SOFTWARE PROJECT MANAGEMENT
TUTORIAL LETTER 203
FOR
INF3708

ASSIGNMENT 03 SOLUTION

Assignment 03: Due date - 19th September 2017

Unique nr: 675016
Marks weight: 40%

ASSIGNMENT 03 - SEMESTER 2

ASSIGNMENT	
Due date	19th September 2017
Study material	Hughes & Cotterell: Chapters 5 and 6
Total marks	90 marks = 100%
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. 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:
675016

3. Show all your working (calculations).

4. This assignment consists of 4 questions.

QUESTIONS AND ANSWERS FOR ASSIGNMENT 03:

Questions on Chapter 5 and 6 - Activity Planning

QUESTION 1 **[10 Marks]**

1.1 Software project estimations are very important in software development. They are carried out at various stages of software development. Name and discuss Barry Boehm's various software effort estimations techniques. (7)

See page 108. Section 5.5

Answer

Algorithmic models: With this technique, 'effort drivers' representing characteristics of the target system and the implementation environment to predict effort

Expert judgement: with this technique, software effort is estimated based on the advice of an expert or knowledgeable staff in the field**.**

Analogy: this technique base software estimation effort on the actual effort of a similar, completed, project.

Parkinson: is where the staff effort available to do a project becomes the 'estimate'

Price to win: the estimate is a figure that seems sufficiently low to win a contract

Top-down: overall estimate for the whole project is broken down into the effort required for the component task

Bottom-up: component tasks are identified and sized and the individual estimates are aggregated

1.2 As an emerging project manager working with a team on a new project. You have been mandated to investigate possible problems associated with under-estimating software project effort.

Answer

See page 107. Section 5.3 **(3)**

Under-estimated project might……:

- not be completed on time or to cost
- have effect on the quality of the project - less experience staff could respond to pressing deadlines by producing work that is substandard
- cause a substandard work to only become visible at later testing phases of a project, making it difficult to control. As a result of this, extensive re-work can easily delay project completion.

QUESTION 2 **[20 Marks]**

2.1 Provide the equation and identify the variables in Boehm's equation for calculating effort in the use of the COCOMO model

Answer

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)

2.2 Five systems with the following estimated lines of code were identified. Identify which system can be completed in three years

Answer

Solve the bracket, then power k before multiplying by c

A	=3.0*(17862/1000)$^{1.12}$	=	75.73	Person months/12 = years	=	6.31 years
B	=3.0*(10762/1000)$^{1.12}$	=	42.93	Person months/12 = years	=	3.78 years
C	=2.4*(22132/1000)$^{1.05}$	=	62.01	Person months/12 = years	=	5.17 years
D	=3.6*(7253/1000)$^{1.20}$	=	38.80	Person months/12 = years	=	3.23 years
E	=3.6*(6434/1000)$^{1.20}$	=	33.61	Person months/12 = years	=	2.80 years
	(5 marks)		**(5 marks)**			**(5 marks)**

Table 2 Calculations of the systems line of code

Only systems E can be completed in less than 3 years. See last column of the table above **(1 mark)**

QUESTION 3 **[39 Marks]**

3.1 A project activity must be defined to meet certain criteria if not it has to be redefined. What are the criteria? (4)

Answer

See section 6.5

An activity must have a clearly defined start and end-point, normally marked by the production of a tangible deliverable

The required resource of an activity must be forecastable and is assumed to be required at a constant level throughout the duration of the activity.

The duration of an activity must be forecastable – assuming normal circumstances, and the reasonable availability of resources

Precedence requirements. Some activities might require that others are completed before they can begin

3.2. There are three approaches to identifying the activities or tasks that makes up a project. Name and discuss the first two approaches. (6)

Answer

Activity-based approach: this approach consists of creating a list of the activities that a project would be involved in. This approach is based entirely on structuring of activities and the considered favoured way of generating activity list is by creating Work Break Down structure (WBS). WBS start with identifying the main (or high-level) tasks required to complete a project. The high-level activities are further broken down into a set of lower-level tasks.

Product-based approach: this approach consists of producing a Product Breakdown Structure (PBS) and a Product Flow Diagram (PFD). PBS depict a relationship that exist between different hierarchy of project products or between project main products and their sub-component products. PFD indicates, for each product, which other products are required as inputs.

