

Software Engineering

(CS3009) CS-(A,B,C,D,E)

Date: May 23, 2024

Final Exam

Total Time (Hrs): 03

Total Marks: 90

Total Questions: 07

Course Instructor(s):

Dr.Javaria Imtiaz, Ms.Shafaq Riaz, Mr.Basharat
Hussain,Ms.Saba Kanwal

Roll No

Course Section

Student Signature

Do not write below this line.

Attempt all the questions on the answer sheet provided separately.

Question1: Short questions and answers

[12 marks]

- What are the different phases of RUP?
- Imagine you're tasked with testing the payment information entry feature in an online shopping website's checkout process. Apply equivalence class partitioning to identify distinct classes of input data for testing. Provide examples of Equivalence Classes and Boundary Values relevant to this scenario
- What are project buffers and feeding buffers, and how do they contribute to project scheduling?
- How is Total Float defined in project scheduling, and what significance does it hold in ensuring project deadlines are met without violating constraints?
- Case: Adobe is working on project to come up with a competing product for Microsoft Word, that provides all the features provided by Microsoft Word and any other features requested by the marketing team. The final product needs to be ready in 10 months of time. Considering the given case, describe
 - Which process model do you think will work best for this project. And why?
 - What method you prefer for initial requirement gathering?

Question 2: Imagine that you are responsible for the design of a computer system that will be used to automate the definition, evaluation and examination of the academic content for a course in the FAST university. This system should allow the syllabus, lectures, supervision exercises and examination papers to be defined in consultation with a variety of stakeholders, including students and future employers.

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Construct one or more UML use case diagrams and a single UML class diagram, showing the overall structure of a system that includes the elements described above. [8 marks]

Question 3:

a) Match each description below to the most appropriate architectural style/pattern given below (Note: each architectural style may apply to none, one, or more than one description but each question is to be answered with only 1 term). [5 marks]

1. Layered Architecture
2. Pipe and Filter Architecture
3. Model View Controller
4. Client-Server Architecture
5. Repository Architecture
6. Service Oriented Architecture

Descriptions:	Architecture
Web-based application system organized with multiple ways to view and interact with data	
IDE that includes different tools to support <u>model-driven development</u> and efficient sharing of large amount of data	
A system for sharing copyright documents held in different libraries where security is of greater concern	
A film and video/DVD library organized in a shared database that has to be accessed from a range of locations	
A bill processing system that processes all billing requests received throughout a week.	

b) Draw an architecture diagram of most common/general e-commerce microservices system [5 marks]

Question 4:

A project size of 170 KLOC is to be developed software with very high memory constraints and extra high-performance constraints. However, the complexity of the product is low. All remaining factors are nominal Calculate the Effort, development time, average staff size, and productivity of the project. [10 Marks]

Given the following weights:

Software Project	a_b	b_b	c_b	d_b
Organic	2.4	1.05	2.5	0.38
Semidetached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

Hint: use semidetached approach. You must apply correct formulas and calculation steps are necessary to present.

Question 5

Consider a project having 30K lines of code which in an embedded software with critical area hence reliability is 17% higher than normal. The estimation can be $E = a_i * (KLOC)^{b_i} * (EAF)$

Consider reliability as a product attribute. Find out how many persons needed on this project?

Hint: utilize Embedded Intermediate COCOMO

[10 marks]

Question 6

a) Draw PERT network through CPM/PDM for the following project containing ten activities.

[12 Marks]

Note. Each activity should have complete info such as: Name, Duration, ES, EF, LS, LF, Float.

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b) Highlight the critical path(s), also mention the names of activities present on critical path in a sequence [3 Marks]

Activity	Preceding Activity	Time Estimate weeks		
		Optimistic	Most likely	Pessimistic
A	—	4	5	12
B	—	1	1.5	5
C	A	2	3	4
D	A	3	4	11
E	A	2	3	4
F	C	1.5	2	2.5
G	D	1.5	3	4.5
H	B, E	2.5	3.5	7.5
I	H	1.5	2	2.5
J	F, G, I	1	2	3

Question 7

[25 Marks]

For the following code snippet,

Node	Statement
(1)	while(x<100){
(2)	if (a[x] % 2 == 0) {
(3)	parity = 0;
	}
	else {
(4)	parity = 1;
(5)	}
(6)	switch(parity){
	case 0:
(7)	println("a[" + i + "] is even");
	case 1:
(8)	println("a[" + i + "] is odd");
	default:
(9)	println("Unexpected error");
	}
(10)	x++;
	}
(11)	p = true;

1. Draw control flow graph [10 marks]
2. Find cyclomatic complexity [5 marks]
3. Write all paths for this program [5 marks]
4. Write test cases for
 - a. Statement coverage
 - b. Decision coverage [5 marks]

Note: Minimum test cases should be written, marks will be deducted for extra/unnecessary test cases.