

APSC 221 : Assignment 1 Solution - Fall 2013

Question 1: Chapter 1 and 2 (14 marks)

Read the Harvard Business Review article titled “Ferguson’s Formula” found in the October 2013 issue [Article# R1310G]. This link should take you directly to the article (<http://hbr.org/2013/10/fergusons-formula/ar/pr>). Otherwise, the Queen’s Library has a digital subscription to the magazine and you can access this and other articles via the Library webpage.

For each of the following find examples in the article. **Minimum of one, maximum of three examples per part; in total you need 14 solid examples for full marks.**

- a) What are the management functions illustrated in this article?
For example: “he increasingly delegated the training sessions to his assistant coaches” – is a classic example of leading, the key here however is that Sir Alex used that time to “observe” which allows him to simultaneously do step 2 of *planning*, identify gaps, and by assessing individual performance against standards, which is part of *controlling*.
- b) The management skills exemplified by Sir Alex?
For example: “he increasingly delegated the training sessions to his assistant coaches” – (same example from above) is a classic example of *time management*
- c) What goals were set? Identify which of the four main purposes of goal setting and what time frame is being demonstrated.
- d) The strategies that were used. Identify which of the three levels of strategy is being demonstrated.
For example: “He is strategic, rational, and systematic”, will get you zero marks, yes the word strategic is in the sentence, however this tells us nothing. One sentence further on “... was a continued commitment to young players: Those under 25 constituted a far higher share of United’s incoming transfers than of its competitors’.” - This is an excellent example of a long-term strategic goal and a business-level (competitive) strategy.
- e) What corporate cultural issues were identified?
- f) What entrepreneurial characteristics does Sir Alex demonstrate?

One mark for each correct, well connected quote.

Question 2: Chapter 3 (22 marks)

The following table represents some of the major activities associated with renovations to the Victoria Hall.

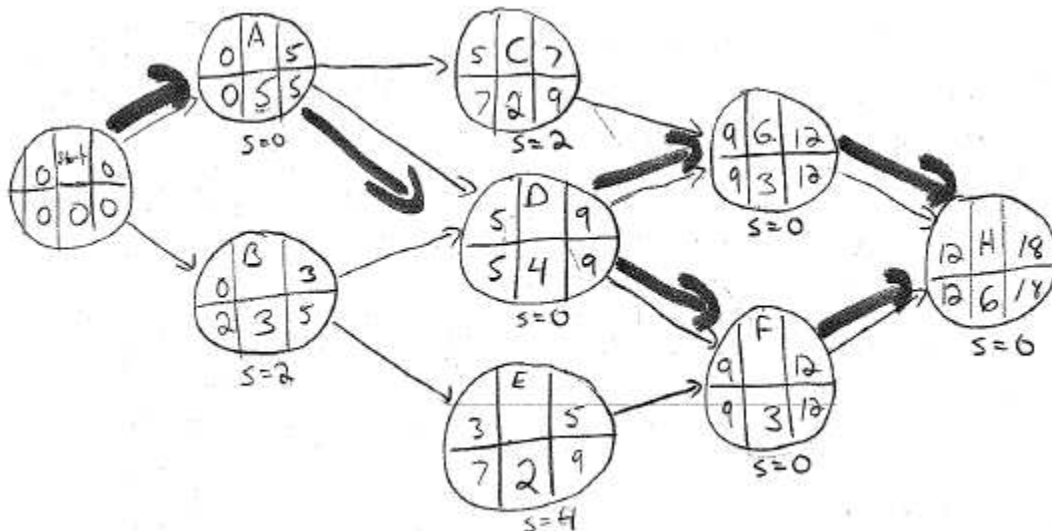
- a) Calculate the activity time and variance for all activities using PERT (4 marks in total – ¼ mark for each correct value);

$$t = (a + 4m + b) / 6 \quad \text{and} \quad \text{Variance} = ((b - a) / 6)^2$$

Activity	Immediate Predecessor(s)	Activity time (weeks)				Variance
		<i>a</i>	<i>m</i>	<i>b</i>	<i>t</i>	
A	-	2.00	4.00	12.00	5	2.78
B	-	2.00	3.00	4.00	3	0.11
C	A	1.00	2.00	3.00	2	0.11
D	A,B	2.00	4.00	6.00	4	0.44
E	B	1.00	2.00	3.00	2	0.11
F	D,E	0.75	2.75	6.25	3	0.84
G	C,D	2.50	3.00	3.50	3	0.03
H	G,F	4.00	6.00	8.00	6	0.44

- b) Draw the CPM network to represent this project. Your diagram must show; (11 marks)

1. The Earliest Start (ES), Earliest Finish (EF), Latest Start (LS), Latest Finish (LF) and b. Slack time for each activity. One mark for each fully correct node.



