Government College University, Lahore
Software Engineering
Mid Term Examination
Course Code CS-2105
Spring 2021

Total marks: 20 **Time: 60 minutes**

Student Name:	Teacher Name:
Roll No. :	Student Signature:
Section:	Invigilator Signature:

Paper Instructions:

1. **Student shall attempt online exam on *plain pages (Hand written format)* and submit single PDF file to attempted Paper/pages over MS Team in given time.**
2. **Total time to attempt paper is 1 hour and 30 minutes (90 minutes) while there will be extra 30 minutes to submit the paper on MS Team**
3. **In case any student remain unable to submit exam in given time due to power or internet failure. He / She intimate concerned teacher or Department controller of examination through respective CR through SMS or call.**

Attempt all question, all questions carry equal marks. **(4 x 5 = 20)**

Question No.1

Read project description carefully and apply any evolutionary model process also define phases involve in the process model.

A project, Hospital Management system, includes registration of patients, storing their disease details into the system. It will also contain doctor's information and will digitalize the whole billing system. The software has the facility to give a unique id for every patient and stores the details of every patient and staff automatically. It includes a search facility to know the current status of each room. User can search availability of a doctor and the details of a patient using the id. The Hospital Management System can be used by entering respective username and password. It is accessible either by an administrator or receptionist. Only the respective person can add data in the database. The data can be retrieved easily. The interface is very user-friendly. The data are well protected and data processing is very fast, accurate and relevant.

Question No.2 which one is more important, Validation or Verification? Also define both with example.

Question No.3 Write a detail note on agility principles.

Question No.4 what is meant by Umbrella Activities give examples?

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>Best of Luck<<<<<<< <<<<<<<<<<<<<<<<<<<<<<<<<<<<<

Government College University, Lahore

Software Engineering | **Final Term Examination**
Course Code CS-2105 | **spring 2021**
Total marks: 60 | **Time: 180 minutes**

Paper Instructions:

1. **Student shall attempt online exam on *plain pages (Hand written format)* and submit single PDF file to attempted Paper/pages over MS Team in given time.**
2. **Total time to attempt paper is 3 hours (180 minutes) while there will be extra 30 minutes to submit the paper on MS Team**
3. **In case any student remain unable to submit exam in given time due to power or internet failure. He / She intimate concerned teacher or Department controller of examination through respective CR through SMS or call.**

NOTE: Attempt any 5 questions, all questions carry equal marks. **(5 x 12 = 60)**

Question No.1 **(6+6)**

a) Describe the concept of *separation of concerns* in your own words
b) Describe what *granularity* means in the context of a project schedule

Question No.2 **(6+6)**

a) Develop at least three additional "context-free questions" that you might ask a stakeholder during inception.
b) Describe what an *analysis pattern* is in your own words.

Question No.3 **(6+6)**

a) What do you think happens when requirement validation uncovers an error? Who is involved in correcting the error?
b) Is it possible to combine process models? If so, provide an example.

Question No.4 **(12)**

You have been asked to build one of the following systems:

a) A network-based course registration system for your university.
b) A Web-based order-processing system for a computer store.
c) A simple invoicing system for a small business.
d) An Internet-based cookbook that is built into an electric range or microwave.

Select the system that is of interest to you and write use case descriptions any 3 possible use cases and make its use case diagram.

Question No.5 Write a detail not on Communication Principles. **(12)**

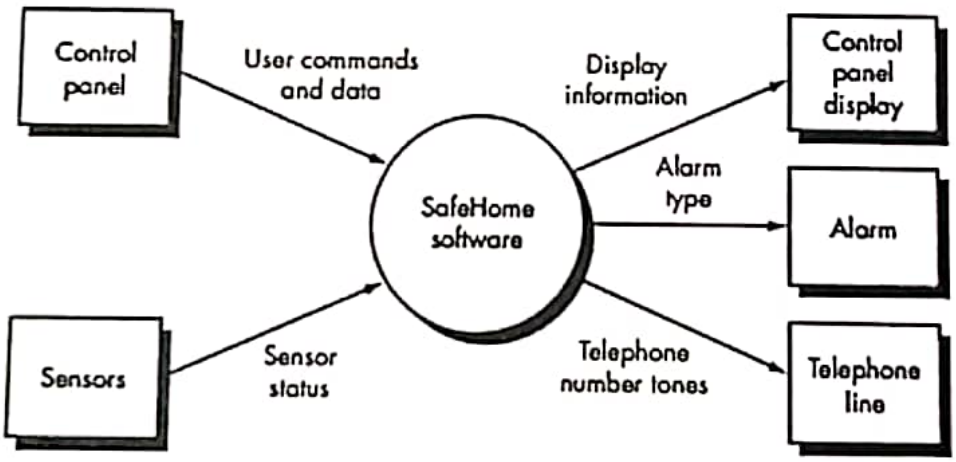
Question No.6 Define Following Terms with an example: **(4+4+4)**

