Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. (COMPUTER AND COMMUNICATION ENGINEERING)

END SEM EXAMINATIONS, NOVEMBER 2019

SUBJECT: SOFTWARE DESIGN TECHNOLOGY [ICT 3155]

REVISED CREDIT SYSTEM
(25/11/2019)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates

- Answer **ALL** the questions.
- Missing data if any may be suitably assumed.

1A. Explain following agile process models with a diagram. **5**
i) Extreme Programming
ii) Scrum

1B. What is Software Prototype? What is the reason for developing a prototype during software development? Mention its associated advantages and disadvantages. **3**

1C. How is pair programming useful in software development? **2**

2A. Identify the classes using noun phrase approach for the problem statement given below and draw the detailed class diagram for the same. (including cardinality, association name etc.) **5**

The hospital has several specialized departments like Cardiology, Orthopedics, Pediatrics, ENT etc. OPD is another independent department. A doctor is only associated with one specialized Department at a time though he/she can be a member of the OPD (Outside Patients Department) department. Each doctor has a visiting time and day in a week. At reception the patient details are entered and the fees are also taken and the patient is tracked on the basis of the ID generated. In routine, a patient can visit the doctors either directly selecting a doctor or by getting admitted to the hospital and then a doctor visits the patients. A doctor can prescribe tests for the patient to perform. The patient visits the lab to get the tests to be done, prescribed by his/her doctor. The reports are given to the patient. The payments pertaining to the tests are done at the reception. Referring the reports, the doctor prescribes the patient medicines or further tests or is asked to get admitted. A patient is admitted into a ward of a specialized department (if available) as per the doctor's prescription. The number of wards is limited and if there is no vacant bed in the ward, the admission of the patient is rescheduled. As per the prescription of the doctor the patient is operated on a specified date and time as decided by the doctor who is doing the operation. Further at least 4 nurses should be present during the operation to assist the doctor. After the completion of the treatment a patient may get discharged as an advice from a doctor and upon the complete payment of all due charges at the reception. On payment of full dues, the reception generates a discharge ticket for the patient.

2B. Explain functional independence in the context of software design. What are the advantages of functional independence? How can functional independence in a software design be achieved? **3**

2C. Explain MVC pattern with a suitable example and CRC. **2**

3A. Consider the code snippet given below: **5**

```
int i=0, temp=0, n=5;
while(i<n-1) {
 j=i+1;
  while(j<n) {
    if(a[i]<a[j]) {
     temp=a[i];
      a[i]=a[j];
      a[j]=temp;
    }
  }
i=i+1;
}
```

i) Draw the CFG of the code snippet.
ii) Calculate the cyclomatic complexity.
iii) Identify the independent paths.
iv) Identify the test cases for basis path testing

3B. Explain the difference between nested states and concurrent states. Draw a state diagram for following problem statement. **3**

Librarians categorize the library books into loanable and non-loanable books. The non-loanable books are the reference books. The loanable books are the non-reference books. After cataloguing the books, the books are available for loan. Students who borrow the library books should return them back before the due date. Books that are 12 months over the due date would be considered as a lost state. However, if those books are found in the future, they must be returned back to the library. When the books are found not required in the library or have been damaged, the book would be disposed.

3C. Write the equivalences classes for the following scenario: **2**

Consider a software module that is intended to accept the name of a grocery item and a list of the different sizes the item comes in, specified in ounces. The specifications state that the item name should be alphabetic characters from 2 to 15 in length. Each size may be a value in the range of 1 to 48, whole numbers only. The sizes are to be entered in ascending order (smaller sizes first).

4A. Define the purpose of following terms with suitable example and UML notations. **5**

i) Composition and Aggregation
ii) Use Case Generalization
iii) Activity and State
iv) Include and Extend
v) Object Creation and Destruction

4B. Explain with an example, synchronous and asynchronous message transfer in sequence diagram and draw the sequence diagram for the following problem statement: **3**

MyManipal is an online social networking service only for MIT students and staff. The users must register before using the site. Once the user is authenticated he can retrieve notifications, updates and messages. Further, in the next step the user can change the user preferences as online/ hidden. Finally, the status will be displayed in users' wall. Unsuccessful login will lock the account for 1 minute to prevent from brute force attack.

4C. Differentiate between reactive risk strategies and proactive risk strategies. Also, mention the steps for risk management. **2**

5A. Draw the activity network representation for the project given in Table Q.5A and compute the following: **5**

i) Identify the critical path and its duration for the given project.
ii) Identify slack time of task T3, T6 and T11.
iii) Identify latest finish time of Task T5.
iv) Identify latest start time of Task T10.

Table Q.5A.

Task name	Duration(days)	Dependencies
T1	15	-
T2	20	-
T3	25	T1
T4	10	T1
T5	15	T2
T6	20	T2
T7	20	T4,T5
T8	30	T4,T5
T9	15	T4,T5
T10	10	T3,T7
T11	20	T6,T9

5B. Assume that the size of complex type software has been estimated to be 98,000 lines of source code. Assume that the average salary of software engineers be Rs. 35,000/- per month. Determine the effort required to develop the software and the nominal development time. Also calculate the cost required to develop the software. **3**

(values for calculation: $a = 2.4$, $b = 1.05$, $c = 2.5$, $d = 0.38$)

5C. How is a baseline important in software development? Mention the steps involved in the baselining process. **2**