National University of Computer and Emerging Sciences

Lahore Campus

Software Engineering (CS3009)

Date: September 23rd 2024

Course Instructor(s)

Ms. Ansa Liaqat, Mr. Ayaz Gillani, Dr. Zeeshan Rana

Sessional-I Exam

Total Time (Hrs):	**1**
Total Marks:	**45**
Total Questions:	**3**

Student Signature

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Attempt all the questions.

1. Provide answers in the sequence in which the questions and parts appear on the question paper.
2. Avoid submitting any extra sheet(s).
3. Use of a single-sided, handwritten help sheet of A-4 size is allowed. Photocopies are not allowed.

CLO 1: Select an appropriate software development process for a software project

Q1: List the process model that will be the most appropriate for the following situations. Also, **list** (as numbered bullets) your reason(s) for choosing a particular model. If you just list the process model without mentioning the reason(s), you will not be awarded any marks. Do not provide more than 4 reasons. No reason shall take more than one line of the answer sheet. Do not write paragraphs. [5+5+5=15 marks]

Part a

A government organization hires your software company to develop a secure document management system. The company is required to provide a detailed document with list of requirements before the software development project can be further taken forward. Once the requirements document is ready it shall be reviewed by the government organization. After approval of the requirements document, the company shall start working on the design and development of the system. Then the software shall pass through the rest of the phases of the software cycle.

Part b

A software startup is developing a social media platform. Instead of trying to develop the complete product before release, they prioritize building a minimum viable product (MVP) with basic features like user registration and posts etc. Every two weeks they release a set of features after meeting with the stakeholders to collect the feedback. The team constantly adapts to the feedback on the released features and makes changes in the next release accordingly.

Part c

A defense contractor is developing a new, mission-critical navigation software for military aircraft. The project involves high levels of uncertainty, technical challenges and strict safety requirements. The development team understands that quarterly reviews of the work shall be possible but they'll have to present a thorough understanding of the work done in each quarter, as well as justify the options taken among several possible options to reach a particular solution. They also have to justify the amount of work done in each quarter and get the budget reviewed for the next quarter or two.

CLO 5: Construct a *reasonable sized software in team setting*

Q2: Consider the Activity on Node (AoN) graph given in Figure 1. The duration of each activity (in days) is mentioned in round brackets inside the node. Activity names are also given inside the node.

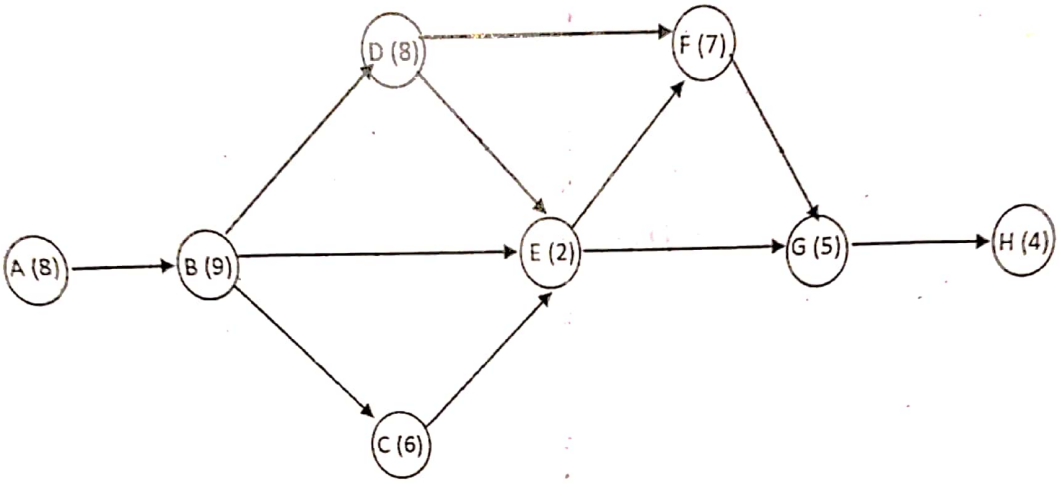

Figure 1: An AoN graph for a software project

To do: Calculate and explicitly mention the estimated minimum project duration with correct units, slack on each activity, earliest and latest start time of each activity, earliest and latest finish time of each activity. **Also explicitly specify the critical activities and critical path.** You can redraw the graph using an appropriate node structure. [15 marks]

CLO 2: Develop a model of requirements for a software system

Q3: CoachingArena (CA) is a place that helps prospective players learn different techniques in their respective sports e.g. golf, badminton, tennis, squash. CA has decided to use technology to help their golf coaches analyse the prospective players' swings while playing a shot. The technology based solution namely Swing Analyser (SA) shall require a player to stand on a sensor-based platform and play a shot in an indoor setting. The cameras mounted at different places in the coaching room shall record the player's moves and send the video stream to the SA system for further analysis. The SA system shall analyse and label the player's postures in the received video stream. The sensors in the platform send the sensors' data to the system so that it analyses and generates a summary of the player's weight on each foot as well as the foot movement while playing the shot. Based on the data from the posture analysis and the sensor analysis, the system simulates the player's movement as well as the trajectory of the golf stick and the ball. Using this trajectory and movement information the system determines the difference between the prospective player's data and the reference players' data available through an existing reference repository by comparing the both data. The SA system generates a report for the coaches based on the results of the comparison. The SA system lets the coaches annotate the swing analysis report and the system shows the annotated report on the screen installed in the report visualization center in the CA where the prospective players are already present.

To do: Provide a level 1 data flow diagram for the above scenario. Use the notation discussed in class. Strictly **follow** the notation. Failure to follow the notation will result in deduction of marks. [12+3=15 marks]
Note: State your assumption(s) clearly.