Software Project Management

INF3708

Assignment 03 MEMO: Due date 4 April 2016 Compulsory

ASSIGNMENT 03 - SEMESTER 1

ASSIGNMENT 03	
Due date	4 April 2016
Study material	Hughes & Cotterell: Chapters 5,6 and 7
Total marks	60 marks
If your assignment is late, please DO NOT PHONE OR E-MAIL asking for an extension but include a note in your assignment stating the reason for the late submission and we will decide whether or not it will be marked.	

Instructions:

1. **Download and complete** this assignment and submit online in a .pdf format by performing the calculations.

2. The following unique number has to be assigned to the assignment:

UNIQUE NUMBER:
739759

3. Show all your working (calculations).

4. This assignment consists of 3 questions.

Questions on Chapter 5

QUESTION 1: **[20]**

1.1 Provide the equation and identify the variables in Boehm's equation for calculating effort in the use of the COCOMO model. (4)

Boehm's equation:

effort = c* (size)*k (1 mark)

Variables in Boehm's equation:

Effort: measured in person months consisting of 152 working hours (1 mark)

Size: measured in thousands of delivered source code instructions (kdsi) (1 mark)

c and k are constants:

The constants, c and k, depended on whether the system could be classified, in Boehm's terms, as "organic", "semi-detached" or "embedded" (1 mark)

Note: c and k are constant values derived from Table below.

These relate to the technical nature of the system and the development environment.

1.2 Five systems with the following estimated lines of code were identified. Identify which can be completed in less than three years. (16)

System	Lines of code	System type
A	23557	Organic
B	18553	Organic
C	17014	Semi-detached
D	10572	Embedded
E	9568	Semi-detached

Table for Question 1: System details

ANSWER:

Use the following COCOMO constants available in the prescribed textbook:

System type	c	K
Organic	2.4	1.05
Semi-detached	3.0	1.12
Embedded	3.6	1.20

NOTE: The COCOMO constants table is to be given in case of exams, as part of exam question.

Calculations:

A	$=2.4*((23557/1000)^{1.05})$	=	66.21208	person months / 12 = years:	=	5.517673	Years
B	$=2.4*((18553/1000)^{1.05})$	=	51.52833	person months / 12 = years:	=	4.294027	Years
C	$=3.0*((17014/1000)^{1.12})$	=	71.71738	person months / 12 = years:	=	5.976448	Years
D	$=3.6*((10572/1000)^{1.20})$	=	60.99456	person months / 12 = years:	=	5.082880	Years
E	$=3.0*((9568/1000)^{1.12})$	=	37.63925	person months / 12 = years:	=	3.136604	Years
	5 marks		**5 marks**			**5 marks**	

