Nirma University

Institute of Technology

Semester End Examination (RPR), July 2022

B. Tech. in Computer Science and Engineering, Semester-V

2CS504 SOFTWARE ENGINEERING

Roll / Exam No.		Supervisor's initial with date	

Time: 3 Hours | Max. Marks: 100

Instructions:
1. Attempt all questions.
2. Figures to right indicate full marks.
3. Use section-wise separate answer book.
4. Draw neat sketches wherever necessary.
5. Attempt questions in sequence only.

Section – I

Q-1.	**Do as directed:**	**[16]**
A **CO1BL4**	In the software engineering process, analyze and explain the myths from developer's point of view?	[04]
B **CO1BL3**	What are the major advantages of first constructing a working prototype before developing the actual product?	[04]
C **CO1BL1**	Draw an outline of software development life cycle. Describe each of the stages, its relation to other stages and its overall importance.	[08]
Q-2.	**Do as directed:**	**[18]**
A **CO2BL3**	Differentiate between user and system requirements by giving suitable examples.	[04]
B **CO2BL4**	State three functional and three non-functional requirements for the airline system, setting out its expected reliability and its response time.	[06]
C **CO2BL4**	Create a sequence diagram for ATM Machine with respect to the following functionality: An ATM Machine at first is in OFF Mode. When switch is turned on and startup is performed, machine is idle, will ask the user to insert ATM Card. After reading the card, if card is accepted, the machine asks for pin number. If card is not accepted or is not readable, the card will be ejected. If pin number is authenticated, the user will be prompted with transactions to choose. If user enters wrong pin number, the machine asks for pin number again. If invalid pin number is entered more than 3 times, the card will be retained by the machine. The transaction chosen by the user will be performed and corresponding receipt will be printed. Later, card is ejected from the machine. The user can opt for taking several executions for choosing a transaction he/she wants to perform. At any point of time, if user presses on "Cancel", the card will be ejected. The machine will be go from idle to OFF Mode, when switch is turned off and shutdown is performed.	[08]
	OR	
C **CO2BL4**	Consider the following simplified description of a university where professors teach courses in which students can enroll. A professor	[08]

has a name, address, phone number, email address, and salary. A student has also a name, etc., but no salary (sorry). A student, however, has an average mark (of the final marks of his or her courses). A course has a name and a number. When a student is enrolled in a course, the marks for this enrollment are recorded. From enrollment, the current average as well as the final mark (if there is one) can be obtained. From a student, one can obtain a list of courses he or she is enrolled in. Professors can teach many courses. Each course has at least one and at most three teachers. A student can get enrolled in exactly 5 courses. A course can be offered only if at least one student is enrolled in it. There are two types of course: bachelor and master. From a bachelor course students can not withdraw. From a master course they can.

Design a class diagram for this university. Add attributes and methods when necessary. Make use of the concepts of object-oriented programming.

Q-3. Do as directed: **[16]**

A CO4BL2 Explain why the process of project planning is iterative and why a plan must be continually reviewed during a software project. [04]

B CO4BL2 Risk management is an important task that is being carried out by the project manager. Which are the important activities that are involved in the risk management process? Explain in detail. [06]

OR

B CO4BL2 What do you mean by umbrella activities? Describe any four umbrella activities that are involved in a software engineering process. [06]

C CO4BL4 A project consists of 8 activities named A to H. Consider the following table: [06]

Activity	Completion time (in days)	Immediate predecessor activities
A	3	-
B	6	A
C	7	A
D	5	A
E	13	B, C
F	8	C, D
G	11	D, F
H	6	G, E

i) Construct activity network so as to satisfy the scheduling requirements shown in the table.

ii) Find the least time required to complete the whole project.

iii) Identify the critical path.

Section – II

Q-4. Do as directed: **[16]**

A CO3BL3 Differentiate between abstraction and refinement with respect to software design with help of suitable examples. [04]

B CO3BL3 Differentiate between top-down and bottom-up integration testing with the help of suitable examples. [06]

C CO3BL4 Consider a program for determining the previous date. Its input is a triple of day, month and year with the values in the range. [06]

$1 \leq$ month ≤ 12, $1 \leq$ day ≤ 31, $1900 \leq$ year ≤ 2025
The possible outputs would be previous date or invalid date. Design equivalence class and boundary value test cases for each class.

Q-5. Do as directed: **[16]**

A CO5BL2 Illustrate the process of restructuring with the help of a suitable diagram. [04]

B CO5BL1 Interpret the relationship between internal and external software attributes for quality management. Explain static software product metrics for quality management. [06]

OR

B CO5BL1 Explain how baseline SCIs are established in software configuration management. Also, explain SCM features in detail. [06]

C CO5BL1 Describe mentioned agile process models in detail: [06]
a) Adaptive Software Development (ASD)
b) Extreme Programming (XP)
c) Dynamic Systems Development Method (DSDM).

OR

C CO5BL1 What do you mean by aspect-oriented software engineering? Justify the significance of cross-cutting concerns in the same. Differentiate between joinpoint and pointcut. [06]

Q-6. Do as directed: **[18]**

A CO3BL3 Assume that the size of an organic type software product has been estimated to be 32,000 lines of source code. Assume that the average salary of software engineers be Rs.15,000/ per month. Determine the effort required to develop the software product and the nominal development time. The values required for calculation for the same are: [06]

Software Project	a_b	b_b	c_b	d_d
Organic	2.4	1.05	2.5	0.38
Semi-detached	3.0	1.12	2.5	0.35
Embedded	3.6	1.20	2.5	0.32

B CO3BL4 Consider the following pseudocode: [06]

```
int function sdivisor (int n)
int d, r;
begin
    if not odd(n) then
        sdivisor = 2;
    else
       begin
            r = trunc(sqrt(n));
            d = 3;
            while (n mod d<>0) and (d< r)
            do
               d = d+2;
               if n mod d =0 then
                     sdivisor = d
               else
                     sdivisor = 1
    end
```

end 2CS504

Do the following:

a) Derive the control flow graph for the given pseudocode.
b) Find the cyclomatic complexity.
c) Find out the independent paths using basis path testing.

C CO3BL3 Country Bank plans to create its on-line banking application. The application interface allows customers to check balances, transfer funds and bill payment services. [06]

To enter the on-line banking application, the user enters a preassigned user name and a password.

Once validated, the user gains access to a main menu which displays the following links:

- Check balances
- Transfer funds
- Bill Payment

The user will be able to check his balance by inquiring his/her account. Transferring funds will require the user to enter name, account number, IFSC code, amount to be transferred and a transaction pin.

Payee data will be maintained by the on-line banking application in a Payee logical file through add payee and make changes to payee transactions. Display payee will retrieve data from the Payee logical file and will not include any calculations. Payment by Country Bank check will be generated and mailed to a designated payee when Make payment has been selected and submitted, the payment date will be recorded into the Payee logical file when the check is created as an output. The functionality shown below is being added via the Bill Payment screen.

- Add a payee
- Display payee
- Make changes to a payee
- Make a payment : Generate check

All of these data are of average complexity and assume sum of value adjustment factors is 42. Given the historical data that the organizational average productivity for systems of this type is 9.5 FP/pm. Also, labor rate is of Rs 18,000 per month. Cost of per FP is approximately Rs 1500. Based on the data provided, compute the following:

a) Compute FP for the system.
b) Total estimated project cost of the system.

Weighting factors required are provided as follows:

Simple	Average	Complex
3	4	6
4	5	7
3	4	6
7	10	15
5	7	10