National University of Computer & Emerging Sciences, Karachi
Spring-2020 CS-Department
Final Examination
3rd July 2020, 09:00 AM – 12:30 PM

Course Code:CS-303	**Course Name: Software Engineering**
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Student Roll No:	**Section:**

Instructions:

- Write your NU ID and sign on the top of every page of answer script.
- Read each question completely before answering it. There are **16 questions and 4 pages**.
- All the answers must be solved according to the sequence number given in the paper, otherwise question will not be graded.
- Be specific, to the point and no assumption should be made which contradicts with any statement given in the question paper.
- **Answers must be in your own words**. Word for word answers from any source including book will result in deduction of marks. If any similarity is found between two students in any answer, both students will get 0 in the exam and the matter will be referred to the DC.
- You need to prepare a **single pdf file** of all the questions as per the question ordering. The orientation should be **portrait** for each page. It should be clearly visible for each and every text written (also roll no. and signature) on the page. Writing should be **legible**. Save the pdf file named on your roll no. and section. i.e. k17-2000A.
- It is your responsibility to make sure the correct file is uploaded and that the file is not corrupted.
- You have to upload the exam to **SLATE and google classroom** of your respective teacher. In case of issues in uploading to either SLATE or google classroom, you can email the exam to your respective teacher, but this also needs to be done **within the given time frame**. Email addresses of the teachers are given with their names in the exam header. The instructions on solving and uploading were announced in the online examination policy.
- By uploading the solution, you are agreeing to the following honor pledge: This paper is my own work and I have not discussed anything related to the paper with anyone else.

Time: 3 hours to solve + 30 mins to upload **Max Points: 100**

Q1. You are about to start a software company. How will you make sure you and your software engineers adhere to the following principles?

i. CLIENT AND EMPLOYER
ii. PRODUCT

Write down a brief guide about how your organization will go about ensuring that these principles are followed. [5 marks]

Q2. Assume that FAST Karachi campus is a software organization. Based on your knowledge of FAST, which level of process maturity model would FAST currently occupy? Justify your answer by giving examples of how FAST matches the requirements set out for that maturity level. Please note, your answer should be based on facts and not your personal opinions. [5 marks]

Q3. Define what ethnographic studies are. Give two disadvantages of ethnographic studies in understanding software requirements. [5 marks]

Q4. Given the requirements below, which process model is most suitable for this project? Justify your answer by relating qualities of the process model with the requirements. [5 marks]

"The drone, a quad chopper, will be very useful in search and recovery operations, especially in remote areas or in extreme weather conditions. It will click high-resolution images. It will fly according to a path preset by a ground operator, but will be able to avoid obstacles on its own, returning to its original path whenever possible. The drone will also be able to identify various objects and match them to the target it is looking for."

Q5. Among the many design principles two commonly suggested ones are:

1. Reduce demand on short-term memory
2. Allow the user to put the current task into a meaningful context.

How did you apply these principles in your course project? If you didn't, suggest how you can do so. Draw the screen (if you require, draw more than one) on your answer sheet and use the drawing as example to explain. [5 marks]

Q6. Task Analysis and Modeling can be accomplished in a number of ways, two of which are Task elaboration and Object elaboration.

1. Clearly explain the differences between the two. [2 marks]
2. Your course project consisted of some type of task analysis. Give one example of applying Task elaboration and one example of applying Object elaboration for task analysis related to your project. [3 marks]

Q7. Categorize the following under either Product Standard or Process standard. Justify your choice with a brief explanation. [10 marks]

i. All changes requests for any product should be done through a change request form
ii. An organization uses Jira for project tracking
iii. Have a standard template to develop SRS
iv. Develop a form that can record the complete code review activities
v. Set milestones in project timeline to carry out reviews

Q8. You are part a software house whose business consists of developing small and medium sized software. They are considering getting an ISO 9001/2000 certification. How will you make sure that the software house is compliant to ISO 9001? [5 marks]

Q9. You as a project manager have to manage a project of development of a new version of a particular software product. The activities necessary for the completion of this project are listed in Table I below along with their dependencies and completion times in weeks. [10 marks]

Table 1

Activity	Predecessor	Duration (Weeks)
A		6
B		4
C		3
D	A, B, C	7
E	C	4
F	D	2
G	D	3
H	E	6

a) Draw the network diagram to analyze your project.
b) How many paths are in the network, and what are they along with their duration? What is the critical path and its duration?
d) Do a forward and backward pass by showing all calculations (ES, EF, LS, LF).
e) What is the free float and total float on activity E?
f) What is the impact to the project if activity B takes three weeks longer than planned? Does this affect the critical path?

Q10. FP characterizes the complexity of the software system and hence can be used to depict the project time and the effort estimation. FPs (Function points) of an application is found out by counting the number and types of functions used in the applications. Recall various components and functions used in your course project that can be put under five types: Number of External Inputs (EI), Number of External Output (EO), Number of external inquiries (EQ), Number of internal files (ILF) and Number of external interfaces (EIF). (Note: Also mention which screen/ function/ component from your course project you have chosen this from).

Calculate Unadjusted Function Point by using the predefined weights for each function point in each category according to table 2. (Redraw the whole table on your answer sheet). [10 marks]

Table 2

Measurement Parameter	Count		Weighing factor			
			Simple	Average	Complex	
1. Number of external inputs (EI)	—	*	3	4	6 =	—
2. Number of external Output (EO)	—	*	4	5	7 =	—
3. Number of external Inquiries (EQ)	—	*	3	4	6 =	—
4. Number of internal Files (ILF)	—	*	7	10	15 =	—
5. Number of external interfaces(EIF)	—	*	5	7	10 =	—
Count-total →						

Q11. In order to achieve efficient and effective management of software projects, it is important to estimate the size and cost of the project. How does the LOC metric help in estimating the cost of a software project? Also discuss at least 2 limitations of LOC software metric. [5 marks]

Q12. Search out a code snippet at least 15 lines long having conditional and loop statements in it. (Note: Please do also describe in text form what the code is doing). Draw a control graph, find out the independent paths and write one test-case for each path. [10 marks]

Q13. Provide two examples from other fields that illustrate the problems associated with a reactive risk strategy and two examples for proactive risk strategy? [5 marks]

Q14. Suppose you and your developer friend participating in an international competition in which participants are supposed to give a technological solution to the global problems and you decided to develop an application or website to "eradicate hunger" now keep in mind all the software engineering phases and do a little research on this type of system and then make a list and justify the risk and type risk associated with your solution. [5 Marks]

Q15. Consider the situation in **Q#14** depict your solution with help of high-level system architecture diagram and also suggest an architectural pattern that justify your solution. [5 marks]

Q16. Some people argue that developers should not be involved in testing their own code but that all testing should be the responsibility of a separate team. Give arguments for and against testing by the developers themselves. [5 marks]