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**Solution**

**KIIT Deemed to be University**

**Online Mid Semester Examination(Spring Semester-2021)**

**Software Engineering & IT-3003:**

**Full Marks=20** **Time:1 Hour**

**SECTION-A(Answer All Questions. All questions carry 2 Marks)**

**Time:20 Minutes (5×2=10 Marks)**

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| **Question No** | **Question Type(MCQ/SAT)** | **Question** | **Answer Key(if MCQ)** | **CO Mapping** |
| **Q.No:1(a)** | **MCQ** | Which is not true about Gantt chart?   1. Lists the activities 2. Provides activity start and end time 3. Estimates Activity complexity 4. Captures Activity Overlapping | C | CO3 |
|  | **MCQ** | Function point metric of software also depends on the?   1. Time required for calculating one set of output 2. Number of interfaces 3. Complexity of files 4. Level of abstraction | B | CO3 |
|  | **MCQ** | Which of the following statement is correct regarding COCOMO?   1. Basic COCOMO uses 15 cost drivers in order to make the estimation more accurate. 2. Constant parameters in basic and indeterminate COCOMO have no impact on the estimation. 3. basic and the intermediate COCOMO consider a software product as a single homogeneous entity 4. A and B both | C | CO3 |
|  | **MCQ** | Which of the following statement is correct regarding the work breakdown structure of a system?   1. leaf-level subactivity requires approximately two months to develop 2. The system should be decomposed till hidden complexities are exposed. 3. There is no limit to the decomposition of a activity. 4. Only A and C | B | CO3 |
| **Q.No:1(b)** | **MCQ** | Choose the correct option from given below:   1. XP is an appropriate agile process model for projects involving old technology or non-research projects 2. The objective of Sprint review is to review the work done by the Scrum team and provide feedback. 3. User story can be defined as a quantifiable value that can be used to track testing progress. 4. Agile is not suitable for adopting dynamic changes during the development process. | B | CO1 |
|  | **MCQ** | Which of the following do not apply to agility to a software process?   1. Less emphasis on Communication among team members 2. Working Software Over Documentation 3. Uses incremental product delivery strategy 4. Working Software Over Documentation | A | CO1 |
|  | **MCQ** | Abstraction refers to:   1. process of representing the entire information of the system 2. The principle advocates decomposing the problem into many small independent parts. 3. Process of crafting the various prototypes 4. the simplification of a problem by focusing on only one aspect of the problem while omitting all other aspects | D | CO1 |
|  | **MCQ** | Choose the correct option from given below:   1. Daily scrum is a formal opportunity to inspect the testing scenarios of the entire project 2. The sprint retrospective is a formal opportunity to review how the last Sprint went and identify areas for continuous improvement for future Sprints. 3. Timeboxing helps in stay focused on ethics. 4. A sprint is a period during which complete project work has to be completed and made ready for review | B | CO1 |
| **Q.No:1(c)** | **MCQ** | Product Backlog Refinement is the process where:   1. The user stories are developed 2. The Scrum team understands the Product Backlog and keeps it ready for at least a couple of Sprints. 3. A formal inspection is done for tracking the team's progress with respect to Sprint Goal. 4. Several quick designs are created that are useful in a sprint | B | CO1 |
