**Eastern Mediterranean University - Computer Engineering Department**

**Software Engineering Program**

**CMSE-201 Fundamentals of Software Engineering - Midterm Exam**

**Std Id\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Std Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Instructor: Alexander G. Chefranov**

**Duration: 100 Minutes April 21, 2025, 8.30**

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**Three A4 sheets of paper with *your* *handwritings* (not photocopies, printouts, etc.) may be used for your help. Calculators, telephones, other electronic devices are not allowed. Passing of any material (rubbers, pencils, etc.) is not allowed.**

**There are 5 questions (totally, 100 points), 7 pages**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Task** | **Q1** | **Q2** | **Q3** | **Q4** | **Q5** | **Total** |
| **Point** | **20** | **20** | **20** | **20** | **20** | **100** |
| **Grade** |  |  |  |  |  |  |

**Good Luck!**

**Q1) 20 points Ch1 Introductiom**

What are the five signs that your project is going wrong? Fill in the table below

|  |  |
| --- | --- |
| **#** | **Sign** |
|  | Too many changes are done |
|  | Some tasks finish late |
|  | Cost increases |
|  | Team’s communication problems |
|  | Customer is not satisfied |

**Q2) 20 points Ch2 SDLC Models**

1. What are the three possible ways of a process description? (5 points)

Sequence of activities, Inputs/outputs; Pre- and post-conditions

1. Explain the meaning of the “Integration test” activity of the Waterfall SDLC model? (5 points)

Integration test means the testing of a subsystem obtained by integration of the lower-level subsystems

1. Explain why in the Incremental SDLC, specification, design, and testing activities interleave? (5 points)

The activities can interleave because the system is considered as a set of increments, and when the first increment, for example, undergoes testing, the second one can be on the specification stage. Thus, the both activities go concurrently but on the different increments

1. Explain the difference between the Waterfall and V-shaped SDLC models (5 points)

V-shaped model is the same as the Waterfall model with only one difference that once some activity before Unit implementation completes, the next activity starts in parallel with respective test design activity. For example, when SRS is ready, in addition to the next Architectural design activity, in parallel, also System and Acceptance tests design also starts

**Q3) 20 points Ch3 Requirements Engineering**

1. What are the software requirements? Why are they important for the software engineering? (5 points)

Software requirements is the description of the functionalities of a system to be developed and constraints on it. They are important for software engineering as they define all the next activities (design, implementation, testing) and they are checked by a customer when accepting the system

1. What are the three types of the software requirements? (5 points)

Functional, non-functional, and domain requirements

1. What does it mean: “the software requirements verifiability”? Why the software requirements verifiability is important? (5 points**)**

Software requirements verifiability means that there exists some objective measure with the help of which it is possible objectively deciding on whether the requirement is satisfied or not. Verifiability is important because in acceptance test, customers need checking whether all the requirements specified in SRS are satisfied.

1. What four objective measures can be used to verify the “reliability” software requirement? (5 points).
2. Mean time to failure; 2) probability of unavailability; 3) rate of failure occurrence; 4) availability

Q4) **20 points** Ch4 Project Management

1. Give three reasons for the importance of the software project management (5 points)

The projects shall be completed inside given time and budget by teams of people. The project management is important because without it people will not be organized for the work, and the project may go out of the time and budget.

1. What are the three main risk management activities? (5 points)

Risk identification, risk assessment, risk planning

1. What are the three main people management activities? (5 points)

Organize a team, distribute work, and monitor the process

1. What are the four people management factors? (5 points)

Consistency, respect, inclusion, and honesty

Q5) **20 points** Ch5 Project Planning and Scheduling

For the given in the table below set of the seven tasks T1..T7

|  |  |  |
| --- | --- | --- |
| **Task** | **Duration (work days)** | **Dependencies** |
| T1 | 10 |  |
| T2 | 15 |  |
| T3 | 15 | T1 |
| T4 | 10 |  |
| T5 | 10 | T2, T4 |
| T6 | 5 | T1, T2 |
| T7 | 20 | T1 |

1. Explain the meaning of the table and draw respective an activity network diagram for the tasks T1..T7 (5 points)

The set has 7 tasks durations of which are given in work days in the 2nd column. The 3rd column specifies the tasks which shall complete before a particular task can start. For example, T6 can start only after completion of T1 and T2.

T1

T2

T4

T3

T5

T6

T7

1. Calculate Early start (ES), Early finish (EF), Late start (LS), Late finish (LF), and Slack time for each task T1..T7 filling in the table below. In the Column 7, indicate by “C” the critical path tasks. What is the minimal project duration in work days? Explain your calculations. (15 points)

Early start of the tasks not having preceding tasks is set to 0. Early finish = Early start + duration. Early start of the tasks having preceding tasks is the maximum Early finish of the preceding ones. At first, Early start and Early finish is calculated for all the tasks (forward step). Maximum of the Early finish times of all the tasks is the project minimal completion time. It is used as Late finish for the tasks not having dependent on them ones. Late start of the tasks is calculated as Late start = Late finish – duration. Late start of a task having dependent on it ones is calculated as minimum of the Early start times of the tasks dependent on this task (backward step)

Slack = LS-ES=LF-EF. The critical path tasks have Slack = 0.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Task | ES | EF | LS | LF | Slack | Critical path task |
| T1 | 0 | 10 | 0 | 10 | 0 | C |
| T2 | 0 | 15 | 5 | 20 | 5 | N |
| T3 | 10 | 25 | 15 | 30 | 5 | N |
| T4 | 0 | 10 | 10 | 20 | 10 | N |
| T5 | 15 | 25 | 20 | 30 | 5 | N |
| T6 | 15 | 20 | 25 | 30 | 10 | N |
| T7 | 10 | 30 | 10 | 30 | 0 | C |

The minimal project duration is 30 days (T1+T7= 10+20)

Hints:

* **Activity**: a specific task or set of tasks that is part of the scope of a project
* **Path**: sequence of activities
* **Event**: Beginning and End of activity
* **LS**: Late Start time **ES**: Early Start time -----FORWARD PASS
* **LF**: Late Finish time **EF**: Early Finish time ---BACKWARD PASS
* **Slack**: Amount of play in the system;
* Difference between critical path time and time required for a given path.

=LS-ES or LF-EF