

CONSTRUCTION PROJECT MANAGEMENT

MOCK EXAM

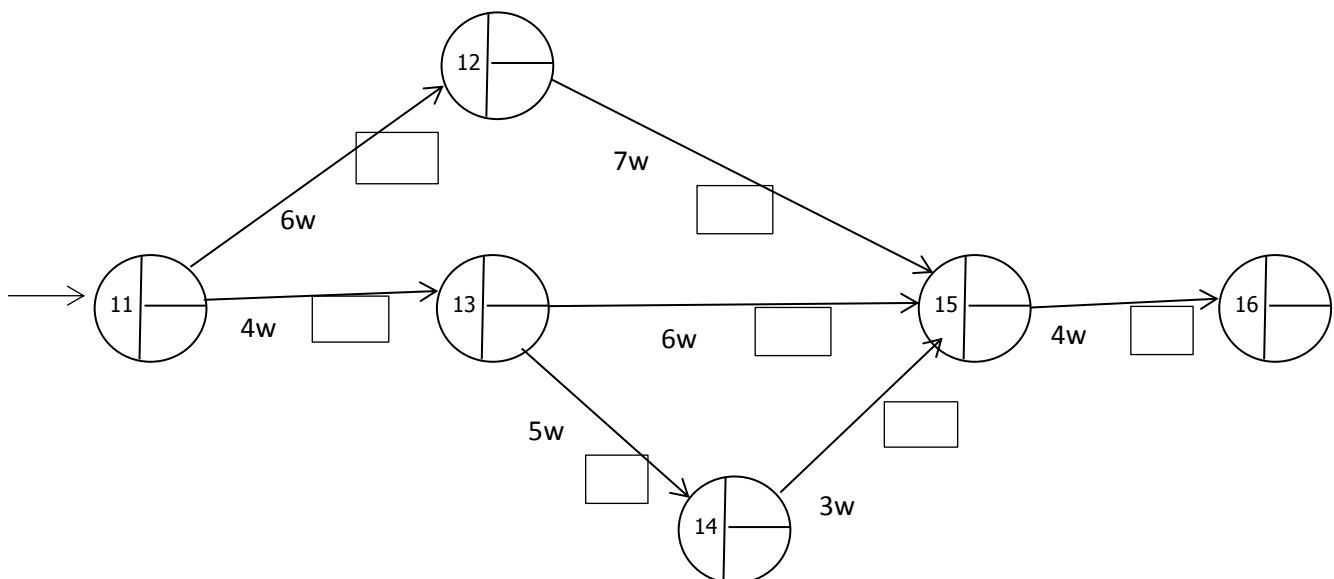
SECTION A

QUESTION 1 (34 marks)

The cladding activity is split in the following tasks in our arrow diagram. We start in node 11 until node 16. The construction of slabs have been delayed for 2 weeks and we need to accelerate this programme so that we can catch up with our next milestone (node 16).

Our conversations with the different subcontractors for these tasks have brought to the table shown below, identifying normal/crash time and normal/crash cost for every task.

Activity	Normal time (weeks)	Crash time (weeks)	Normal cost (£)	Crash cost (£)
11-12	6w	4w	30,000	50,000
11-13	4w	3w	20,000	22,000
12-15	7w	5w	48,000	60,000
13-14	5w	2w	20,000	38,000
13-15	6w	5w	60,000	75,000
14-15	3w	2w	10,000	30,000
15-16	4w	3w	55,000	74,000



Answer these questions:

- The contractor is convinced that if we accelerate activity 11-12 for 2 weeks we will be able to gain this time. Do you agree with him? Why or why not? (4 marks)
- Another solution he proposes is to accelerate activities 11-13 and 13-15. Will it help to reduce this time? Do you agree with this solution? (4 marks)
- What is the cheapest solution for this programme to reduce time in 2 weeks so as to finish right in time for this milestone? How much is the cost for this activity accelerating? (24 marks)
- Do indirect costs have any influence on the final price in this case? (4 marks)

SECTION B

QUESTION 2 (33 marks)

