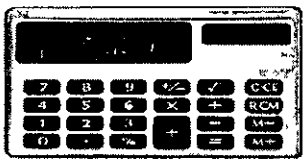
UNIVERSITY EXAMINATIONS



UNIVERSITEITSEKSAMENS

UNISA university of south africa

# INF3708

October/November 2013

## SOFTWARE PROJECT MANAGEMENT

Duration 2 Hours

100 Marks

EXAMINERS

| | |
|---|---|
| FIRST | MR EO OCHOLA |
| SECOND | MRS B CHIMBO |
| EXTERNAL | PROF MO OHANGA |

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**Use of a non-programmable pocket calculator is permissible**

**Closed book examination**



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## INSTRUCTIONS

- **This paper consists of 7 pages.**
- Non-programmable calculators may be used
- Show all calculations
- Round off all your calculations to two decimal places
- Answer ALL the questions

GOOD LUCK!!

## QUESTION 1 [5]

Select the appropriate answer Write only the appropriate letter next to the question number in your answer book

| | |
|---|---|
| 1 1 | The first stage in the software development life cycle is<br>A code and test<br>B detailed design<br>C requirements analysis<br>D qualification testing<br>E architecture design |
| 1 2 | The project steering committee _____<br>A authorizes changes to the activity networks of the project<br>B consists of users, developers and managers<br>C has the responsibility of running the project on daily basis<br>D reports to the project manager<br>E does none of the above |
| 1 3 | What needs to be done when identifying scope and objectives of a project·<br>A Establish a project authority<br>B Identify high-level project risks<br>C Stakeholder analysis<br>D Establish methods of communication with all parties<br>E A, C and D |
| 1 4 | Which one of the following is NOT a concern of the project manager when managing the allocation of resources within programmes?<br>A Impersonal relationship with resource type<br>B Need to maximise utilisation of resources<br>C Projects tend to be dissimilar<br>D One project at a time<br>E None of the above |
| 1 5 | The business case for a project is best suited to the following deliverable<br>A completion date of the project<br>B cost-benefit analysis<br>C feasibility study<br>D A & B<br>E none of the above |

## QUESTION 2 [24]

2 1 Name and briefly discuss the four characteristics that Brooks pointed out that the projects of software products have in common that make them different from the products of general projects (8)

2 2 Briefly describe the function of each of the following

2 2 1 Product Breakdown Structure (PBS) (2)
2 2 2 Product Flow Diagram (PFD) (2)
2 2 3 Activity Network (2)

2 3 Write a neat essay on prototyping Build your essay around a discussion of the following aspects

- What is prototyping? (2)
- Two kinds of prototypes with a discussion of each (4)
- How prototypes may eliminate risks? (2)
- How prototypes may facilitate communication? (2)

## QUESTION 3 [19]

The table below gives the estimated cash flow for three different projects (in South African Rand, R)

| Year | Project 1 | Project 2 | Project 3 |
|---|---|---|---|
| 0 | - R195 000 | - R160 000 | - R295 000 |
| 1 | + R15 000 | + R15 000 | + R30 000 |
| 2 | + R30 000 | + R15 000 | + R35 000 |
| 3 | + R55 000 | + R20 000 | + R50 000 |
| 4 | + R50 000 | + R35 000 | + R120 000 |
| 5 | + R55 000 | + R55 000 | + R110 000 |
| 6 | + R50 000 | + R90 000 | + R115 000 |

**Table 3 1 for Question 3: Projects cash flow**

3 1 Calculate the **net profit** of each project (3)

3 2 Based on your answer to Question 3 1 above, identify which project you would select to develop Motivate your answer (1)

3 3 Using the **shortest payback** method, identify which project you would now select for development Justify your answer by referring to the projects' payback periods and possible profits in the payback year (5)

3 4 Calculate the **return on investment** *(ROI)* of each of the projects given in Table 3 1 (3)

3 5 Based on your calculation of the ROI of each project in Question 3 4 above, identify which project you would select to develop (1)

3 6 Calculate the Net Present Value (NPV) of the one project you would select based on your calculations in Questions 3.1-3 5 so far Use the 10% discount rate from Table 3 2 (6)

| Year | 10% discount rate |
|---|---|
| 1 | 0 9091 |
| 2 | 0 8264 |
| 3 | 0 7513 |
| 4 | 0 6830 |
| 5 | 0 6209 |
| 6 | 0 5645 |

**Table 3.2 for Question 3.6: NPV discount factors**

## QUESTION 4 [7]

4 1 Provide the equation and identify the variables in Boehm's equation for calculating effort in the use of the COCOMO model (4)

4 2 Three systems with the following estimated lines of code were identified Determine if System A can be completed in three years (3)

| System | Lines of code | System type |
|---|---|---|
| A | 6749 | Semi-detached mode |
| B | 7557 | Embedded mode |
| C | 12425 | Organic mode |

**Table 3 for Question 4: System details**

| System type | c | k |
|---|---|---|
| Organic | 2 4 | 1 05 |
| Semi-detached | 3 | 1 12 |
| Embedded | 3 6 | 1 2 |

**Table 4 for Question 4: COCOMO constants**

## QUESTION 5 [20]

5 1 Consider the following list of tasks with dependencies and estimated durations reflected in table 5 1 Redraw and complete the given draft CPM network (activity-on-arrow diagram – Diagram 5.1) in your exam script to illustrate the interaction of activities Include the following detailed information on all the nodes in the diagram the event number, earliest start, latest start and slack (16)