Product-based approached is particularly…cont with page 135

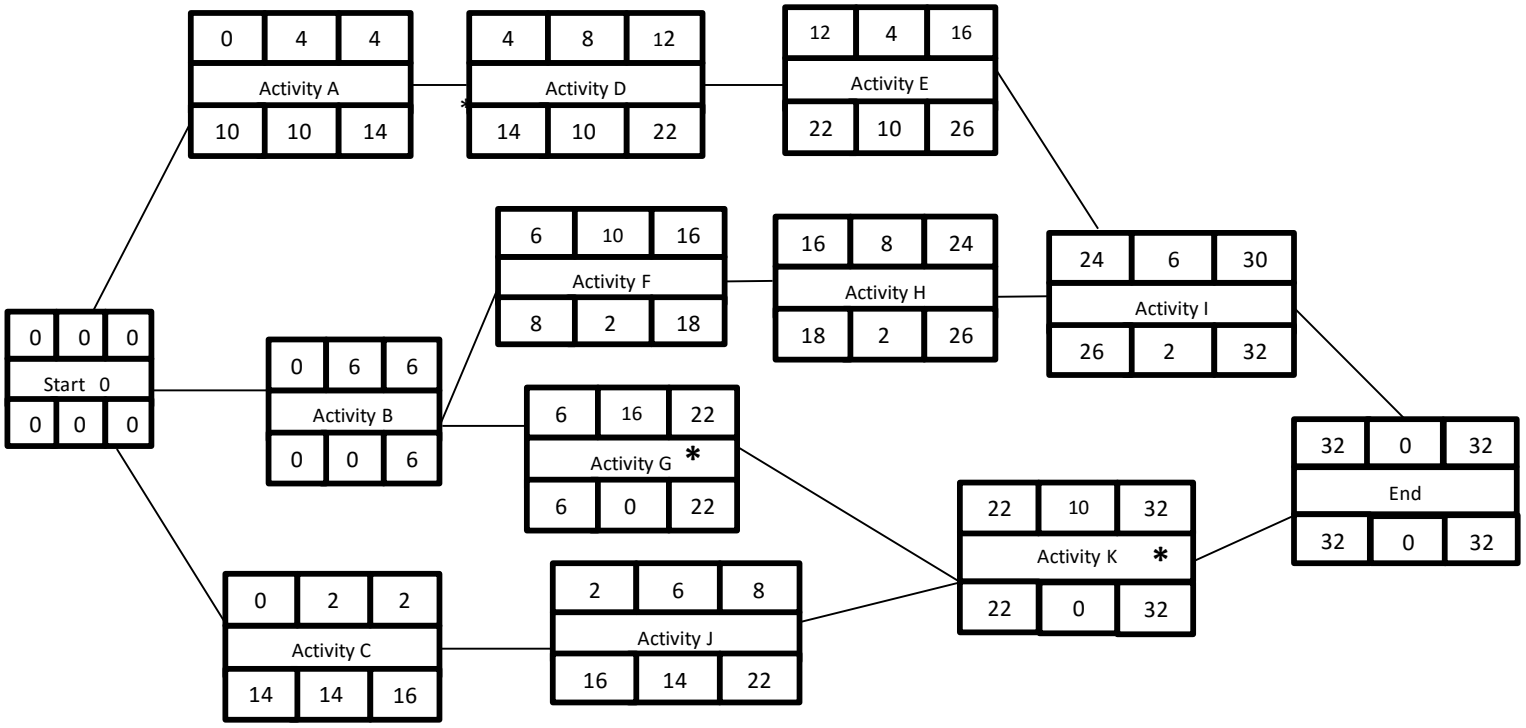
3.3 Consider the following list of tasks with dependencies and estimated durations reflected in the table. Draw a CPM network (activity-on-arrow diagram) to illustrate the interaction of activities. (9)

Activity	Duration (Weeks)	Precedents
A	4	-
B	6	-
C	2	-
D	8	A
E	4	D
F	10	B
G	16	B
H	8	F
I	6	E,H
J	6	C
K	10	G,J

Table 2 for Question 3

Answer

3.3.1 Draw a CPM network **(activity-on-node diagram**) to illustrate the interaction in table 2. Please indicate **all** the values on the nodes forward pass (earliest date) and backward pass (latest date). Mark with * all the node of a critical path. (19)



