Dhaka International University
Faculty of Science and Engineering
Department of Computer Science and Engineering
Semester Final Examination (Spring- 2018)
Batch: **36+37 (Day)**   Semester No.: **9th**
Course Title: **Operating Systems**   Course Code: **CSE-309**

Total Time: 2.3 hours

Total Marks: 50

Group A

<u>Answer any two from the following questions</u>

12.5 * 2=25

1. (a) List the essential properties of the following types of Operating Systems: 3
   I.   Open Source
   II. Cloud Based
   III. Real time

   (b) What are the Operating System Services that are helpful to the user?   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 the mechanism of IPC.   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

Process	Burst Time
P_1	10
P_2	29
P_3	3
P_4	7
P_5	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

12.5 * 1=12.5

4.   (a)   Explain Deadlocks precisely in terms of a directed graph called a system   4.5
           resource-allocation graph.
     (b)   How we can prevent the occurrence of a Deadlock?   4
     (c)   Compare the memory organization schemes of contagious memory   4
           allocation, pure segmentation, and pure paging with respect to the following
           issues:
           I.   External fragmentation
           II.   Internal fragmentation

5.   (a)   Suppose there are three resources A, B and C with 10, 5 and 7 instances   6
           respectively. Also have 5 processes P_0 through P_4.

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 Producer Consumer problem.   4
     (c)   Define Segmentation and Paging.   2.5

Group C

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 four 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