a) **Use Case and Actor**
b) **Interface**
c) **Team Software Process (TSP)**

>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>Best of Luck<<<<<<< <<<<<<<<<<<<<<<<<<<<<<<<<<<

Internet—display camera views (ACS-DCV) function.

b. The SafeHome security function enables the homeowner to configure the security system when it is installed, monitors all sensors connected to the security system, and interacts with the homeowner through the Internet, a PC, or a control panel. During installation, the SafeHome PC is used to program and configure the system. Each sensor is assigned a number and type, a master password is programmed for arming and disarming the system, and telephone number(s) are input for dialing when a sensor event occurs. When a sensor event is recognized, the software invokes an audible alarm attached to the system. After a delay time that is specified by the homeowner during system configuration activities, the software dials a telephone number of a monitoring service, provides information about the location, reporting the nature of the event that has been detected. The telephone number will be redialed every 20 seconds until telephone connection is obtained. The homeowner receives security information via a control panel, the PC, or a browser, collectively called an interface. The interface displays prompting messages and system status information on the control panel, the PC, or the browser window. Homeowner interaction takes the following form.



i. Using grammatical parse and taking the above given Context level DFD as a starting point, construct level 1 and level 2 DFDs for the Safe Home Security Function.

ii. Draw a preliminary state diagram for the Safe Home Security Function.

(4+3+4+3)

Total Time: 155 minutes
Total Marks: 48

Subjective Type

Attempt any four questions. All questions carry equal marks. Please give precise and to the point answers to the attempted questions.

Q2.

(A) What is kernel panic? **(2)**
(B) What is preemptive and non-preemptive scheduling? **(2)**
(C) Define concurrency in multi-programming? **(2)**
(D) What is page fault? Explain the steps that are used to handle page fault? **(6)**

Q3.

(A) What is external and internal fragmentation? **(2)**
(B) What are the three requirements for the solution of critical section problem? **(3)**
(C) How page fault frequency can be used as a method of thrashing? **(3)**
(D) What are the differences between processes and threads. **(4)**

Q4.

(A) Is it possible to implement dual mode of operation at the software level? If Yes then how and if No then why not? **(2)**
(B) Why the idea of implementing page table as a set of dedicated registers is not used anymore? **(3)**
(C) What are the advantages and disadvantages of contiguous and non-contiguous memory allocation? **(5)**
(D) What is trap? **(2)**

Q5.

(A) Consider the following resource allocation graph.
P={P1,P2,P3,P4}, R={R1,R2,R3},E={R1→P1, P1→ R2, R2→P2, P2→R3, R3→P3,P3→R1, R1→P4}
1. Resource R1 has 2 instances
2. Resource R2 has 1 instance
3. Resource R3 has 1 instance
Draw the resource allocation graph and explain the possibility for a deadlock. **(6)**

(B) Assume that there are three resources, A, B, and C. There are 4 processes P0 to P3. At some time we have the following snapshot of the system. You have to create the need matrix and briefly describe why or why not is the system in a safe state? **(6)**

	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	1	0	1	2	1	1	2	1	1
P1	2	1	2	5	4	4			
P2	3	0	0	3	1	1			
P3	1	0	1	1	1	1			

Q6.

(A) With reference to page replacement what is the significance of dirty bit? How does it effects the page fault? **(2)**
(B) Elaborate the Best-Fit First-Fit and Worst-Fit algorithms **(3)**
(C) Briefly describe the different type of schedulers along with the differences between them. **(3)**
(D) Briefly explain the following terms **(4)**
Dispatcher, Starvation, Context Switch, Paging

Use Case Template for Surveillance

Use case: Access camera surveillance via the Internet—display camera views (ACS-DCV)

Iteration: 2, last modification: January 14 by V. Raman.