None will be completed in three years - **1 mark**

Questions on Chapter 6 - Activity Planning

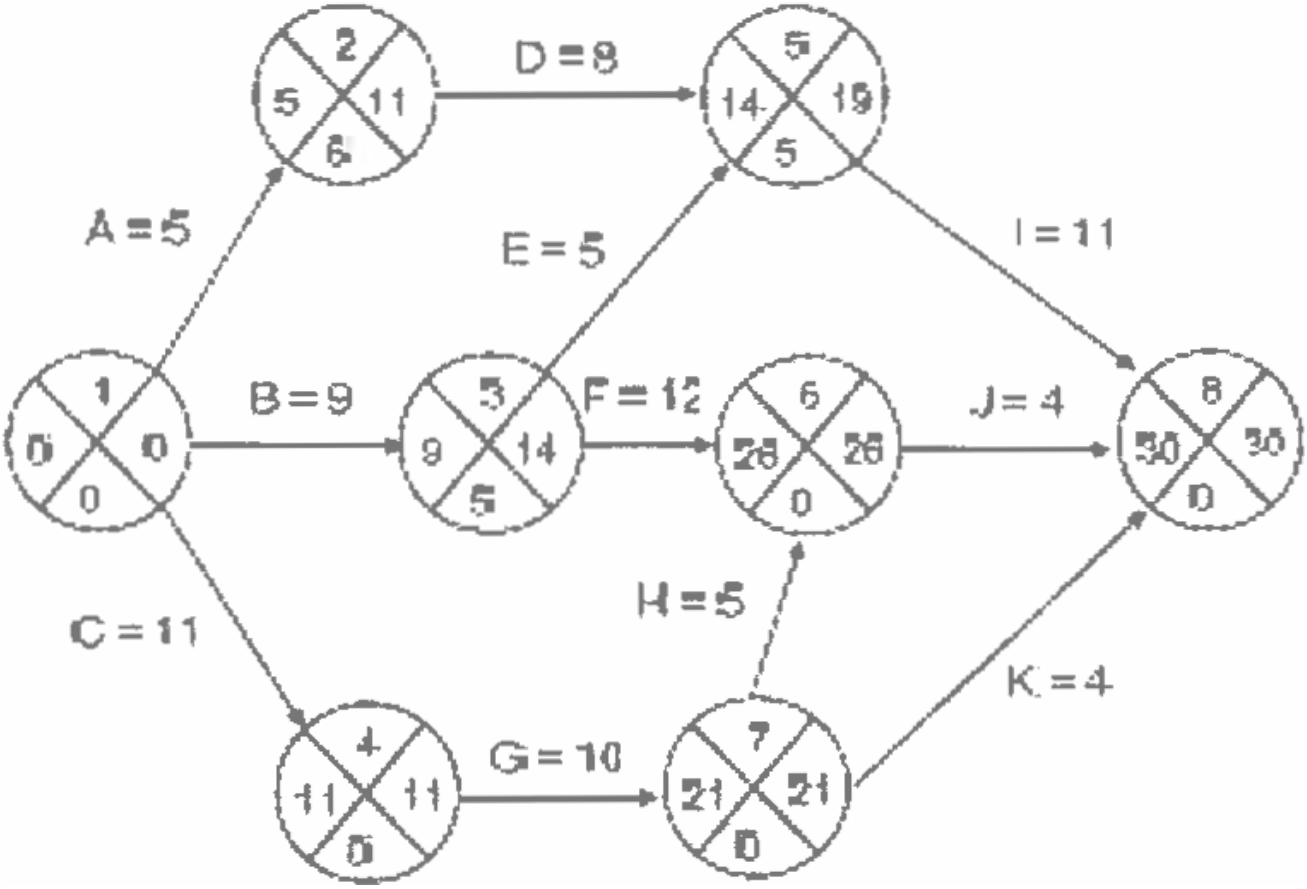
QUESTION 2 **[20]**

2.1 Consider the following list of tasks with dependencies and estimated durations reflected in table 1. Draw a CPM network (activity-on-arrow diagram) to illustrate the interaction of activities. Include all the values in the nodes. (12)

Task	Precedents	Duration (weeks)
A	None	5
B	None	9
C	None	11
D	A	8
E	B	5
F	B	12
G	C	10
H	G	5
I	D, E	11
J	F, H	4
K	G	4

Table 1 for Question 1.1

ANSWER



2.2 Write down the critical path(s) using the letters of the tasks and calculate and write down the duration of the project. How many paths are there in total? Identify them all and write them down. (3)

Answer:

Critical path (= longest path and with a slack of zero) C-G-H-J = 30 weeks% mark.

All paths are:

Path	Duration
A-D-1	5 + 8 + 11 = 24 ½ mark
B-E-1	9 + 5 + 11 = 25 ½ mark
B-F-J	9+12+4=25 ½ mark
C-G-H-J (Critical path)	11 + 10 + 5 + 4 = 30 ½ mark
C-G-K	11 + 10 + 4 = 25 ½ mark

2.3 "Planning does not only take place during the project start-up." Discuss this statement, referring to **when** and **why** planning takes place as it does. (5)

ANSWER:

NOTE: This question was marked based on the student's answer. However, below is a solution sample:

"The importance of ongoing planning throughout the project life cycle cannot be stressed enough – often neglect in this area may result in overall project failure or costly delays. Planning is an ongoing process of refinement with each iteration becoming more detailed and more accurate than the last.