|  | **MCQ** | What are the criteria for a successful software project?   1. Complete the project without including documentation process 2. Develop all the requirements without concerning about quality factors 3. Emphasis more on adopting changes even if a project is not meeting budget and schedule 4. Complete the project within the given budget and deadline | D | CO1 |
|  | **MCQ** | The classical waterfall model is useful when:   1. There are regular changes during the development process 2. When customers are involved in assisting regular changes 3. When there is a need for incremental delivery 4. No defect is introduced during any development activity | D | CO1 |
|  | **MCQ** | Choose the correct option from given below:   1. RAD model is the most suitable process model for high risk oriented projects 2. The spiral model is best suited for rapid development. 3. The evolutionary software development process is sometimes referred to as   design a little, build a little, test a little, deploy a little model.   1. Waterfall process models are best suited for incomplete and ever-changing requirements. | C | CO1 |
| **Q.No:1(d)** | **MCQ** | Which statement is correct regarding requirements Gathering and analysis?   1. A stakeholder is a source of the requirements and is usually a person or a group of persons directly or indirectly concerned with the software. 2. Uncertain and incomplete requirements do not lead to any complications during the design and development phases. 3. The requirement gathering and analysis outcome does not deal with ambiguities, incompleteness, and inconsistencies in requirements. 4. Only B and C | A | CO2 |
|  | **MCQ** | Choose the correct option from given below:   1. Decision trees and decision tables are used to represent the complex processing logic 2. Non-functional requirements can be represented as a set of functions. 3. Non-functional requirements are not part of the SRS. 4. B and C | A | CO2 |
|  | **MCQ** | A software requirements specification (SRS) document should avoid discussing which one of the following?   1. Functional requirements 2. Non-Functional requirements 3. Product perspective: 4. Fundamentals for configuration management | D | CO2 |
|  | **MCQ** | Which of the following is not a goal of requirements analysis?   1. Weed out ambiguities in the requirements 2. Weed out inconsistencies in the requirements 3. Weed out non-functional requirements   D. Weed out incompleteness in the requirements | C | CO2 |
| **Q.No:1(e)** | **MCQ** | Activities A, B, and C are the immediate predecessors for D activity. If the earliest finishing time for the three activities is 11, 14, and 14, what will be D's earliest starting time?   1. 11   **B.** 12  **C.** 13  **D.** 14 | D | CO3 |
|  | **MCQ** | Which statement is correct regarding critical path (CPM)?   1. CPM can be used to determine the optimal estimated duration of a project. 2. A critical task is one with a non-zero slack time. 3. A path from the start node to the finish node containing few critical tasks is called a critical path. 4. A critical task is one with zero slack time. | D | CO3 |
|  | **MCQ** | Which of the following statement is correct regarding project risk?   1. A risk is any predictable and known event or circumstance that can occur while a project is underway. 2. schedule slippage is one of the examples of risk handling method 3. Risk reduction involves planning ways to contain the damage due to risk. 4. A and B | C | CO3 |
|  | **MCQ** | Which of the following is not a SCM (software configuration management) activity?   1. Configuration Object identification 2. Change Control 3. Risk management 4. Release Management | C | CO3 |

