Cumulative Normal Probability Table should accompany this Examination paper.

1. a) Explain, with diagrams, the following time dependence in relation to networks:

   i) Finish-to-Start = d time units, (FS =d)

   ii) Start-to-Start = d time units, (SS=d)

   iii) Finish-to Finish = d time units, (FF=d)

   iv) Start-to-Finish = d time units, (SF=d) [4 marks]

   b) Draw a network given the following information: [6 marks]

Activity	Predecessor	Duration	Activity	Predecessor	Duration
A	-	4	B	A	4
C	A	4	D	C	2
E	B	4	F	B,D	5
G	C	3	H	F,G	4
I	E,H	1			

   c) Calculate EST, EFT, LST, LFT, TF, FF and IF for each activity. [8 marks]

   d) Identify the critical path. [2 marks]

PTO

2. Information on all tasks of a project at the end of the sixth week is given in Table Q2. Costs may be assumed uniformly distributed in time.

a) Evaluate the following at the end of the sixth week: BCWS, BCWP, ACWP, CPI, SPI, the schedule variance and the cost variance. [10 marks]

Where BCWS is Budgeted Cost of Work Scheduled, BCWP is Budgeted Cost of Work Performed, ACWP is Actual Cost of Work Performed, CPI is the Cost Performance Index, (BCWP/ACWP), and SPI is the Schedule Performance Index, (BCWP/BCWS).

b) Comment on the status of the project. [4 marks]

c) Evaluate the ECC and FCC for the project at the end of the sixth week, (Estimated cost to Completion and Forecast Cost to Completion) [6 marks]

Activity	Predecessor	Duration (weeks)	Budget €	Actual Cost €	% Completion
A	-	2	300	400	100
B	-	3	200	180	100
C	A	2	250	300	100
D	A	5	600	400	20
E	B,C	4	400	200	20

TABLE Q2

3. An appraisal of three alternative, mutually exclusive projects, X, Y and Z is being made for a company that requires a return of at least 10% on its invested capital. The estimated details of the investments are shown in Table Q3. Which investment should be recommend and why? Support your reasoning with calculations of the IRR for each project. [20 marks]

	Project X	Project Y	Project Z
Initial Cost	€100,000	€160,000	€280,000
Salvage	0	0	0
Net Annual Receipts, (end of year)	€18,400	€30,600	€40,000
Life in Years	8	8	10

TABLE Q3

Note discounted values of future cash flow, F, are given by $F[1/(1+i)^n]$.

4. The 'Production Diagram' for a product X is shown in Figure Q4 below. The delivery schedule to be met is specified in Table Q4.
At the end of week five it is reported that:
11 products are completed; 22 components D are tested;
24 components C are tested; 24 components B are painted;
22 components A are painted; 24 components B are made;
32 components A are made; 36 components C are made;
60 components D are made.
a) Evaluate the lead time for each event in the network. [4 marks]
b) Draw the Line of Balance for week five and comment on the production. [16 marks]

