Bangladesh University of Business and Technology (BUBT)
Department of Computer Science and Engineering (CSE)
Course Code: CSE 309
Course Title: Operating Systems
Semester: Fall 2020-21
Intake: 39 (Sec – 01)

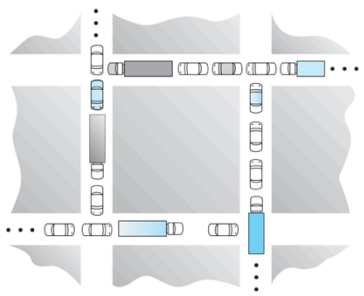
1) Describe resource allocation graph with a deadlock, with a cycle but no deadlock. What are two options for breaking deadlock?
2) Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock free.
3) Given 3 processes A, B and C, three resources x, y and z and following events,
   i. A requests x ii) A requests y iii) B requests y iv) B requests z
   v) C requests z vi) C requests x vii) C requests y
   Assume that requested resources should always be allocated to the request process if it is available. Draw the resource allocation graph for the sequences. And also mention whether it is a deadlock? If it is, how to recover the deadlock.
4) Consider the following snapshot of a system:

	Allocation	*Max*	*Available*
	A B C D	*A B C D*	*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	

Answer the following questions using the banker's algorithm:

i. What is the content of the matrix Need?
ii. Is the system in a safe state?
iii. If a request from process P1 arrives for (0, 4, 2, 0), can the request be granted immediately?

5) Consider the traffic deadlock depicted in the following figure:



i. Show that the four necessary conditions for deadlock hold in this example.

ii. State a simple rule for avoiding deadlocks in this system.