

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 2 EXAMINATION- 2016

B.Tech (VIII)/ M.Tech (II) Semester

COURSE CODE: ADVANCED SOFTWARE ENGINEERING

MAX. MARKS: 25

COURSE NAME: 10M11CI213

COURSE CREDITS: 3

MAX. TIME: 1 Hr 30 Minutes

Note: All questions are compulsory.

1. [2.5 + 2.5]

- a. Why is it important that all component interactions are defined through 'requires' and 'provides' interfaces?
- b. Using examples, illustrate the different types of adaptor needed to support sequential composition, hierarchical composition, and additive composition.

2. [2.5 + 2.5]

- a. Give two examples of government functions that are supported by complex socio-technical systems and explain why, in the foreseeable future, these functions cannot be completely automated.
- b. Explain why the development of a national medical records system should be considered a 'wicked problem'.

3. [2.5 + 2.5]

- a. Giving reasons for your answer, suggest which dependability attributes are likely to be most critical for the following systems:
 - i. An Internet server provided by an ISP with thousands of customers
 - ii. An Internet-based personal finance management system
- b. In a medical system that is designed to deliver radiation to treat tumors, suggest one hazard that may arise and propose one software feature that may be used to ensure that the identified hazard does not result in an accident.

4. [2.5 + 2.5]

- a. Design the interfaces of components that might be used in a system for an emergency control room. You should design interfaces for a call-logging component that records calls made, and a vehicle discovery component that, given a post code (zip code) and an incident type, finds the nearest suitable vehicle to be dispatched to the incident.
- b. Under what circumstances might an organization decide to scrap a system when the system assessment suggests that it is of high quality and of high business value?

5. [2 + 3]

- a. Give two examples of diverse, redundant activities that might be incorporated into dependable processes
- b. The door lock control mechanism in a nuclear waste storage facility is designed for safe operation. It ensures that entry to the storeroom is only permitted when radiation shields are in place or when the radiation level in the room falls below some given value (dangerLevel). So:
 - i. If remotely controlled radiation shields are in place within a room, an authorized operator may open the door.
 - ii. If the radiation level in a room is below a specified value, an authorized operator may open the door.
 - iii. An authorized operator is identified by the input of an authorized door entry code.

The code shown below controls the door-locking mechanism. Develop a safety argument for this code. If you find that the code is unsafe, suggest how it should be modified to make it safe.

```
1  entryCode = lock.getEntryCode () ;
2  if (entryCode == lock.authorizedCode)
3  {
4      shieldStatus = Shield.getStatus ();
5      radiationLevel = RadSensor.get ();
6      if (radiationLevel < dangerLevel)
7          state = safe;
8      else
9          state = unsafe;
10     if (shieldStatus == Shield.inPlace() )
11         state = safe;
12     if (state == safe)
13     {
14         Door.locked = false ;
15         Door.unlock ();
16     }
17     else
18     {
19         Door.lock ( );
20         Door.locked := true ;
21     }
22 }
```