

# Dhaka International University

Faculty of Science and Engineering

Department of Computer Science and Engineering

**Semester Final Examination (Fall-2017)**

Batch: 35 (Day) Semester No.: 9<sup>th</sup>

Course Title: **Operating Systems**

Course Code: **CSE-309**

**Total Time:** 2.3 hours

**Total Marks:** 50

## Group A

**Answer any two from the following questions**

12.5 \* 2=25

1. (a) List the essential properties of the following types of Operating Systems: 3
  - I. Batch
  - II. Time sharing
  - III. Real time
- (b) What are the Operating System Services that are helpful to the use? 4
- (c) Categorize the directory structure of a File System and illustrate it with appropriate diagram. 5.5
2. (a) What is a Process? Describe PCB with block diagram. 4.5
- (b) Draw the diagram of Process state and describe each of the state. 4
- (c) Classify the types of Multithreading model. 4
3. (a) Define Critical Section Problem? Identify the requirements to solve a Critical Section Problem? 4
- (b) The hardware-based solutions to the Critical-Section Problem are complicated for application programmers to use. To overcome this difficulty, how a Synchronization tool called a Semaphore could be useful? 3.5
- (c) Assume the following set of Processes, with the length of the CPU burst given in milliseconds: 5

<u>Process</u>	<u>Burst Time</u>
P <sub>1</sub>	10
P <sub>2</sub>	29
P <sub>3</sub>	3
P <sub>4</sub>	7
P <sub>5</sub>	12

- I. Draw Gantt charts that illustrate the execution of these process using the following scheduling algorithm:  
SJF, Round Robin (quantum=10 milliseconds)
- II. Calculate average waiting time and turnaround time.

### Group B

Answer any one from the following questions

12.5 \* 1 = 12.5

4. (a) Explain Deadlocks precisely in terms of a directed graph called a system resource-allocation graph. 4.5  
(b) How we can prevent the occurrence of a Deadlock? 4  
(c) Compare the memory organization schemes of contiguous memory allocation, pure segmentation, and pure paging with respect to the following issues: 4  
I. External fragmentation  
II. Internal fragmentation
5. (a) Suppose there are three resources A, B and C with 10, 5 and 7 instances respectively. Also have 5 processes  $P_0$  through  $P_4$ . 6

Process	Allocation			Max		
	A	B	C	A	B	C
$P_0$	2	2	1	7	4	3
$P_1$	2	1	1	3	1	2
$P_2$	2	1	0	3	2	3
$P_3$	1	0	1	2	1	2
$P_4$	1	0	1	3	0	1

Find the Available resource instances and Need of each process using Banker's Algorithm. Is there a safe sequence that satisfies the safety criteria? If there has any safe sequence, find it using Banker's algorithm.

- (b) Explain the Dining-Philosophers Problem. 4  
(c) Define Segmentation and Paging. 2.5

### Group C

Answer the following question

12.5 \* 1 = 12.5

6. (a) Analyze the following page reference string: 8.5  
1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6  
How many page faults would occur for the following replacement algorithms, assuming three frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each.  
I. LRU replacement  
II. FIFO replacement  
III. Optimal replacement
- (b) Define Virtual Memory? List the benefits of using Virtual Memory. 4