National University of Computer & Emerging Sciences, Karachi
Spring-2020 CS-Department
Final Examination
7th July 2020, 09:00 AM – 12:30 noon

Course Code:SE-110	**Course Name: Introduction to Software Engineering**
Instructor Name: Syeda Rubab Manzar (rubab.jaffar@nu.edu.pk)	
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 **6 questions and 4 pages**.
- All the answers must be solved according to the sequence number given in the paper.
- Be specific, to the point and no assumption should be made which contradict 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 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. k19-2000A.
- 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**. In case of issues in uploading to either SLATE or google classroom, you can email the exam to your teacher, but this also needs to be done **within the given time frame**. Email address is given with the name 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: ~3.5 hours (Solving + uploading time) **Max Marks: 100 Points**

Question 1 Software Process Models [15 points]

a) Read the following scenario carefully.

Three bears choose to take a walk-in light of the fact that their morning meal is sweltering. While they are out, a trouble maker, Goldilocks, strolls into their home. She goes into the kitchen and attempts the food that is in three dishes. The food in the initial two dishes isn't decent, however the third bowl she believes is acceptable. She attempts their three seat and likes the third one the best, yet breaks it. At that point she attempts their beds and nods off in the third one. The three bears return home and are irate about child bear's morning meal, seat and bed. They thunder at Goldilocks and she runs home.

The project is to create the children's comic book. Suppose you are the product owner of the above described project. Create a product backlog for this scenario. [10 points]

b) Why does prototyping fall between waterfall and agile? [5 points]

Question 2 Requirement Engineering [15 points]

a) Describe four different reasons/sources for requirements change? [7.5points]
b) Draw a use-case diagram for the following game ticket reservation system. [7.5points]

The system displays to the customer a calendar for all the season games. the customer choses the game he/she would like to attend. the customer then specifies the section in which he/she would like the tickets to be located. the system checks whether the requested tickets are available or not. if the tickets are available, the system offers these tickets to the customer. The customer chooses to accept or reject the tickets. If the customer accepts the tickets, the customer is offered to pay either by a credit card or cash. Upon verification of payment information by system, the tickets are issued.

Question 3 Software Design [15 points]

a) What is the purpose of modelling? What are the fundamental architectural views proposed in Krutchen's 4+ 1 model? [4 points]

b) You have to develop an aircraft monitoring system (AMS). Many sensors are there in an aircraft e.g. elevation sensor, speed sensor, cabin pressure sensor, fuel level sensor and so forth. The AMS executes multiple checks on the data collected by these sensors. The system should do the checks in near real-time when new sensor data comes in. If any trouble issue is detected, the AMS either displays a warning message to the pilot (such as low fuel), or in a critical situation may respond automatically (such as to let fall oxygen masks). The system will run on multicore computer.

i. Name most suitable architectural pattern that you will use for the AMS. [2 points]
ii. Draw a diagram that describes your system architecture pattern. [2 points]
iii. State the one most important advantages and disadvantage of using your proposed architecture pattern. [2 points]

c) You work for a small software house which has won a contract with a new client to design, develop and implement an office database system. You are hired as a member of the UI team. You are assigned the task of designing and implementing forms that gather data about users of the system (e.g., first name, last name, contact number, address, e-mail address, proficiency level). The information you gather is then stored in the database and is used by the accounting and reporting subsystem. You are not sure which fields for gathering user data is mandatory and which are optional.

How do you perform the analysis and design of this interface task assigned to you? [5 points]

Question 4 Software Quality and Testing [20 points]

a) Explain why program inspection is an efficient approach for finding errors in a program. What types of error are unlikely to be discovered through inspections? [5 points]
b) How can you relate the quality management and software development process? [5 points]
c) What tests should be included in object class testing? [5 points]

d) Perform path testing on following code snippet. [5 points]

```
1 PROGRAM maxsum ( maxint, value : INT )
2 INT result := 0 ; i := 0 ;
3 IF value < 0
4 THEN value := - value ;
5 WHILE ( i < value ) AND ( result <= maxint )
6 DO i := i + 1 ;
7 result := result + i ;
8 OD;
9 IF result <= maxint
10 THEN OUTPUT ( result )
11 ELSE OUTPUT ( "too large" )
12 END.
```

Question 5 Risk Management [10 points]

The IT officer of an electronic enterprise gets some information about Internet Security. The organization has an online business site that is hosted by an Internet Services provider whose personnel read the details of the orders and other client enquires from the site before putting away them in a database file for the organization to download. The organization also utilizes a Virtual Private Network (VPN) interface with the manufacturer consultancy that provides the plans for new electronic products, and furthermore utilizes email with different organizations in its supply chain.

Read the above scenario carefully and answer the following:

a) Identify and analyze THREE risks that cover the manufacturer's use of the Internet. [3 points]
b) Rank the identified risks in priority order. [1 point]
c) Choose some mitigation action that is appropriate for each risk, giving your reasons. [6 points]

Question 6 Project Management [25 points]

a) One goal of software project management is to get successful product. Can you give at least **two** success criteria for the any software project? [3 points]
b) A team is tasked with improving the process of building a house. The team lists the major steps involved everything from the excavation step through the landscaping step.

Activities	Completion Time	Immediate Predecessor
A. Excavate	5 days	
B. Foundation	2 days	A
C. Frame	12 days	B
D. Electrical	9 days	C
E. Roof	5 days	C.
F. Masonry	8 days	C.
G. Interior	10 days	E.
H. Exterior	7 days	E.
I. Landscape	5 days	H.

i. Draw the activity network diagram. How many paths are in the network, and what are they along with their duration. [4 points]
ii. Calculate the early start, early finish, late start and late finish for all activities. [4 points]
iii. Determine the critical path. [2 points]
iv. Draw the Gantt chart showing the project schedule with starting date 22/01/2020. [2 points]

c) Suppose the requirement specification for the E-commerce Website Development has been carefully analyzed and the following estimates have been obtained. There is a need for 11 inputs, 11 outputs, 7 inquiries, 22 files, and 6 external interfaces. Also, assume outputs, queries, files function point attributes are of low complexity and all other function points attributes are of medium complexity.

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

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 →						

Best of Luck!!!!