**SECTION-B(Answer Any One Question. Each Question carries 10 Marks)**

**Time: 30 Minutes** **(1×10=10 Marks)**

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| **Question No** | **Question** | **CO Mapping** |
| **Q.No:2** | **Q.No:2 (a)** Consider a software project scenario with the following activities and their duration in weeks. **[Total 6 marks]**   |  |  |  | | --- | --- | --- | | **Activity** | **Duration** | **Immediate Predecessor (s)** | | **A** | **4** | **-** | | **B** | **5** | **-** | | **C** | **3** | **B** | | **D** | **12** | **A** | | **E** | **6** | **A,C** | | **F** | **9** | **B** | | **G** | **4** | **E,F** |  1. Draw the activity network diagram. 2. Identify the critical path and slack time for all paths.   **Solution: IMG_20210918_192823**  **Q.No:2 (b)** Define risk reduction leverage. After doing risk analysis, a team estimated that a 1% chance of fire could cause damage of Rs. 100000/- to the company. However, the team found that if they install a fire alarm system to resolve the risk, the chances of damage will be reduced to 0.5%. The fire alarm system installation will cost Rs.1000/- to the company. As a team leader, will you go ahead with the installation of a fire alarm system? **[Total 4 marks]**  **Solution:**  **Risk Reduction Leverage:** Risk Reduction Leverage (RRL) can be defined as the variation in risk exposure divided by the amount of reducing the risk. Mathematically, Risk Reduction Leverage can be represented as below:  **RRL = (REbefore– REafter) / (cost of reduction)**  If the RRL < 1, it means that the cost of the risk reduction activity outweighs the probable gain from implementing the action i.e. one should opt for a risk reduction solution only when the RRL > 1.  According to the given scenario:  **REbefore = r \* s**  = 0.01 \* 100000 = 1000  **REafter = r \* s**  = 0.005 \* 100000 = 500  Cost of reduction = 1000  Hence, RRL = (1000 – 500) / 1000  = 0.5  Here, RRL is less than 1 which means that the cost of the fire system installation outweighs the probable gain from implementing the action. Therefore, being a team leader I will not opt for the installation of fire alarm system. | CO-3 |
| **Q.No:3** | **Q.No:3 (a)**  Consider a software project consisting of 12 activities, namely A, B, C, D, E, F, G, H, I, J, K, and L. The duration, in days, for the activities are 5, 7, 6, 5, 10, 15, 8, 8, 4, 4, 5, and 3, respectively. Activity A is an independent activity. However, activities B and D can start only after the completion of activity A. Similarly, we can start the activities F, C, and G only after the completion of B. When activity D gets completed, we can initiate activity E. Again, activity H and J can be started only when activity G is completed, whereas activity I can commence after completing activity C. Activity K will be commenced only after completion of activities E and F. Similarly, the commencement of activity L depends on the completion of I and H. Assuming yourself as a project manager: **[Total 7 marks]**  i. Draw the activity network diagram.  ii. Identify the critical path and slack/float for all other possible paths.  iii. Determine slack/float for activities D and F.  **Solution:**  Critical Path Problem  iii.  **(a)** **Slack/Float for activity D = Late Start of D – Early Start of D**  Late Start of D = Late Finish of D - Duration + 1  Late Finish of D = Late Start of Successor (E) - 1  Now, from activity network diagram we know that E is the successor of D. Hence, we need to determine the Late Start of activity E.  Late Start of E = Late Finish of E - Duration + 1  Late Finish of E = Late Start of Successor (K) - 1  Activity K is the successor of E. So, we need to calculate the Late Start of K.  Late Start of K = Late Finish of K - Duration + 1  Late Finish of K = Late Start of Successor - 1  Now, from the activity network diagram we find that there is no successor of activity K. Hence, Late Start of K will be equal to critical path duration i.e. 32 days.  So, Late Start of K = Late Finish of K - Duration + 1 = 32 - 5 + 1 = 28  Therefore, Late Finish of E = Late Start of Successor K – 1 = 28 – 1 = 27  Late Start of E = Late Finish of E - Duration + 1 = 27 – 10 + 1 = 18  Thus, Late Finish of D = Late Start of Successor E - 1 = 18 – 1 = 17  Late Start of D = Late Finish of D - Duration + 1 = 17 – 5 + 1 = 13  Again, Early Start of D = Early Finish of predecessor (A) + 1  So, we need to determine the Early Finish of A.  Early Finish of A = Duration + Early Start of A – 1  Now, activity A is an independent activity which means that it can be started on day 1. So, Early Start of A is 1.  Early Finish of A = Duration + Early Start of A – 1 = 5 + 1 – 1 = 5  Hence, Early Start of D = Early Finish of predecessor (A) + 1 = 5 + 1 = 6  **Therefore, Slack/float for D = Late Start of D – Early Start of D = 13 – 6 = 7 days**  **(b) Slack/Float for E is 0 as it is a critical activity.**  **Q.No:3 (b)**  Critical path finding can optimize resource allocation. True or false, justify your answer with an example. **[Total 3 marks]**  **Solution: True.** If we delay any task within the critical path (let us say in the above solution), even for one day, then the entire duration of the project will increase; hence, the resource demand of these tasks has to be given as the highest priority. However, on the other side, if we delay any non-critical path task (example: say delay D by one day), it will still not affect the final project schedule. So we can delay the start of task D, and the resources of this task may be allotted to the critical path’s task. | CO3 |

