

Roll Number:

Thapar Institute of Engineering and Technology, Patiala
Department of Computer Science and Engineering

BE CoE Third Year

EST- Dec 8, 2025

Time: 3 Hours; MM: 40

Course Code: UCS503

Course Name: Software Engineering

Instructors: ASH, ASB, DPM, TAG, RGB, KML

Note: Attempt ANY FOUR Questions. Assume any missing data.

Ques	Questions	Marks	CO	BL																													
Q1a)	<p>Considering the evolving, data-driven nature of the features described in the following case, identify which software development process model is most appropriate for the enhancement. Discuss the process model with suitable diagram.</p> <p>Spotify is planning a major improvement to its “Personalised Recommendations” feature, which already includes Daily Mixes, Discover Weekly, Release Radar, and suggested radio playlists. The engineering team must incorporate new data sources such as listening habits across devices, social activity from friends, and contextual patterns like time-of-day listening behavior. The challenge is that user behaviour shifts continuously, new artists appear daily, metadata quality changes, and certain recommendations require rapid experimentation before being rolled out globally.</p>	6	CO1 CO5	L4 L2																													
b)	<p>How does the number of modules affect the cost of development and the cost of integration? Explain with the help of a suitable diagram. List different faults in at least four fault classes that can be identified in static analysis checks.</p>	4																															
Q2a)	<p>A software development project is estimated to have 30000000 lines of code. The project is classified as an embedded project with an experienced development team. The project schedule is not very tight. Calculate the effort, and development time using the COCOMO model.</p>	3	CO3	L3																													
b)	<p>A software engineering team is preparing a new release of a project management application and must schedule several activities using a precedence table. The tasks include Requirements Drafting (A), UI Wireframing (B), Server Configuration (C), REST Endpoint Coding (D), Role-Based Access Control Setup (E), Task Assignment Feature Development (F), Dashboard Visualization Module (G).</p> <table border="1"><thead><tr><th>Activities</th><th>A</th><th>B</th><th>C</th><th>D</th><th>E</th><th>F</th><th>G</th></tr></thead><tbody><tr><td>Predecessor(s)</td><td></td><td></td><td>A</td><td>A,B</td><td>C</td><td>C,D</td><td>E,F</td></tr><tr><td>Duration</td><td>4</td><td>6</td><td>5</td><td>7</td><td>4</td><td>6</td><td>3</td></tr></tbody></table> <p>Legend to be use on Network Diagram</p> <table border="1"><thead><tr><th>Early Start</th><th>Early Finish</th><th rowspan="2">Slack/Delay</th></tr></thead><tbody><tr><th>Late Start</th><th>Late Finish</th></tr></tbody></table> <p>i)Prepare activity on Arc using legend given above. ii). Calculate Early Start, Early Finish, Late Start, Late Finish, and Slack for each activity. (Give in Table) iii). Give Critical Time, Critical Path quoting the critical activities</p>	Activities	A	B	C	D	E	F	G	Predecessor(s)			A	A,B	C	C,D	E,F	Duration	4	6	5	7	4	6	3	Early Start	Early Finish	Slack/Delay	Late Start	Late Finish	7		
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<p>Q3a)</p> <p>b)</p>	<p>Consider the following case and create a decision table that aims to generate test cases for making a clear recommendation on whether to go for a walk today, considering all relevant factors and circumstances.</p> <p>A Software development team is generating test cases for an app that aims to determine whether a person should Go for a Walk or Not, considering weather conditions, time of day, day of the week, and personal schedule. If it's raining or stormy outside, staying indoors is the preferred option to avoid getting wet. In the morning, the decision pivots on whether it's a weekday or a weekend and if the personal schedule permits. If it's not morning, the decision simplifies based on whether the weather is sunny or cloudy, with additional consideration for weekends and personal schedules (BUSY or IDLE).</p> <p>Discuss different types of integration testing, highlighting the significance of Stubs and drivers in this context with the help of suitable diagram.</p>	<p>6</p> <p>4</p>	<p>CO4</p>	<p>L6</p>
<p>Q4</p> <p>a)</p> <p>b)</p>	<p>YouTube's "Live Stream with Live Chat" feature involves several interacting behaviours. Creators start and stop live streams, viewers join and leave, chat messages appear in real time, moderators can remove inappropriate messages, and the system highlights "Super Chat" paid messages. The platform must coordinate stream playback, message flow, moderation actions, payment verification, and viewer notifications, even when the viewer count changes rapidly.</p> <p>Draw a UML State Chart Diagram modelling the lifecycle of a Live Stream session from the Creator's perspective. Show appropriate events and guard conditions.</p> <p>Create a Class Diagram for the above case, ensuring correct relationships, cardinalities, and responsibilities</p>	<p></p> <p>5</p> <p>5</p>	<p>CO3</p>	<p>L4</p>
<p>Q5</p> <p>a)</p> <p>b)</p>	<p>Consider the following input conditions:</p> <p>i) A registration form field Age that accepts integer values from 18 to 60 (inclusive).</p> <p>ii) An online shopping cart field ItemQuantity that accepts integer values from 1 to 50 (inclusive).</p> <p>iii) A discount percentage field, Discount_Rate that accepts real (decimal) values from 0.0% to 30.0% (inclusive).</p> <p>iv) A PIN code field that accepts exactly 4 digits (0–9).</p> <p>Using Equivalence Class Partitioning (ECP) and Boundary Value Analysis (BVA), identify all possible classes of test cases for each of the above conditions.</p> <p>For the following code snippet:</p> <div style="display: flex; justify-content: space-between;"> <pre> 1 void string_logic(const char *s, int len) 2 { 3 if (len == 0) { 4 printf("Empty string\n"); 5 } else { 6 if (s[0] == s[len - 1]) { 7 printf("1st and last character r same\n"); 8 } else { 9 if (s[0] == 'a') { 10 printf("Starts with 'a'\n"); 11 } else { 12 if (s[0] == 'b') { 13 printf("Starts with 'b'\n"); 14 } else { 15 if (len == 1) { 16 printf("Single-character string\n"); 17 } else { 18 printf("General string case\n"); 19 } 20 } 21 } 22 } 23 } 24 }</pre> </div> <p>i. Draw the Control Flow Graph</p> <p>ii. Write the independent paths</p> <p>iii. Calculate the Cyclomatic Complexity using three different techniques.</p>	<p>4</p> <p>6</p>	<p>CO4</p>	<p>L6</p>