5.2 Write down all the paths using the letters of the tasks as well as the duration of each path Identify the critical path and mark it clearly on the diagram (3)

| 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 5.1 for Question 5: Tasks, precedents and durations**

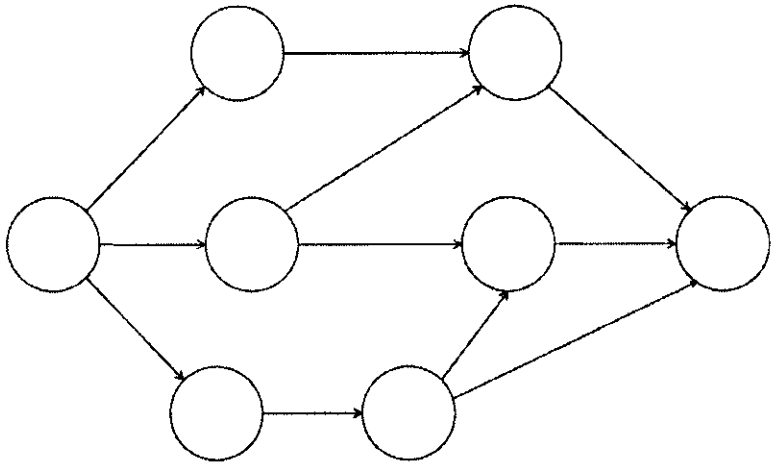

**Diagram 5.1 for Question 5: CPM network (activity-on-arrow diagram) draft**

5.3 What will the effect on the project be if the duration of activity A changes to 12 weeks? (1)

## QUESTION 6 [4]

6 1 Briefly explain the following software project effort estimation laws

6 1 1 Parkinson's Law (2)

6 1 2 Brooks' Law (2)

## QUESTION 7 [5]

Identify and name three (3) tools that can be used to visualise the progress of a project Briefly describe any two of these

## QUESTION 8 [16]

8 2 In the PERT network illustrated in the Figure 8 1 below, the targeted date for the completion of the project is fifteen (15) weeks

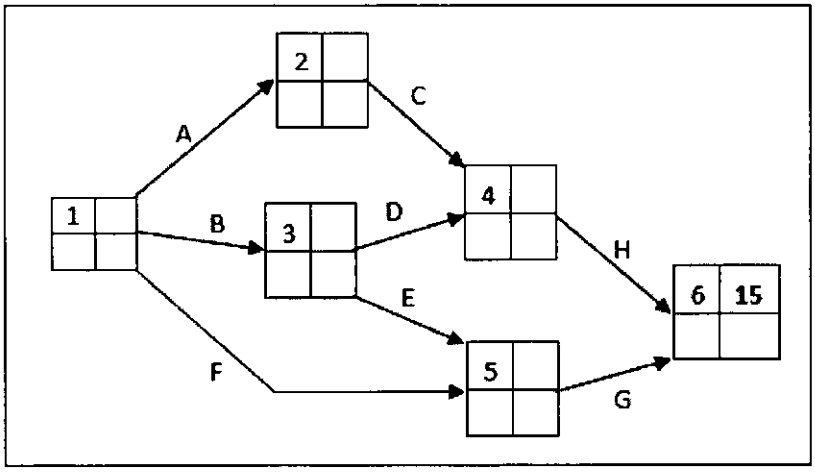


**FIGURE 8.1 PERT network diagram**

| Activity | Optimistic (a) | Most Likely (m) | Pessimistic (b) | Expected ($t_e$) | 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 8.1 Values for the PERT network**

Use the Table 8 1 and the Figure 8 1 above to calculate the following:

8 2 1 Calculate the expected times ($t_e$) for all activities. (4)

8 2 2 Calculate the standard deviation (s) for all activities (4)

8 2 3 Use Figure 8 1 to calculate the standard deviation (s) for the fourth (4) task (event) (3)

8 2 4 Use Figure 8 1 to calculate the standard deviation (s) for the sixth (6) task (event) (4)

8 2 5 According to Figure 8 2 below, what is the probability of not meeting the target date? (1)

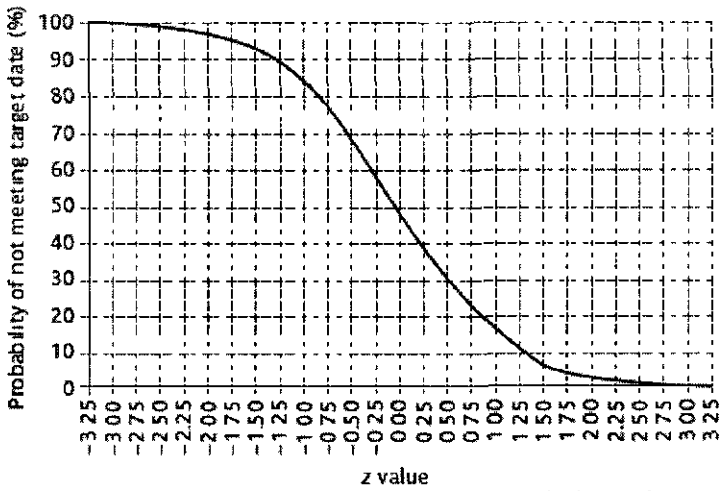


**FIGURE 8.2 The probability of obtaining a value within z standard deviations of the mean for a normal distribution**