MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

IV SEMESTER B.TECH. (INFORMATION TECHNOLOGY)

END SEMESTER EXAMINATIONS, APRIL/MAY 2019

SUBJECT: SOFTWARE ENGINEERING [ICT 2204]

REVISED CREDIT SYSTEM
(04/05/2019)

Time: 3 Hours   MAX. MARKS: 50

Instructions to Candidates:
- ❖ Answer **ALL** the questions.
- ❖ Missing data may be suitably assumed.

1A. Explain the accomplishment of requirements engineering process through the execution of seven distinct functions.

5

1B. With a neat diagram explain the steps involved in the Rapid Application Development process model.

3

1C. Explain the use of stubs and drivers in software testing with a suitable example.

2

2A. Show any one relation between actors in Usecase diagram with a suitable example. Draw a Use case diagram for the trailing requirements pertaining to the applicant.

Passport Automation System is used in the effective dispatch of passport to all of the applicants. This system adopts a comprehensive approach to minimize the manual work and schedule resources, time in a cogent manner. The core of the system is to get the online registration form (with details such as name, address etc.,) filled by the applicant. This forms the first and foremost step in the processing of passport application. Next the applicant has to collect the user name and password to login in to the portal. The client can apply passport for a period of maximum 5 years by specifying its type and mode. The client has to enter the valid user name and password to initiate the Process. A maximum of 3 chances will be there to enter the credentials, else it may show an error message "enter a valid user name and password." and the portal will be blocked for 15 minutes for the corresponding user. After successful login, the applicant has to submit the details. Basically there are two Modes to apply for a passport. One is Normal mode and other is Tatkal mode. If an applicant choses the Tatkal mode, he /she has to pay extra processing charge to issue the passport. And also all other formalities will be completed within stipulated time period. If application is on normal mode, no need to pay extra money for the processing. It will take 3-6 months for processing in a regular basis. For payment user can pay in 3 different modes namely credit card, debit card and making a draft.

There is one passport authority management consisting of two departments like Police verification dept. and certificate verification dept. After the registration process applicant has to take an appointment for the verification of documents. First round of verification is done by the system, the information is in turn forwarded to the regional administrator's/ministry of external affairs office. The application is then processed manually based on the report given by the system, and any forfeiting identified can make the applicant liable to penalty as per the law because of which the applicant cannot apply in the next 6 months. The system forwards the necessary details to the police for its separate verification whose report is then presented to the administrator. Before proceeding to this step, there will be certificate verification by the concern head of the certificate verification dept. Once police receives a verification request, the nearest police station will receive a user name and password to login and to check the details. Then there will a verification if any criminal cases filed against the concerned applicant or not. Based on the police record a document has to be sent to the Ministry of external affairs. After all the necessary criteria have been met, the original information is added to the database and the passport is sent to the applicant.

The applicant can check the status periodically and can send a remainder to the administrator. A passport basically contains information like Country code, Passport number, Surname, Given name(s), Nationality, Gender, Date of birth, Place of birth, Place of issue, Date of issue, Date of expiry, Passport type. There are 3 different types of passport available such as Type P, D and S respectively. Further, the passport renewal process for Type S is different from Type P and Type D.   5

2B. The Fig.Q.2B represents access graphs of two modules *M1* and *M2*. The filled circles represent methods and the unfilled circles represent attributes. If method *m* is moved to module M2 keeping the attributes where they are, what can we say about the average cohesion and coupling between modules in the system of two modules.
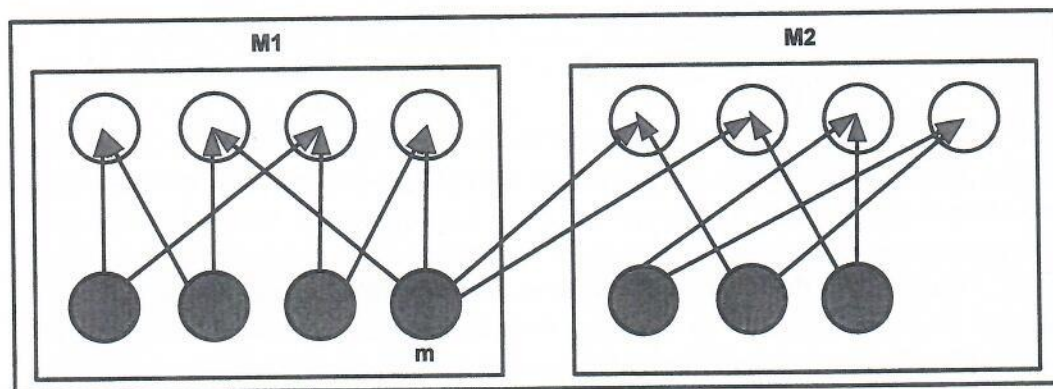

Fig.Q.2B

                                                                                3

2C. Draw a sequence diagram for "Renew books with fine generation for late renewal in library management system".   2

3A. Draw the class diagram by identifying the classes using noun phrase approach for the requirements given in the Q. 2A.

                                                                                5

3B. Explain in detail about the collaborative requirements gathering process.

                                                                                3

3C. Suggest with justification, the most appropriate software process model that might be used as a basis for managing the development of "*Air traffic monitoring software*".   2

4A. Consider the following pseudo code:
```
Begin
int x,y;
int z;
read (x,y);
z=0;
if(x<0 and y<0) {
  z=x*x;
  if(y>=0)
    z=z+1;
}
else
  z=x*x*x;
print(z);
End
```

Draw the CFG for the pseudocode.
  i)   Find the cyclomatic complexity for the CFG, in terms of regions, edges and predicate nodes.
  ii) Find the independent execution paths.
  iii) Write the test cases for the identified independent paths.

4B. How is debugging different from testing? Explain the debugging process using a neat diagram.

4C. With suitable example explain fan-in and fan-out with reference to software design.

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

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

Fig.Q.5A

5B. Assume the size of complex type software has been estimated to be 80,000 lines of source code, and the average salary of software engineers be Rs. 25,000/- per month.

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3

2

5

3

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Determine the following:
   i)   Effort required for developing the software.
   ii)   The nominal development time.
   iii) Total cost required to develop the software.
Note: a = 3.6, b = 1.2, c = 2.5, d = 0.32

5C. An application takes two inputs x and y where x<=y and -5<=y<=4.
   i)   Write the test cases for equivalence class.
   ii)   Write the test cases to perform boundary value analysis.   2