A-D-E-I: Path duration: 4+8+4+6 = 22

B-F-H-I: Path duration: 6+10+8+6 = 30

B-G-K: Path duration: 6+16+10 = 32 (Critical Path)

C-J-K: Path duration: 2+6+10 = 18

3.3.2 In a table format, calculate the earliest start time, earliest finish, latest start time, latest finish and total float of the tasks for the activity-on-node network. (10)

Answer

Task	Duration (Weeks)	Earliest Start	Earliest Finish	Latest Start	Latest Finish	Float
A	4	0	4	10	14	10
B	6	0	6	0	6	0
C	2	0	2	14	16	14
D	8	4	12	14	22	10
E	4	12	16	22	26	10
F	10	6	16	8	18	2
G	16	6	22	6	22	0
H	8	16	24	18	26	2
I	6	24	30	26	32	2
J	6	2	8	16	22	14
K	10	22	32	22	32	0

Write down the critical path 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. Calculate their durations

This question/answer has no mark allocated to it. Is just for your practice.

Critical path: ***B****-G-K* ***Project duration: 6 + 16 + 10 = 32*** weeks

Number of paths: *4 paths, namely:*

A-D-E-I: Path duration: 4+8+4+6 = 22

B-F-H-I: Path duration: 6+10+8+6 = 30

B-G-K: Path duration: 6+16+10 = 32

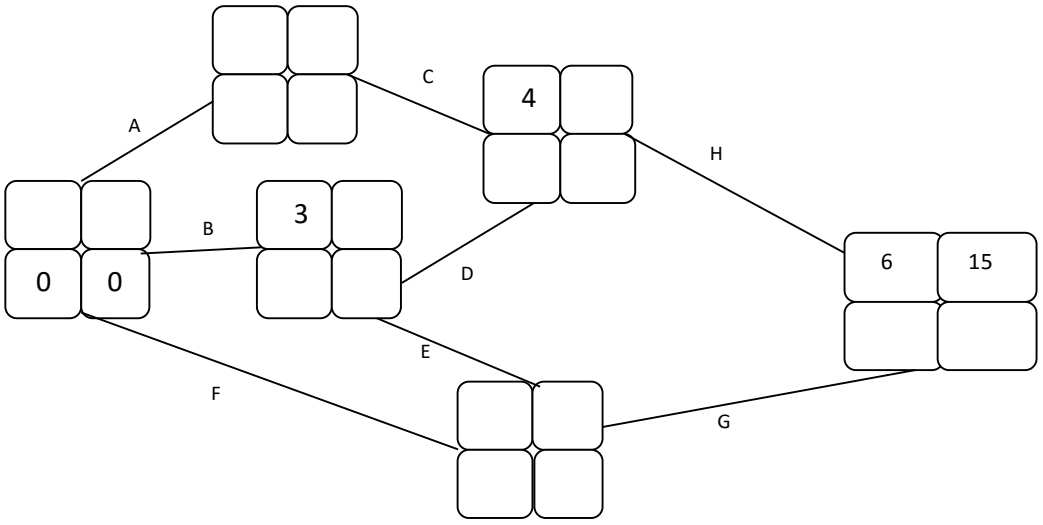
C-J-K: Path duration: 2+6+10 = 18

QUESTION 4 **[21 Marks]**

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

	Optimistic (a)	Most Likely (m)	Pessimistic (b)	Expected (te)	Standard Deviation (s)
A	5	6	8		
B	3	4	5		
C	2	3	3		
D	3.5	4	5		
E	1	3	4		
F	8	10	15		
G	2	3	4		
H	2	2	2.5		

Table for Question 4



Pert network for Question 4

Use the table above to calculate the following:

4.1 Calculate the Expected activity duration (te) values and use it to carry out a forward pass through the network depicted on figure 1. (16)

Calculate the Standard Deviation (s) and expected activity duration for all the task indicate your (s) and (te) values on figure 1 also. Show all your calculations.