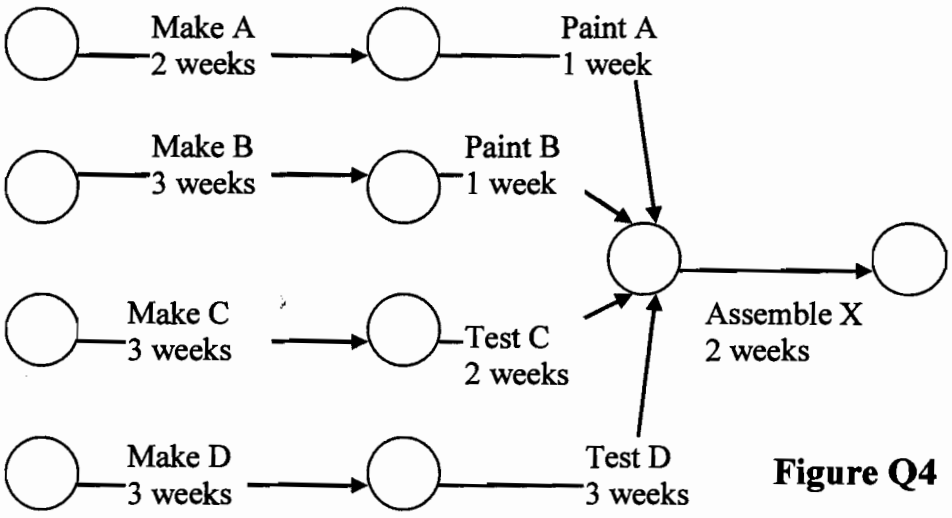


Figure Q4

Week No.	Quantity		Week No.	Quantity
1	1		11	10
2	1		12	10
3	2		13	9
4	3		14	8
5	4		15	6
6	5		16	5
7	6		17	2
8	7		18	1
9	8		19	1
10	10		20	1

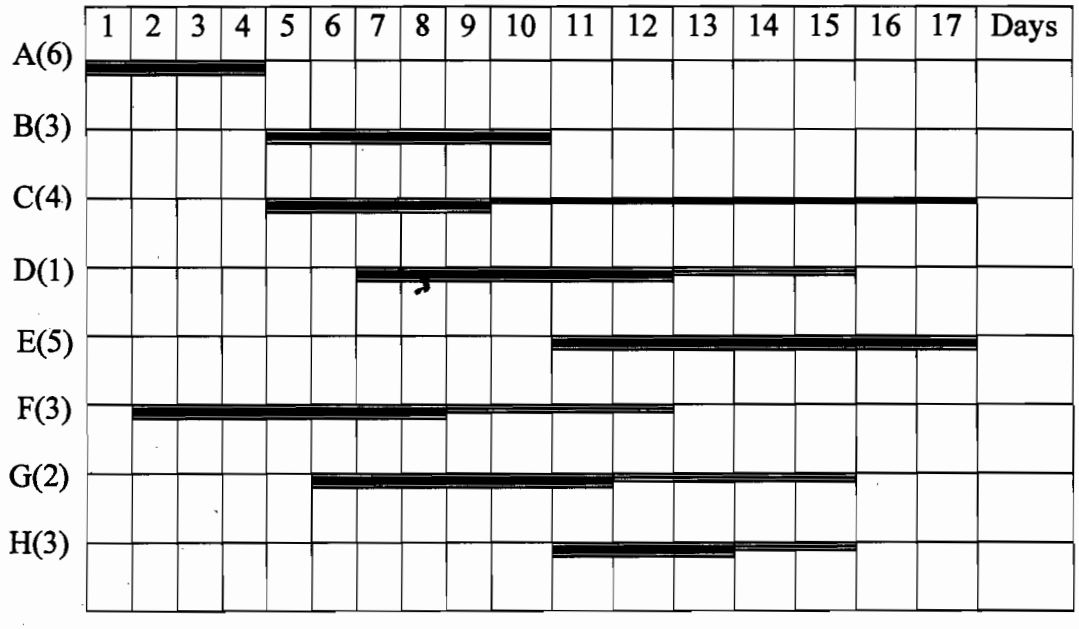
Table Q4

5. Given the following project logic and estimates of activity durations, where O is an optimistic estimate, P is a pessimistic estimate and L is the most likely estimate, determine the mean and variance of the project duration. How many days are required to give a 95% probability of completion? [20 marks]

Activity	Predecessor(s)	DURATION (DAYS) O	L	P
A	-	8	9	14
B	-	4	7	9
C	B	6	14	20
D	A,C	11	13	15
E	D	9	19	29
F	E	3	6	9
G	E	1	4	6
H	G	5	7	11
I	H,F	3	4	5

The activities may be assumed to be statistically independent and use may be made of the Central Limit Theorem. The range O to P may be assumed to contain 99% of values. Note then: $E[t] = \{O+4L+P\}/6$ and $Var[t] = \{(P-O)/6\}^2$

6 The bar chart shows a project with activities starting at their EST. The daily demand for workers is shown in brackets for each activity. Level this resource without exceeding the project duration using the improvement factor method. [20 marks]



KEY ▬ Scheduled Duration ▬ ═══ Float ═══

END