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| **Q.No:4** | **Q.No:3 (a)**  Consider a software project that consists of 8 activities, namely A, B, C, D, E, F, G, and H. The duration, in days, for the activities are 3, 4, 2, 5, 1, 2, 4, and 3, respectively. Activity A is an independent activity. However, activities B and C can start only after the completion of activity A. Similarly, we can start activity D after completing B. Activities E and F can only start after the completion of C. When activities D and E gets completed, we can initiate activity G. Again. Activity H can be started once the acclivities G and F are completed.  Assuming yourself as project manager: **[Total 6 marks]**  i. Draw the activity network diagram.  ii. Identify the critical path and slack/float for all other possible paths.  iii. Determine slack/float for activities D and F.  **Solution:**IMG_20210918_193321  **Q.No:3 (b)**  A project has 7.5 KLOC, and the average salary of a software developer is Rs. 18,000 per month. Calculate the following: [Total 4 marks]   1. Effort 2. Development Time 3. Average Staff 4. Productivity   Cost to develop the project.  **Solution:**  **IMG_20210918_201409**  **[Total 3 marks]** | CO3 |
| **Q.No:5** | **Q.No:5 (a)** Consider a software project scenario with the following activities and their duration in weeks. **[Total 6 marks]**   |  |  |  | | --- | --- | --- | | **Activity** | **Duration** | **Immediate Predecessor (s)** | | **A** | **4** | **-** | | **B** | **5** | **-** | | **C** | **3** | **B** | | **D** | **12** | **A** | | **E** | **6** | **C** | | **F** | **9** | **B** | | **G** | **4** | **E,F** |  1. Draw the activity network diagram. 2. Identify the critical path and slack time for all paths.   **Solution:**  **IMG_20210918_193912**  **Q.No:2 (b)** Consider the following function point components and their complexities. Calculate the estimated function points **[Total 4 marks]**   |  |  |  | | --- | --- | --- | | **Function type** | **Estimated count** | **Complexity** | | EIF (Interface) | 2 | Average | | ILF (logical files) | 4 | Simple | | EQ (inquiry) | 22 | Average | | EO (O/P) | 16 | Complex | | EI (I/P) | 24 | Complex |   Various processing complexity (influencing parameters) factors are: 4, 1, 0, 3, 3, 5, 4, 4, 3, 3, 2, 2, 4, 5.  **Solution:**  IMG_20210918_201949 | CO3 |
| **Q.No:6** | **Q.No:3 (a)**  Consider a software project that consists of 8 activities, namely T1, T2, T3, T4, T5, T6, T7, and T8. The duration, in days, for the activities are 3, 4, 2, 5, 1, 2, 4, and 3, respectively. Activity T1 is an independent activity. However, the activities T2 and T3 can start only after the completion of activity T1. Similarly, we can start activity T4 after the completion of T2. Activities T5 and T6 can only start after the completion of T3. When activities T4 and T5 get completed, we can initiate activity T7. Again, activity T8 can be started once activities T7 and T6 are completed.  Assuming yourself as project manager: **[Total 6 marks]**  i. Draw the activity network diagram.  ii. Identify the critical path and slack/float for all other possible paths.  iii. Determine slack/float for activities D and F.  **Solution:**IMG_20210918_194341  **Q.No:3 (b)**  Consider a project with a large project team, complex, innovative, severe constraints, and 400 KLOC, and the average salary of a software developer is Rs. 17,000 per month. Calculate the following: **[Total 4 marks]**   1. Effort 2. Development Time 3. Average Staff 4. Productivity 5. Cost to develop the project.   **Solution:**IMG_20210918_201417  **[Total 3 marks]** | CO3 |

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