Primary actor: Homeowner.

Goal in context: To view output of camera placed throughout the house from any remote location via the Internet.

Preconditions: System must be fully configured; appropriate user ID and passwords must be obtained.

Trigger: The homeowner decides to take a look inside the house while away.

Scenario:

1. The homeowner logs onto the *SafeHome Products* website.
2. The homeowner enters his or her user ID.
3. The homeowner enters two passwords (each at least eight characters in length).
4. The system displays all major function buttons.
5. The homeowner selects the "surveillance" from the major function buttons.
6. The homeowner selects "pick a camera."
7. The system displays the floor plan of the house.
8. The homeowner selects a camera icon from the floor plan.
9. The homeowner selects the "view" button.
10. The system displays a viewing window that is identified by the camera ID.
11. The system displays video output within the viewing window at one frame per second.

Exceptions:

1. ID or passwords are incorrect or not recognized—see use case **Validate ID and passwords.**
2. Surveillance function not configured for this system—system displays appropriate error message; see use case **Configure surveillance function.**
3. Homeowner selects "View thumbnail snapshots for all camera"—see use case **View thumbnail snapshots for all cameras.**
4. A floor plan is not available or has not been configured—display appropriate error message and see use case **Configure floor plan.**
5. An alarm condition is encountered—see use case **Alarm condition encountered.**

Priority: Moderate priority, to be implemented after basic functions.

When available: Third increment.

Frequency of use: Moderate frequency.

Channel to actor: Via PC-based browser and Internet connection.

Secondary actors: System administrator, cameras.

Channels to secondary actors:

1. System administrator: PC-based system.
2. Cameras: wireless connectivity.

Open issues:

1. What mechanisms protect unauthorized use of this capability by employees of *SafeHome Products*?
2. Is security sufficient? Hacking into this feature would represent a major invasion of privacy.
3. Will system response via the Internet be acceptable given the bandwidth required for camera views?
4. Will we develop a capability to provide video at a higher frames-per-second rate when high-bandwidth connections are available?

i. Make an activity diagram for Access camera surveillance via the Internet—display camera views (ACS-DCV) function.

Operating Systems (CS-2006)
Semester: VI Final 2017

Objective Type

Total Time: 25 Minutes
Total Marks: 12

Note: Encircle the right option for each of the following questions.

1. Memory Management technique in which system stores and retrieves data from secondary storage for use in main memory is called _____?

A. Fragmentation	B. Swapping	C. Mapping	D. None of these

2. Which of the following is a synchronization tool _____.

A. Thread	B. Pipe	C. Semaphore	D. Socket

3. Round-robin scheduling falls under the category of _____.

A. Non preemptive scheduling	B. Preemptive scheduling	C. All above	D. None of these

4. Paging _____?

A. Solves the external fragmentation problem	B. Solves the internal fragmentation problem	C. Allows modular programming	D. Allows structured programming

5. The operating system is a layer of software between _____ and _____?

A. Hardware, software	B. Kernel, hardware	C. DOS, Windows	D. None of the above

6. The banker's algorithm is used _____?

A. To prevent deadlock	B. To detect deadlock	C. To rectify a deadlock state	D. None of these

7. A critical section is a program segment _____?

A. Which has a high priority	B. Where code is shared by programs	C. Which forces deadlock	D. Where shared resources are accessed

P.T.O

Note: Attempt any FOUR questions from the following.

