Nirma University

Institute of Technology

Semester End Examination (IR), December 2021

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

2CS504 SOFTWARE ENGINEERING

Roll / Exam No.		Supervisor's initial with date	

Time: 2 Hours | Max. Marks: 50

Instructions:
1. Attempt all questions.
2. Figures to right indicate full marks.
3. Draw neat sketches wherever necessary.
4. Attempt questions in sequence only.

Q-1. Do as directed: **[16]**

A CO1BL4 Selection of a process model for any software project to be developed depends upon a number of factors. Identify those factors that are taken into consideration and justify the same. [05]

B CO1BL4 "Both the waterfall model of the software process and the prototyping model can be accommodated in the spiral process model." Justify with appropriate example. [05]

C CO2BL6 Consider the following simplified description of a university where professors teach courses in which students can enroll. A professor 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. [06]

Q-2. Do as directed: **[16]**

A CO2BL3 Differentiate between milestones and deliverables. Also, prepare a set of task list stating dependencies, milestones and deliverables for a project for developing library management system for Nirma University. [05]

B CO3BL5 Design black box test suits for a function that checks whether a character string (of up to 25 characters length) is a palindrome using equivalence partitioning and boundary value analysis. Consider all [05]

possibilities for the functionality given.

C CO3BL1 Explain all the steps of software configuration management process in software engineering. [06]

OR

C CO3BL1 In a distributed software architecture, represent the role of Object Request Broker using the architecture of CORBA. Show appropriate diagram of how ORB stub and ORB skeleton are communicating and providing services and explain the same. [06]

Q-3. Do as directed: **[18]**

A CO3BL6 Consider the following algorithm: [05]

```
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
```

Perform the following tasks:

a) Design the control flow graph for the given code.
b) Determine cyclomatic complexity.
c) Identify the linearly independent paths using basis path testing.

B CO4BL2 How internal and external attributes affect quality of software? Explain static software project metrics in software quality management. [05]

C CO4BL6 A project consists of 8 activities named A to N. Consider the following table: [08]

Activity	Completion time (in days)	Immediate predecessor activities
A	2	-
B	5	-
C	4	-
D	5	B
E	7	A
F	3	A
G	3	B
H	6	C, D
I	2	C, D

J	5	E
K	4	F, G, H
L	3	F, G, H
M	12	I
N	8	J, K

Perform the following tasks:

a) Construct activity network so as to satisfy the scheduling requirements shown in the table.
b) Find the least time required to complete the whole project.
c) Show the calculation of free float time of each activity and based on that calculate the critical path.
d) Mention the critical path.

OR

C CO4BL6 SME is implementing a Customer Relations Management (CRM) application. The Web Info (WI) application, an existing application, will be required to send information to the CRM each evening by retrieving all Requests for Information (RFI) submitted that day and currently maintained in the RFI logical file within the WI application. The following information is sent on this daily feed: requestor ID; requestor's first, middle, and last name; requestor's organization; requestor's address (street address, city, state, and Zip Code); date of request; requested items; and quantities for requested items. The CRM application will validate and process the daily feed into a new Potential Customer logical file. Separate reports by state will be generated each morning by the CRM application and delivered to state sales coordinators. The printout will contain all of the information on the Potential Customer logical file as well as a total number of requests for information, which is calculated at the time the report is produced. The state code and state name, retrieved from a code table, will also be printed on each report. Each state sales coordinator will have the ability to retrieve via screen all customer information maintained in the Potential Customer logical file by entering the requestor ID and action key; hardcoded error messages will be returned if the requestor ID is not found. The state coordinator can update the requested items and/or quantities using the requestor ID and a preassigned function key; hard-coded error messages may be returned if the newly assigned requested item is not contained in the Inventory logical file maintained by the Inventory application, or a hard-coded confirmation message will occur. [08]

All of these data are of average complexity and overall system is moderately complex i.e. assume sum of value adjustment factors is 50. 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 32,000 per month. Based on the data provided, compute the following:

a) Mention all the external inputs, external outputs, external inquiries, internal logical files and external interface files.
b) Compute function point for the system.
c) Measure the 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

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