

Roll Number: _____

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

BE- COE (V Semester) EST
07th December 2022

UCS503: Software Engineering

Time: 3 Hrs; MM: 40

Name of Faculty: Dr. Harkiran Kaur, Dr. Manish Kumar,
Dr. Sumit Kumar, Ms. Tanya

Note: Attempt all questions. Use your assumptions in diagram questions and clearly write your assumptions.

Q.1	<p>(a) Explain the Equivalence Class Partitioning and Boundary Value Analysis methodologies for test case selection. Elicit suitable examples to differentiate between both of these.</p> <p>(b) For the following code snippet,</p> <ul style="list-style-type: none">(i) Draw the Control Flow Graph(ii) Identify the independent paths(iii) Compute the Cyclomatic Complexity <table border="1"><tr><td>1.</td><td>while(x<100) {</td></tr><tr><td>2.</td><td> if(a[x] % 2 == 0) {</td></tr><tr><td>3.</td><td> parity = 0; }</td></tr><tr><td>4.</td><td> else { parity = 1;</td></tr><tr><td>5.</td><td> }</td></tr><tr><td>6.</td><td> switch(parity) {</td></tr><tr><td>7.</td><td> case 0: println("a[" + i + "] is even");</td></tr><tr><td>8.</td><td> case 1: println("a[" + i + "] is odd");</td></tr><tr><td>9.</td><td> default: println("Unexpected Error"); }</td></tr><tr><td>10.</td><td> x++; }</td></tr><tr><td>11.</td><td>p = true;</td></tr></table> <p>(c) Enlist the types of Errors which can be detected while conducting Unit Testing with appropriate examples.</p>	1.	while(x<100) {	2.	if(a[x] % 2 == 0) {	3.	parity = 0; }	4.	else { parity = 1;	5.	}	6.	switch(parity) {	7.	case 0: println("a[" + i + "] is even");	8.	case 1: println("a[" + i + "] is odd");	9.	default: println("Unexpected Error"); }	10.	x++; }	11.	p = true;	<p>(3)</p> <p>(2)</p> <p>(2)</p> <p>(1)</p> <p>(2)</p>
1.	while(x<100) {																							
2.	if(a[x] % 2 == 0) {																							
3.	parity = 0; }																							
4.	else { parity = 1;																							
5.	}																							
6.	switch(parity) {																							
7.	case 0: println("a[" + i + "] is even");																							
8.	case 1: println("a[" + i + "] is odd");																							
9.	default: println("Unexpected Error"); }																							
10.	x++; }																							
11.	p = true;																							
Q.2	<p>(a) An Airline Check-in System is to be developed to allow passengers to check in and get the boarding pass for flying. The baggage can also be checked-in, which is optional. The check-in can happen by the counter clerk or by the passenger using this system. The system should allow individuals as well as group of passengers to check-in through the system. The boarding pass can be issued through this system. Passengers below 4 yrs. need not have tickets. The airport also allows to provision for the special needs of passengers like wheelchair etc. The system should also be able to capture the fact that the baggage for a passenger is screened by security. Identify Use Cases for this system. Draw Use Case Diagram for the above scenario.</p>	<p>(1+4=5)</p>																						

	<p>(b) You have been asked to develop a system for a local Thai food takeaway shop Curry Yum. The system should allow customers to order their Thai curries over the internet and collect them (and pay) at the shop. Customers do not register with the system but they do need to supply a contact phone number. A Curry has a price derived from its size, type (red, green, or yellow) and protein. A Curry has only one protein (chicken, beef, pork, tofu or prawn). Each type of protein has a different price. Customers have Orders and each Order is for one Customer. An Order consists of a number Items, and has a collection time. An Item is a Curry, Rice or a Drink. To place an order the customer must supply a contact phone number and name. When the order is submitted the customer receives a confirmation message along with the final cost of the order and a collection time. The system calculates the collection time based on the number of orders currently being processed and the average time to fill an order.</p> <p>(i) Draw the Sequence Diagram for the above mentioned system. (ii) Draw the Collaboration Diagram for this system.</p>	(3+2=5)																								
Q.3	<p>(a) Explain the Unified Process Model and its characteristics. Further, discuss the different phases of a unified process cycle in detail.</p> <p>b) Describe types of coupling and cohesion with the help of suitable examples.</p>	(5) (5)																								
Q.4	<p>(a) Prepare an Activity-On-Arrow (AOA) network model for optimal scheduling of tasks given in the following precedence table and find the critical path in the project.</p> <table border="1"><thead><tr><th>Task Name</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</td><td>--</td><td>--</td><td>A</td><td>B</td><td>A, D</td><td>C, E</td><td>F</td></tr><tr><td>Time (Days)</td><td>10</td><td>6</td><td>8</td><td>6</td><td>7</td><td>4</td><td>3</td></tr></tbody></table> <p>Note: Tasks “A” and “B” do not require any predecessor task to complete before their execution.</p> <p>(b) “The basic model of Constructive Cost Model (COCOMO) considers three modes of software development: organic, semi-detached and embedded”. Write the values of COCOMO coefficients (a_b, b_b, c_b, d_b) for these three modes (organic, semi-detached and embedded).</p> <p>(c) Suppose that a project was estimated to be 500 KLOC and the deadline of the project is tight. Compute the effort and average staff size using COCOMO basic model.</p> <p>(d) Write a short note on Data-Centred Architectural Style and Call – And – Return Architectural Style.</p> <p>(e) Describe the design steps to map a DFD with transaction flow characteristics into a software architecture.</p>	Task Name	A	B	C	D	E	F	G	Predecessor	--	--	A	B	A, D	C, E	F	Time (Days)	10	6	8	6	7	4	3	(3) (1) (2) (2) (2)
Task Name	A	B	C	D	E	F	G																			
Predecessor	--	--	A	B	A, D	C, E	F																			
Time (Days)	10	6	8	6	7	4	3																			