Q#	Question	Marks
2(i)	d) What is the difference between Token, Pattern & Lexeme? Explain with example. e) $E \rightarrow T - E \mid T$ $T \rightarrow id$ Prove that this grammar is LL(1), LR(0) or SLR(1). f) What is Relocation?	3+2+1 6
(ii)	From the given CFG find FIRST, FOLLOW sets of each non-terminals: $S \rightarrow [\, S\, X \,] \mid a$ $X \rightarrow + S\, Y \mid Y\, b \mid \varepsilon$ $Y \rightarrow -S\, X\, c \mid \varepsilon$	
3(i)	Create the syntax directed translation of the following grammar for the input 7–6*4: $S \rightarrow S - T \mid T$ $T \rightarrow T * F \mid F$ $F \rightarrow num$	6
(ii)	Draw DAG with construction steps using SDD for the expression: x := (a*b) + 2*a*a + (a*b) – 8.	6
4(i)	By using the grammar of question 3(i) show the working of LR parser (Shift-Reduce parser) for the string **id * (id – id),** also draw parse tree.	8
(ii)	Draw a transition diagram for **relop operators (<, <=, >, >=, <> and =).**	4
5(i)	Apply LALR(1) parser to the following Grammar: $S \rightarrow AB$ $A \rightarrow a \mid \varepsilon$ $B \rightarrow b \mid \varepsilon$	6
(ii)	What is the difference between left-recursion and left-factoring? Write down methods for removing left-recursion and left-factoring.	4
(iii)	Which types of data structure are used for symbol table manager.	2
6(i)	Construct SLR(1) parsing table for the following grammar: $A \rightarrow A + B \mid B$ $B \rightarrow B / C \mid C$ $C \rightarrow id$	6
(ii)	What is the difference between Quadruple, Triple & Indirect-Triple? Also, write TAC statement draw quadruple for the expression: **x = a * b + c * d - e * f.**	6

8. Time-sharing of resources by users is _____

A. Based on time slice	B. Based on input	C. Event driven	D. Operated by spooling

9. In UNIX which system call creates the new process_____.

A. Fork	B. New	C. Create	D. None of the above.

10. Bootstrap program is loaded at power-up _____.

A. Typically stored in ROM	B. Typically stored in RAM	C. Typically stored in Cache	D. Typically stored in Flash

11. The strategy of allowing processes that are logically runnable to be temporarily suspended is called _____ scheduling.

A. Preemptive	B. Non-preemptive	C. Shortest job first	D. First come first served

12. The memory allocation scheme subject to "external" fragmentation is _____

A. Segmentation	B. Swapping	C. Multiple contiguous fixed partitions	D. None of the above

GOVERNMENT COLLEGE UNIVERSITY

Summer Semester FINAL EXAMINATION 2017

SUBJECTIVE CS-2105

COURSE: SOFTWARE ENGINEERING

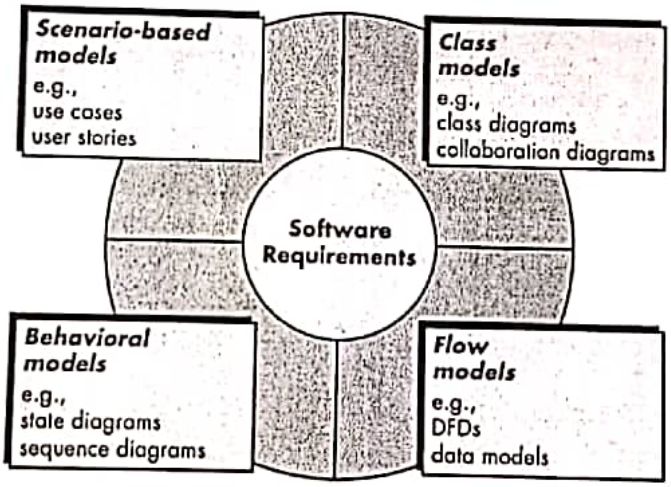
INSTRUCTOR: ADNAN KHALID TOTAL MARKS: 48 TIME: 155 Minutes

Note: Attempt all questions: all questions carry equal marks. Draw diagrams to illustrate your answer where necessary. Have a nice day :D

1.

a. Is it possible to begin coding immediately after an analysis model has been created? Explain your answer and then argue the counterpoint?

b. Is it possible to develop an effective analysis model without developing all four elements shown in the Figure? Explain.



c. What is the purpose of domain analysis? How is it related to the concept of requirements patterns?

d. The department of public works for a large city has decided to develop a Web-based pothole tracking and repair system (PHTRS). A description follows: Citizens can log onto a website and report the location and severity of potholes. As potholes are reported they are logged within a "public works department repair system" and are assigned an identifying number, stored by street address, size (on a scale of 1 to 10), location (middle, curb, etc.), district (determined from street address), and repair priority (determined

from the size of the pothole). Work order data are associated with each pothole and include pothole location and size, repair crew identifying number, number of people on crew, equipment assigned, hours applied to repair, hole status (work in progress, repaired, temporary repair, not repaired), amount of filler material used, and cost of repair (computed from hours applied, number of people, material and equipment used). Finally, a damage file is created to hold information about reported damage due to the pothole and includes citizen's name, address, phone number, type of damage, and dollar amount of damage. PHTRS is an online system; all queries are to be made interactively.

i. Draw a UML use case diagram for the PHTRS system. You'll have to make a number of assumptions about the manner in which a user interacts with this system.
ii. Develop a class model for the PHTRS system.