4.2 Based on your calculation of (te), what is the project duration? State it in weeks. (2)

4.3 Calculate the Z value on the last event. (3)

Discussion of Question 4

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

Answer:

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

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

*Calculating the te value of Activity A: te = (5+(4*6)+8)/6 = 37/6 = 6.16*

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

*Calculating the te value of Activity C: te = (2+(4*3)+3)/6 = 17/6 = 2.83*

*Calculating the te value of Activity D: te = (3.5+(4*5)+6)/6 = 29.5/6 = 4.91*

*Calculating the te value of Activity E: te = (1+(4*3)+4)/6 = 17/6 = 2.83*

*Calculating the te value of Activity F: te = (8+(4*10)+15)/6 = 63/6 = 10.5*

*Calculating the te value of Activity G: te = (2+(4*3)+4)/6 = 18/6 = 3*

*Calculating the te value of Activity H: te = (2+(4*2)+2.5)/6 = 12.5/6 = 2.08*

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 = (8-5)/6 = 3/6 = 0.5

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

Calculating the s value of Activity C: s = (3-2)/6 = 1/6 = 0.16

Calculating the s value of Activity D: s = (5-3.5)/6 = 1.5/6 = 0.25

Calculating the s value of Activity E: s = (4-1)/6 = 3/6 = 0.5

Calculating the s value of Activity F: s = (15-8)/6 = 7/6 = 1.16

Calculating the s value of Activity G: s = (4-2)/6 = 2/6 = 0.33

Calculating the s value of Activity H: s = (2.5-2)/6 = 0.5/6 = 0.08

In the table below find a summary of the calculations:

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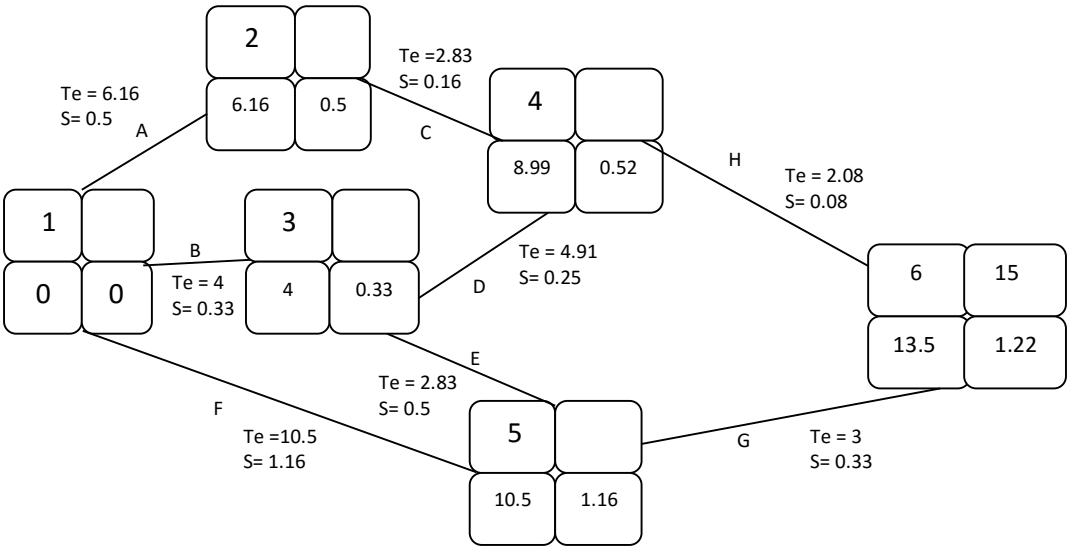
	Optimistic (a)	Most Likely (m)	Pessimistic (b)	Expected (t_e)	Standard Deviation (s)
A	5	6	8	6.16	0.5
B	3	4	5	4	0.33
C	2	3	3	2.83	0.16
D	3.5	4	5	4.91	0.25
E	1	3	4	2.83	0.5
F	8	10	15	10.5	1.16
G	2	3	4	3	0.33
H	2	2	2.5	2.08	0.08

Pert network calculations



(For each value on the diagram = 1 mark, remember Target date (T) = 15 weeks - given)

4.2 Based on your calculation of (t_e), what is the project duration? State it in weeks. (5)

Answer

The project duration is 13.5 weeks

4.3 Calculate the Z value on the last event. (3)

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

Answer

$$Z = \frac{T - t_e}{S}$$

Z = *(15 -13.5) / 1.22*

= *3.9344*