The emphasis and purpose of planning shifts over successive iterations. During the feasibility study and project start-up the main purpose of planning will be to estimate timescales and the risks of not achieving target completion date or keeping within budget.

The emphasis will be placed upon the production of activity plans for ensuring resource availability and cash flow control as the project proceeds beyond the feasibility study. Monitoring and replanning must continue throughout the project to correct any drift that might prevent meeting time or cost targets until the final deliverable has reached the customer" (Saunders F, 2015).

Questions on Chapter 7 - Risk Management

QUESTION 3: **[20]**

3.1 Briefly discus a framework for dealing with risk. (8)

ANSWER

Students are referred to the textbook p. 166 section 7.4

2 marks will be allocated for naming and discussing each of the following basic steps:

- Risk identification; 2 marks
- Risk analysis and prioritization; 2 marks
- Risk planning; 2 marks
- Risk monitoring. 2 marks

Study pages 166 to 176 for detail on each of these steps. Possible discussion:

P166 - p176 describes the framework dealing with risk. The steps identified include risk identification; risk analysis and prioritization; risk planning; risk monitoring.

1. **Risk Identification**: Involves the use of checklists and brainstorming. A checklist is an already developed list of risks likely to occur in a software development project, as well as countermeasures that can be taken to reduce the risk. Organizations may have their own organizational risk checklist. Table 7.1, p167 gives an example of such a checklist.

This is discussed by a group of project stakeholders once there is a preliminary project plan. The checklist as well as knowledge and experience of the participants are used to identify problems that may occur. This collaboration is important in giving a sense of ownership of the project to stakeholders.

It is recommended that on review of completed projects, any problems identified and the steps taken to avoid or resolve them be documented. These could in some cases be added to the organizational risk checklist.

2. **Risk Analysis and Prioritization**: Once the risks have been identified they need to be distinguished in terms of which are most likely and how damaging exposure to the risk would be. Risk exposure formula is a way of estimating potential damage the risk can cause. Risk exposure may be indicated as a monitory or duration value {p168-169}.

It is important that planners prioritize risks, and give focus to highest risks, and the potential impact the risk may have. Probability impact matrix (p171) represents the risks according to the probability and impact.

3. **Risk Planning (p172- 173**): Once the risks are identified and prioritized the next step is to decide on how to deal with each of them. This includes

a. Risk acceptance- do nothing, particularly if the anticipated damage would be less than the cost of trying to reduce the likely occurrence of the risk.

b. Risk voidance- take a decision of whether to continue or change direction based on the level of the risk. For example an alternative may be found instead of developing the software.

c. Risk reduction and mitigation - when a decision has been made to continue, precautions to reduce the probability of the risk may be taken. Risk reduction involves reducing the likelihood of the risk occurring, while risk mitigation is related to contingency planning, and involves reducing the impact of the risk in the event that it occurs.