(3+3+3+5)

2.

a. Explain the set of core principles which can be applied to every software process?
b. Explain distinct tasks of Requirement Engineering? Briefly mention requirement elicitation guidelines?

(7+7)

3.

a. Provide examples of three data abstractions and the procedural abstractions that can be used to manipulate them.
b. Describe software architecture in your own words
c. Describe separation of concerns in your own words. Is there a case when a divide-and-conquer strategy may not be appropriate? How might such a case affect the argument for modularity?
d. Discuss the relationship between the concept of information hiding as an attribute of effective modularity and the concept of module independence.
e. How are the concepts of coupling and software portability related? Provide examples to support your discussion.

(3+3+3+2+3)

TITLE: COMPILER CONSTRUCTION
TIME ALLOWED: 25 Minutes

COURSE CODE: CS- 4202
SEMESTER: SUMMER
MAX MARKS: 12

Multiple Choices: Encircle the best option. **12*1 = 12**

1. Consider the grammar with non-terminals N = {S,C,M}, terminals T = {a,b,i,e} with S is starting symbol and the production is:

   S → iCiSM | a
   M → eS | ε
   C → b

   The grammar is not LL(1) because it is _____.

   a) left recursive b) right recursive c) ambiguous d) not context-free
2. The output of lexical analyzer is:

   a) Machine code b) Intermediate code c) A stream of tokens d) A parse tree
3. An intermediate code form is:

   a) postfix notation b) syntax tree c) three address code d) all of these
4. Attributes whose values are defined in terms of a node's own attributes, node's siblings and node's parents are called _____.

   a) physical attributes b) inherited attributes
   c) logical attributes d) un-synthesized attributes
5. A shift-reduce parser is known as:

   a) bottom-up parser b) top-down parser c) both a & b d) none of these
6. What data structure in a compiler is used for managing information about variables and their attributes?

   a) Abstract syntax tree b) Semantic stack c) Symbol table d) Parse table
7. Recursive decent parsing is an example of:

   a) predictive parsing b) top-down parsing c) bottom-up parsing d) none of these
8. Three address code involves _____.

   a) exactly 3 address b) at most 3 address
   c) no unary operators d) at least 3 address
9. Synthesized attributes can be easily simulated by:

   a) LL grammar b) LR grammar c) Ambiguous grammar d) None of these
10. What is a *sentential form*?

    a) One line of a derivation. b) An arbitrary string of grammar symbols.
    c) The content of the LL(1) parse stack. d) None of These.
11. YACC builds up:

    a) SLR parsing table b) Canonical LR parsing table
    c) LALR parsing table d) LL(1) parsing table
12. Code can be optimized at:

    a) Source code from user b) Target code
    c) Intermediate code d) All of these

$C \rightarrow c$	{c}	{d,e,$}
$D \rightarrow d \mid \in$	{d, ∈}	{e,$}
$E \rightarrow e \mid \in$	{e, ∈}	{$}

Note one thing in the above table, whenever a variable in a production on the right nothing after it then the follow of that variable is whatever is the 'follow of the sy hand side'. As in our example the Symbol E has nothing after it so the Follow(E) i

Example - 02

Grammar	FIRST	FOLLOW
$S \rightarrow Bb \mid Cd$	{a,b,c,d}	{$}
$B \rightarrow aB \mid \in$	{a, ∈}	{b}
$C \rightarrow cC \mid \in$	{c, ∈}	{d}

Example – 03

Grammar	FIRST	FOLLOW
$E \rightarrow TE'$	{id, (}	{$,)}
$E' \rightarrow +TE' \mid \in$	{+, ∈}	{$,)}
$T \rightarrow FT'$	{id, (}	{+,$,)}
$T' \rightarrow *FT' \mid \in$	{*, ∈}	{+,$,)}
$F \rightarrow id \mid (E)$	{id, (}	{*,+,$,)}

Explanation of Example – 03

This is the example that we have already discussed in our previous lectures. there is no left recursion as we eliminated it though elimination method. First(E) as E is the start symbol. First(E) is nothing but First(T) and First(