Comilla University
Department of Computer Science and Engineering
Final Examination – 2014

Course Code: CSE-325
Session: 2011-2012

Course Title: Operating System and System Programming
Semester: 3rd year 2nd Semester

[Answer any Five of the following questions. Figures in the right-hand margin indicate full marks.]

Time: 3 hours

Full Marks: 60

1. a) What is an operating system? Briefly explain the various functions of operating system. 4

    b) Distinguish between the client-server and peer-to-peer model of distributed system. 3

    c) Describe a mechanism for enforcing memory protection in order to prevent a program from modifying the memory associated with other programs. 3

    d) How two categories of services and functions provided by operating system (O/S) can differ? 2

2. a) What is the main advantage of the layered approach to system design? What are the disadvantages of using the layered approach? 4

    b) What is process? Briefly describe the process state with diagram. 4

    c) How a process can be terminated? Describe different thread libraries. 4

3. a) How to handle signal? What are the benefits of using thread pool? 4

    b) Write down the principle of Shortest Job First (SJF) algorithm of CPU scheduling considering same and different arrival time with proper Gantt chart and averaging time. 4

    c) a) Describe how the following pairs of scheduling criteria conflict in certain settings- 4
         i) CPU utilization and Response Time
         ii) Average Turnaround Time and Maximum Waiting Time

4. a) How can you satisfy the critical-section problem? 3

    b) Show that, if the wait and signal operations are not executed atomically then mutual exclusion may be violated. 4

    c) Describe the bounded-buffer problem. 3

    d) Explain the concept of transaction atomicity. 2

5. b) What are the necessary conditions of deadlock? Discuss briefly. 3

    c) Suppose that a system is in an unsafe state. Show that it is possible for the processes to complete their execution without entering a deadlock state. 4

    d) Describe Safety and Resource –Request Algorithms for deadlock avoidance. 5

6. a) Consider the following snapshot of a system and answer the following questions.   6

Process	Allocation A B C D	Max A B C D	Available A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Need = Max − Allo

P_0 P_2 P_3 P_1 P_4

    i)   What are the contents of the matrix need?
    ii)   Is the system in a safe state? Find the safe state.
    iii)   If a request from P_1 arrives for (0,4,2,0), be generated immediately?

  b) What is swapping? Why it is needed? Discuss different address bindings.   *322/18*   3
  c) Describe the hardware support for relocation and limit registers with proper diagram.   3

7. a) What hardware features are needed in a computer system for efficient capability   4
     manipulation? Can these be used for memory protection?
  b) Why is it difficult to protect system in which users are allowed to do their own I/O?   3
  c) What are the advantages of encrypting data stored in the computer system?   3
  d) What are the goals of protection?   2

8. a) Briefly explain the components of a Linux system.   5
  b) What is the difference between process identity and process environment?   3
  c) The Linux scheduler implements soft real time scheduling. What features necessary for   4
     certain real-time programming tasks are missing? How might they be added to the
     kernel?