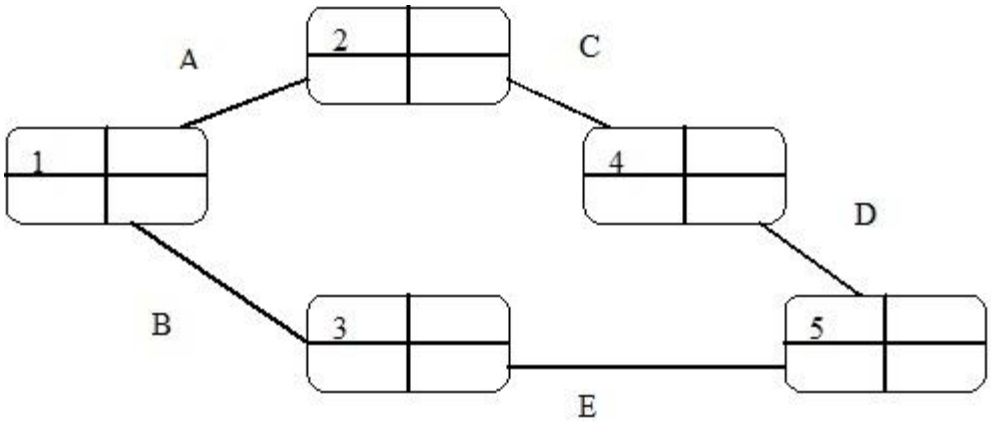
d. Risk transfer - In this instance the organization may choose to move the risk to someone else other than itself, for example through outsourcing. This has the potential of increasing the cost because the outsourced organization may want to cover the risk. Competition may however keep prices down.

4. **Risk Monitoring**: This involves the contingency planning (p174) and drafting and maintaining a risk register (Fig 7.5 p. 175). A contingency plan is a planned action to be carried out if the particular risk materializes. There are costs associated with taking the contingency measure. Most important is that the contingency measure should be cost- effective. The cost-effectiveness of a risk reduction action can be calculated using the risk reduction leverage (RRL) formula (p174). Example of a risk register is on p175 (Fig 7.5).

The risk register should be reviewed and amended as part of the project control lifecycle. Risk identification, analysis and prioritizing and planning would also be probably repeated throughout the project lifecycle.

Note: the question is "Discuss" a framework. This requires that you deliberate or examine the framework. This is more than simply describing or just outlining. The expectation is that you will describe as well as deliberate (discuss) the framework.

In the PERT network illustrated in the figure below, the target date for the completion of the project is 15 weeks.



Pert network for Question 3

	Optimistic (a)	Most Likely (m)	Pessimistic (b)	Expected (te)	Standard Deviation (s)
A	4	6	8		
B	1	4	5		
C	2	3	5		
D	2	5	6		
E	3	4	5		

Table for Question 2

Use the table above to calculate the following:

3.2 Calculate the Expected (te) values and Standard Deviation (s) and indicate the (te) and (s) values on the diagram. (10)

3.3 Calculate the Z value on the last event. (2)

ANSWER

Use the formula below to calculate the te values of each activity:

$$t_e = \frac{a + 4m + b}{6}$$

*Calculating the t_e value of Activity A: t_e = (4+(4*6)+8)/6 = 36 / 6 = 6*

*Calculating the t_e value of Activity B: t_e = (1+(4*4)+5)/6 = 22/6 = 3.67*

*Calculating the t_e value of Activity C: t_e = (2+(4*3)+5)/6 = 19/6 = 3.17*

*Calculating the t_e value of Activity D: t_e = (2+(4*5)+6)/6 = 28/6 = 4.67*

*Calculating the t_e value of Activity E: t_e = (3+(4*4)+5)/6 = 24/6 = 4*

Use the formula below to calculate the s values of each activity:

$$s = \frac{b - a}{6}$$

Calculating the s value of Activity A: $s = (8-4)/6 = 4/6 = 0.67$

Calculating the s value of Activity B: $s = (5-1)/6 = 4/6 = 0.67$

Calculating the s value of Activity C: $s = (5-2)/6 = 3/6 = 0.5$

Calculating the s value of Activity D: $s = (6-2)/6 = 4/6 = 0.67$

Calculating the s value of Activity E: $s = (5-3)/6 = 2/6 = 0.33$

*The **sd** for event 2 is the **s** value for Activity A, i.e. = 0.67*

*The **sd** for event 3 is the **s** value for Activity B, i.e. = 0.67*

*The **sd** for event 4 is total SD of A + C*

$= \sqrt{((sd \text{ of event } 2)^2 + (s \text{ of Activity } C)^2)}$

$= \sqrt{(0.67^2 + 0.5^2)}$

$= \sqrt{(0.694444444)}$

$= 0.83$

*The **sd** for event 5 there are two possible routes: A + C + E and B + D, calculate both, then take the longest route*

