

**Comilla University**  
**Faculty of Engineering**  
**Department of Computer Science and Engineering**  
**3<sup>rd</sup> Year 2<sup>nd</sup> Semester Final Examination-2015**  
**Course Name (Course Code): Operating Systems and Systems Programming (CSE 325)**  
**Session: 2012 - 2013**

Full Marks : 60

Time : 3 Hours

[Answer any five (5) from the following questions. Figures in the right hand margin indicate full marks.]

1. a. What are the functions of an operating system? Explain different viewpoints to explore an operating system. 4
- b. List the main properties of distributed and handheld operating system. 4
- c. Describe the differences between symmetric and asymmetric multiprocessing. What are the advantages and disadvantages of multiprocessor systems? 4
2. a. What are the differences between a trap and an interrupt? What are the uses of each function? 4
- b. What do you mean by DMA? Explain how it works? 3
- c. What are the purposes of the command interpreter and system calls? Summarizes the list of system calls normally provided by operating system. 5
3. a. Describe different types of process scheduler. 2
- b. What is system call? Describe different types of system call. 3
- c. What is LWP? Describe the Process Control Block (PCB) with necessary figure. 4
- d. What is thread? Describe the benefits of multithreaded programming. 3
4. a. What do you understand by schedulers? Describe different type of schedulers. 3
- b. Write short notes on: Throughput, Wait Time, Turnaround Time and Response Time. 4
- c. Consider the following set of processes, with the length of the CPU burst time given in milliseconds: 5

<u>Process</u>	<u>Burst Time</u>	<u>Priority</u>
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.

- a) Using priority scheduling algorithm
  - i) Draw a Gantt chart illustrating the execution of these process
  - ii) What is the average turnaround time and average waiting time for each process?
- b) Using Shortest Job First (SJF) scheduling algorithm
  - i) What is the average turnaround time and average waiting time for each process?

- ii) What is the turnaround time for Process 1 (P1)?  
 c) Make your comments in terms of waiting time and turnaround time for these scheduling algorithm

5. a. What are the necessary conditions for deadlock? 3  
 b. Prove that four conditions for deadlock must hold in river crossing example. 3  
 c. Explain that 6  
 a) a cycle in the graph is both a necessary and sufficient condition for existence of deadlock.  
 b) a cycle in the graph is a necessary but not a sufficient condition for the existence of deadlock.

6. a. What do you understand by resource allocation graph? Explain the scenario of resource allocation graph with a deadlock. 3  
 b. What do you understand by safe state and unsafe state? Describe safety algorithm. 4  
 c. Explain the data structure of Banker's algorithm. Given a system that uses the banker's algorithm for avoiding deadlock and the resource state shown below. 5

Process	Allocation	Max	Available
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 2	
P4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

- a) What is the content of the array NEED?  
 b) Is the system in a safe state?  
 c) If a request from process P1 arrives for (0, 4, 2, 0), immediately granted?

7. a. Describe the following allocation algorithms: (a) First Fit (b) Best Fit (c) Worst Fit 4.5  
 b. Briefly explain the basic method of paging model of logical and physical memory. 4  
 c. What do you understand by paging? Describe the hashed page table structure by considering its respective figure. 3.5
8. a. What are two advantages of encrypting data stored in the computer system? 2  
 b. Differentiate between authorization and authentication. Write short notes on the following authentication techniques: (a) Encrypted Passwords and (b) One-Time Passwords 5  
 c. What do you understand by program threats and system threats? Briefly describe trap door and denial of service. 5