We have to make a programme for the construction of a skyscraper in Swansea city centre. Explain what programme techniques you can use and the advantages of each one. (15 marks)

You have to use subcontractors for the works to be developed in the structure frame for this skyscraper. Make a list of conditions to be included in the contract between the main contractor and the subcontractor. (18 marks)

QUESTION 3 (33 marks)

As in the previous question (question 2), we want to build a skyscraper in Swansea city centre. Explain about the site layout conditions for the following:

- Security (7 marks)
- Site access (pedestrians and traffic) (8 marks)
- Crane/s (10 marks)
- Storage (8 marks)

QUESTION 4 (33 marks)

We would like to use the PERT methodology to estimate probability of duration of works at a tender process. The most important activities are shown in the following table, where the optimistic, most likely and pessimistic duration are shown.

To solve this exercise, you need to calculate the following:

- a) What probability do we have to finish this job in 40 weeks?
- b) What is the duration of works for which you have at least 90% probability to finish on time. (25 marks)
- c) Write a short discussion (one paragraph) explaining your arguments about possibilities to accept this offer. (8 marks)

Activity	d _o (weeks)	D _m (weeks)	D _p (weeks)
1-2	4	6	7
1-3	3	5	6
1-4	9	10	13
2-5	4	7	9
2-6	8	9	11
3-5	6	9	13
4-7	8	12	14
5-7	10	12	14
6-8	7	9	11
7-8	4	5	8
8-9	9	11	12

expected mean duration, $d_e = \frac{d_o + 4d_m + d_p}{6}$

standard deviation, $\sigma d_e = \frac{d_p - d_o}{6}$

variance, $vd_e = \left(\frac{d_p - d_o}{6}\right)^2$

AREA BELOW THE NORMAL CURVE AND THE x VALUE

$(x - \bar{X})/s$	area	$(x - \bar{X})/s$	area
-3.5	0.00023	0.0	0.5000
-3.4	0.00034	0.1	0.5398
-3.3	0.00048	0.2	0.5793
-3.2	0.00069	0.3	0.6179
-3.1	0.00097	0.4	0.6554
-3.0	0.00135	0.5	0.6915
-2.9	0.0019	0.6	0.7257
-2.8	0.0026	0.7	0.7580
-2.7	0.0035	0.8	0.7881
-2.6	0.0047	0.9	0.8159
-2.5	0.0062	1.0	0.8413
-2.4	0.0082	1.1	0.8643
-2.3	0.0107	1.2	0.8849
-2.2	0.0139	1.3	0.9032
-2.1	0.0179	1.4	0.9192
-2.0	0.0228	1.5	0.9332
-1.9	0.0287	1.6	0.9452
-1.8	0.0359	1.7	0.9554
-1.7	0.0446	1.8	0.9641
-1.6	0.0548	1.9	0.9713
-1.5	0.0668	2.0	0.9773
-1.4	0.0808	2.1	0.9821
-1.3	0.0968	2.2	0.9861
-1.2	0.1151	2.3	0.9893
-1.1	0.1357	2.4	0.9918
-1.0	0.1587	2.5	0.9938
-0.9	0.1841	2.6	0.9953
-0.8	0.2119	2.7	0.9965
-0.7	0.2420	2.8	0.9974
-0.6	0.2743	2.9	0.9981
-0.5	0.3085	3.0	0.99865
-0.4	0.3446	3.1	0.99903
-0.3	0.3821	3.2	0.99931
-0.2	0.4207	3.3	0.99952
-0.1	0.4602	3.4	0.99966
-0.0	0.5000	3.5	0.99977

To obtain an area percentage, you should multiply this value times 100

SOLUTIONS

EXERCISE 1

- a) No, you can only accelerate for one week.
- b) No, activity 13-15 is more expensive.
- c) 11-12 and 12-15. £14,000.
- d) No affection, the previous activities are delayed and now we only want to recover this time.

EXERCISE 4

- a) Mean=42.1; Variance=2.74; Standard Deviation=1.66; Probability to finish in 40 days is very low, about 10-11%
- b) 44.3 weeks
- c) You should accept a minimum of 44 weeks for the total duration.