***sd** for A + C + D* $= \sqrt{(0.67^2 + 0.5^2 + 0.67^2)}$

$= \sqrt{(1.1478)}$

$= 1.07$

***sd** for B + D* $= \sqrt{(0.67^2 + 0.33^2)}$

$= \sqrt{(0.5578)}$

$= 0.75$

The biggest is 1.07

*The **te** and **s** values calculated above are depicted in the figure below:*

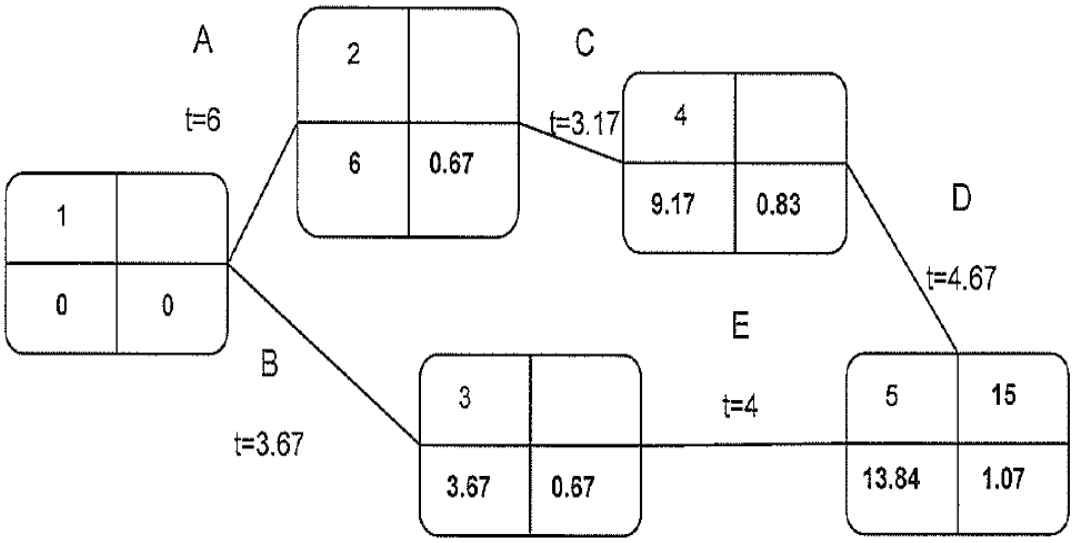


Diagram 1: The Pert network

(1 mark for each value on the diagram = 1 ´ marks, remember target date = 15 weeks - given)

In the table below find a summary of the calculations:

	Optimistic (a)	*Most Likely (m)*	*Pessimistic (b)*	*Values*	*Expected (te)*	*Values*	*Standard Deviation (s)*
A	*4*	*6*	*8*	*=(4+(4*6)+8)/6*	*6.00*	*=(8-4)/6*	*0.67*
B	*1*	*4*	*5*	*=(1+(4*4)+5)/6*	*3.67*	*=(5-1)/6*	*0.67*
C	*2*	*3*	*5*	*=(2+(4*3)+5)/6*	*3.17*	*=(5-2)/6*	*0.50*
D	*2*	*5*	*6*	*=(2+(4*5)+6)/6*	*4.67*	*=(6-2)/6*	*0.67*
E	*3*	*4*	*5*	*=(3+(4*4)+5)/6*	*4.00*	*=(5-3)/6*	*0.33*

Table 1: Pert network calculations

Use the formula below to calculate the **Z** value for last activity:

$$Z = \frac{T - te}{s}$$

$$Z = (15 - 13.84) / 1.07$$

$$= 1.084112$$