



# MANIPAL INSTITUTE OF TECHNOLOGY

## MANIPAL

A Constituent Institution of Manipal University

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

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: SOFTWARE DESIGN TECHNOLOGY [ICT 3155]

REVISED CREDIT SYSTEM  
(03/12/2016)

Time: 3 Hours

MAX. MARKS: 50

#### Instructions to Candidates:

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

- 1A. Draw the class diagram for the following scenario by identifying the classes using noun phrase approach.
- A company needs to develop a Time Management System (TMS) for its executives. The software should let the executives register their daily appointment schedules. The information to be stored includes the names of person(s) with whom meeting is arranged, venue(s), the time, duration and the purpose of each meeting. When a meeting involving many executives needs to be organized, the system should automatically find a common slot in the diaries of the concerned executives, and arrange a meeting (i.e. make relevant entries in the diaries of all the concerned executives) at that time. It should also inform the concerned executives about the scheduled meetings through e-mail. If no common slot is available, TMS should help the secretary to rearrange the appointments of the executives in consultation with the concerned executives for making room for a common slot. To help the executives check their schedules for a particular day the system should have a very easy to use graphical interface. Since the executives and the secretaries have their own desktop computers, the time management software should be able to serve several remote requests simultaneously. Many of the executives are relative novices in computer usage. Every day in the morning the TMS should e-mail all executives their appointments for the day. Besides registering their appointments and meeting, the executives might mark periods for which they plan to be on leave. Also, executives might plan out the important jobs they need to do on any day at different hours and post them in their daily list of engagements. Other features to be supported by the TMS are the following: TMS should be able to provide several types of statistics such as which executive spent how much time on meetings, for which project how many meetings were organized and for what duration and how many man hours were devoted to such meetings. Also, it should be able to display for any given period of time the fraction of time that on the average each executive spent on meetings.
- 1B. Describe Scrum Agile process model with the suitable diagram.
- 1C. Describe W<sup>5</sup>HH Principle is useful for Project Management.

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2A. Consider the following pseudo code:

```

int i, j;
int n;
for (j=0; j<n-1; j++)
{
    int iMin = j;
    for (i=j+1 ; i<n; i++) {
        if (a[i] < a[iMin]) {
            iMin = i;
        }
    }
    if (iMin != j)
    {
        swap (a[j], a[iMin]);
    }
}

```

- i) Draw the CFG for the pseudocode.
- ii) Find the cyclomatic complexity for the CFG, in terms of regions, edges and predicate nodes.
- iii) Find the independent execution paths.
- iv) Write the test cases for the identified independent paths. 5
- 2B. Explain the following terms with respect to project scheduling. Give suitable example for each. 3
  1. Slack time
  2. Critical Path
  3. Pert Chart
- 2C. Compare and contrast waterfall and RAD model with four appropriate points. 2
- 3A. Explain the accomplishment of requirements engineering process through the execution of seven distinct functions. 5
- 3B. Draw the Sequence diagram for the following scenario. 3

The user wants to boot a server with Linux Operating system. So whenever the user click on the start button the operating system will be loaded to the RAM and the booting process will be initiated with following manner: After a time interval the inbuilt BIOS module in OS will generate its current date and time with a self-indication. User will get acknowledgement through the OS within the stipulated time period. Based on the user request the OS will create two processes namely P1 and P2 respectively. The order of creation of the above two processes are in random order. After creation of the processes the OS will schedule the above two processes based on the Shortest Job First (SJF) Algorithm. Based on the scarcity of resources the OS wants to terminate any of the processes based on the XYZ preemption algorithm. 2
- 3C. Draw Class Responsibility Collaborator diagram for MVC pattern. 2
- 4A. Draw the state machine diagram for the following scenario.
 

A process is running if it is assigned to a CPU. A process is preempted that is, removed from the running state by the scheduler if a process with a higher priority becomes runnable. A process is also preempted if it consumes its entire time slice and a process of equal priority is runnable. A process is runnable in memory if it is in primary memory and ready to run, but is not assigned to a CPU. A process is sleeping in memory if it is in primary memory but is waiting for a specific event before it can continue execution. For example, a process is sleeping if it is waiting for an I/O operation to complete, for a locked resource to be unlocked, or for a timer to expire. When the event occurs, the process is sent a wake up; if the reason for its sleep is gone,

the process becomes runnable. A process is runnable and swapped if it is not waiting for a specific event but has had its whole address space written to secondary memory to make room in primary memory for other processes. A process is sleeping and swapped if it is both waiting for a specific event and has had its whole address space written to secondary memory to make room in primary memory for other processes. If a machine does not have enough primary memory to hold all its active processes, it must page or swap some address space to secondary memory. When the system is short of primary memory, it writes individual pages of some processes to secondary memory but still leaves those processes runnable. When a process runs, if it accesses those pages, it must sleep while the pages are read back into primary memory. When the system gets into a more serious shortage of primary memory, it writes all the pages of some processes to secondary memory and marks those processes as swapped. Such processes get back into a state where they can be scheduled only by being chosen by the system scheduler daemon process, then read back into memory. Both paging and swapping cause delay when a process is ready to run again. For processes that have strict timing requirements, this delay can be unacceptable.

- 4B. Why Project Management is important? Explain the 4Ps of Project Management. 5  
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4C. Assume the size of complex type software has been estimated to be 92,000 lines of source code, and the average salary of software engineers be Rs. 35,000/- per month. Determine the following:

- i. Effort required to develop the software.
- ii. The nominal development time.
- iii. Total cost required to develop the software.

(Values for calculation:  $a = 2.4$ ,  $b = 1.05$ ,  $c = 2.5$ ,  $d = 0.38$ ) 2

- 5A. Draw the Use Case diagram for the following scenario and write use case specification for any one use case.

In a Minimart, Point of Sell (POS) system is used at the front desk in order to manage sale transactions. We have one cashier using the system to print receipt for customers when they buy products. From this system, we can produce sale reports effectively and efficiently. This system will communicate with Inventory control system in order to get stock quantity and update stock balance automatically. The system admin have control over the price which is sold to the customer. The system admin can set up different types of users based on the role. Higher the privilege more access to the system resources. The backup functionality of database is also done by the system admin. Authenticated customer on purchase of the product above \$25 will get a discount of 5% on his total cost. The hackers on the other side can easily attack the password by dictionary attack if the password is not strong. Password starts with alphabet followed by one or more numbers, followed by zero or more special characters are said to be strong password. If the customer is not authenticated the discount will be given only on the special occasions. Further in a Minimart the customer can search and download various articles from IEEE website. Article can be either book or journal. Article will be reviewed by the editor board of IEEE before publishing. The Minimart should pay \$100 as a yearly charge. At a time maximum of 5 users can access the IEEE site. 5

- 5B. Explain the following concepts emphasizing their use and need with relevant example.

1. Coupling and Cohesion
2. Modularity
3. Design Patterns

- 5C. Why spiral model is a realistic approach to the development of large scale systems and software? 3  
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