- c. Clearly identified critical path(s) activities One mark for each correct path.

1. A – D – F – H
2. A – D – G – H

c) Determine the project's expected completion time and the variance(s) for the project (2 marks);

Activity	t	Var	CP1		CP2	
			Expected	Var	Expected	Var
A	5	2.78	5	2.78	5	2.78
B	3	0.11				
C	2	0.11				
D	4	0.44	4	0.44	4	0.44
E	2	0.11				
F	3	0.84	3	0.84		
G	3	0.03			3	0.03
H	6	0.44	6	0.44	6	0.44
			18	4.51	18	3.69
			1 mark		1 mark	

d) Determine the most conservative probability that the renovation will be complete by 20 weeks (5 marks in total, broken down as shown below)

Note: Use to two decimal place accuracy for all calculations.

$$\text{CP 1 : } \sigma = \sqrt{\text{Var}} = \sqrt{4.51} = 2.12 \text{ (} \frac{1}{2} \text{ mark)}$$

$$Z = (x - \mu) / \sigma = (20 - 18) / 2.12 = 0.94 \text{ (} \frac{1}{2} \text{ mark)}$$

$$P(Z \leq 0.943) = 82.64\% \text{ (1 mark)}$$

$$\text{CP 2 : } \sigma = \sqrt{\text{Var}} = \sqrt{3.69} = 1.92 \text{ (} \frac{1}{2} \text{ mark)}$$

$$Z = (x - \mu) / \sigma = (20 - 18) / 1.92 = 1.04 \text{ (} \frac{1}{2} \text{ mark)}$$

$$P(Z \leq 1.04) = 85.08\% \text{ (1 mark)}$$

For this question 82.64% is a MORE conservative probability, i.e. we are only 82.64% confident that the renovation will be completed by 20 weeks, versus the higher confidence of 85.08% (1 mark)

Question 3: Chapter 3 (14 marks)

You are the project manager for a project with the network diagram shown below (including the results from the forward and backward passes), and have just found out you will have 20 fewer days to complete the project than you had originally planned. The data provided in the table below shows the costs associated with each project activity, and the crash time. Note: Crash Time is the minimum number of days required to complete task not the number of days that the duration of the activity can be reduced by.

- a) Calculate the crash cost per day for all activities (4 marks- deduct ½ mark for each incorrect one);

Activity	Normal time (days)	Crash time (days)	Normal cost (\$)	Crash cost (\$)	Crash cost per unit of time (\$/day)
A	110	90	\$ 12,000	\$ 14,000	\$ 100
B	10	10	\$ 2,100	-	-
C	20	15	\$ 1,800	\$ 2,800	\$ 200
D	40	30	\$ 16,000	\$ 22,000	\$ 600
E	30	20	\$ 1,400	\$ 2,000	\$ 60
F	50	40	\$ 3,600	\$ 4,800	\$ 120
G	60	45	\$ 13,500	\$ 18,000	\$ 300

- b) Identify the initial critical Path for this project. (1 mark)

Start - C - D - E - F - Finish or C - D - E - F

- c) Using the completed table above, explain what steps you would take to crash the project to achieve the new project time frame while minimizing costs. (6 marks – one mark for each below, or similar explanation)

Must crash by a total of 20 days

E is on the critical path and also the least expensive. E cannot be crashed for more than 10 days.

Step 1 : Crash activity E by 10 days for a cost of \$600

Activity G now no longer has any slack and forms a second critical path.

Activity F is common to both paths and is the least expensive of the remaining critical activities.

Step 2 : Crash activity F by 10 days for a cost of \$1,200

Total project duration has been reduced by 20 days.

- d) Determine how much more the project will now cost. (2 marks)

$\$600 + \$1,200 = \$1,800$

- e) Identify which activities are critical after the project has been fully crashed. (1 mark)

After Step 2 in part c) ALL activities no longer have any slack and ALL activities are critical.

