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**ISLAMIC UNIVERSITY OF TECHNOLOGY (IUT)**  
**ORGANISATION OF ISLAMIC COOPERATION (OIC)**  
**Department of Computer Science and Engineering (CSE)**

SEMESTER FINAL EXAMINATION  
 DURATION: 3 HOURS

SUMMER SEMESTER, 2022-2023  
 FULL MARKS: 150

**SWE 4803: Software Project Management**

Programmable calculators are not allowed. Do not write anything on the question paper.

Answer all 6 (six) questions. Figures in the right margin indicate full marks of questions with corresponding COs and POs in parentheses.

1. Based on the data provided in Table 1, answer the following questions -

5 × 5  
 (CO2)  
 (PO1)

Table 1: Data for Question 1

Task	Preceding Task	Duration (in weeks)		
		Optimistic	Most Likely	Pessimistic
Start		0	0	0
Task A	Start	3	5	10
Task B	Task F	3	4	8
Task C	Task H	6	8	10
Task D	Start	2	4	6
Task E	Task D	5	7	12
Task F	Task A, Task D	5	7	9
Task G	Task E, Task F	3	4	8
Task H	Task G	4	6	11
End	Task C, Task B	0	0	0

- a) Considering three-point estimation, calculate the duration of the critical path.
  - b) Find the float of tasks B, D, and E.
  - c) To accelerate the project schedule, the sponsor suggests excluding task E and revising the project plan to have task D directly precede both tasks F and G. What impact will this modification have on the project?
  - d) With a precedence diagram, show all the logical relationships among the tasks.
  - e) Calculate the critical path duration using the program evaluation review technique (PERT).
2. a) A software development company invests \$100,000 annually in a comprehensive quality assurance (QA) process to ensure defect-free software releases. Despite these efforts, an expected average of 60 defects per quarterly release still occur, leading to additional costs for defect resolution and customer support. The company estimates that it costs \$5,000 to fix each post-release defect, and each defect incurs significant customer support expenses averaging \$20,000 due to service disruptions and customer dissatisfaction. What is the cost of conformance and nonconformance in this scenario? What actions can the company take to reduce the cost of nonconformance? 10
- b) When should a project manager use analogous estimation technique for cost estimation? 5
- c) Which type of power does the project manager primarily demonstrate? Mention other types of power of a project manager with appropriate examples. 10
3. a) Imagine a company is developing a new software application and several potential risks could impact the project's success. The project team has identified the following risks: 5 × 3  
(CO3)  
(PO2)

- External factors such as natural disasters, geopolitical events, or economic downturns may impact project timelines, budgets, or resource availability.
- Shifts in market demands or competitive landscape could necessitate changes to project goals, priorities, or features.
- Difficulty in integrating the new software application with existing systems or third-party services could impact functionality and performance.
- The project may encounter issues or delays due to dependencies on specific technologies, tools, or platforms that could become unavailable or outdated.
- The project may experience budget overruns due to unforeseen circumstances.

Identify the strategies to deal with the risks mentioned above with proper justification.

- b) Assume that a software development team has three QA members working on a project, and the project manager wants to monitor the number of bugs reported each day over 15 days to ensure that they are meeting the project's quality standards. Table 2 shows the last 15 days bug reporting status. Based on the provided data, construct a statistical process control chart and identify the out-of-control signals.

10  
(CO3)  
(PO2)

**Table 2: Data for Question 3.b**

	Day														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
QA1	4	4	3	3	2	5	5	4	5	5	1	1	10	8	1
QA2	4	4	3	3	2	3	5	5	5	5	1	1	4	8	1
QA3	4	2	3	2	3	3	4	4	6	5	3	1	3	4	2

4. a) You are a project manager for a large IT organization. Your current project team consists of individuals from diverse backgrounds and skill sets. While the team members are talented, they initially had varying opinions and approaches to project tasks due to their unique experiences. As the project progressed, you facilitated open discussions and encouraged constructive feedback during team meetings. Over time, team members began to recognize each other's strengths and weaknesses, leading to greater acceptance and understanding among the group. They developed shared norms, values, and work processes that helped streamline collaboration and decision-making. Recently, during a critical project milestone, the team demonstrated cohesion and alignment in their approach. They collectively addressed challenges and made joint decisions based on consensus, showing a commitment to the project's success. What stage of team development is this team in? Describe how the effectiveness of a team evolves across different stages of team development?
- b) Dependency determination is used as a tool to sequence the project activities. Mention different kinds of dependencies with proper examples.
- c) How can the burndown chart be utilized to effectively manage and control project schedules?
5. a) A company is managing a software development project for 12 months with a budget of \$100000. As of today, it is observed that 60% of the budget has been used while only 40% of the work has been completed. According to the project schedule, 50% of the work should be done by this time. Based on the given information calculate the schedule and cost performance index. If the current cost and schedule performance continue, what will be the new estimate at completion (EAC)? What is the TCPI that would be required to complete the project within the original budget?
- b) What are the various sources of conflict within a project environment? Explain the strategies that can be employed to effectively resolve these conflicts.

3 + 7

8

7

8

(CO3)  
(PO1)

3 + 7

(CO3)  
(PO1)

c) A software development company is developing a new online banking application that aims to revolutionize the way customers manage their finances. The project involves integrating with multiple third-party financial systems and implementing advanced security measures to protect sensitive customer data. The team comprises skilled developers, testers, and project managers dedicated to delivering a high-quality and secure product. The development timeline is tight, with a need for rapid response to any security vulnerabilities to ensure effective risk mitigation. Integration issues with third-party banking platforms could directly impact project objectives, requiring immediate attention and resolution. Potential security breaches may go undetected initially, leading to long-term financial and reputational consequences for the company. Controlling outcomes, especially in response to external factors like evolving regulatory requirements, presents ongoing challenges.

The interconnected nature of project risks means that a failure in one area could cascade into multiple other risks, affecting project success. Moreover, stakeholders, including customers and regulators, perceive security and reliability as paramount, highlighting the critical importance of risk management in this project. Given the complexity of the software development project aimed at launching a secure online banking application, which risk parameters are present in the described scenario?

- 6. a) What are the reasons for closing a project? 5
- b) What is process tailoring? What aspects need to be considered when adapting or customizing a process? 5
- c) Vendor X has a 50% probability of being on-time, a 30% probability of being late at an additional cost of \$40,000 and a 20% probability of delivering early at a savings of \$20,000. Vendor Y has a 30% probability of being on-time, a 40% probability of being late at an additional cost of \$40,000 and a 30% probability of delivering early at a savings of \$20,000. Both vendors have a risk of quality issues, with probabilities of 20% for Vendor X and 15% for Vendor Y. If quality issues occur, it will result in an additional cost of \$20,000 for Vendor X and \$25,000 for Vendor Y. Explain which vendor you will choose? 10
- d) The differences between managing people and leading people can be linked to a project managers personality and ability to interact with individuals and groups. Why does a project manager need to have both leadership and management skills in order to be the most effective? 5