DHARMSINH DESAI UNIVERSITY, NADIAD
FACULTY OF TECHNOLOGY
SECOND SESSIONAL
SUBJECT: (IT 607) Applied Operating System

Examination	**: B.TECH Semester - VI**	**Seat No.**	**:**
Date	**: 13/02/2013**	**Day**	**: Wednesday**
Time	**: 11:30 to 12:45**	**Max. Marks**	**: 36**

INSTRUCTIONS:
1. Figures to the right indicate maximum marks for that question.
2. The symbols used carry their usual meanings.
3. Assume suitable data, if required & mention them clearly.
4. Draw neat sketches wherever necessary.

Q.1 Do as directed.

(a) Consider the following resource-allocation policy. Requests and releases for resources are Allowed at any time. If a request for resources cannot be satisfied because the resources Are not available, then we check any processes that are blocked, waiting for resources. If they have the desired resources, then these resources are taken away from them and are Given to the requesting process. The vector of resources for which the process is waiting is Increased to include the resources that were taken away. **[2]**
For example, consider a system with three resource types and the vector Available Initialized to (4,2,2). If processP0asks for (2,2,1), it gets them. IfP1asks for (1,0,1), it gets Them. Then, ifP0asks for (0,0,1), it is blocked (resource not available). IfP2now asks for (2,0,0), it gets the available one (1,0,0) and one that was allocated toP0(sinceP0is blocked). P0'sAllocationvector goes down to (1,2,1), and itsNeedvector goes up to (1,0,1).
Can deadlock occur? If you answer"yes", give an example. If you answer "no," Specify which necessary condition cannot occur.

(b) With a single resource deadlock occurs **[2]**
(a)If there is a single process competing for that resource.
(b)If there are more than 2 processes competing for that resource
(c)If there are only two process competing for that resource
(d)None of this

(c) A scheduling algorithm assigns priority proportional to the waiting time of a Process. Every process starts with priority zero (the lowest priority). The scheduler re-evaluates the process priorities every T time units and decides the Next process to schedule. Which one of the following is TRUE if the processes Have no I/O operations and all arrive at time zero? **[2]**
(A) This algorithm is equivalent to the first-come-first-serve algorithm.
(B) This algorithm is equivalent to the round-robin algorithm.
(C) This algorithm is equivalent to the shortest-job-first algorithm.
(D) This algorithm is equivalent to the shortest-remaining-time-first algorithm.

(d) Match the following **[2]**

Disadvantage	**Scheduling**
1 Short job can be stuck behind long jobs	1 Round Robin
2 High Turnaround time for equal length jobs	2 FCFS
3 Long jobs are starved	3 SRTF
4 Prediction of future	4 SJF

(e) Is it possible to have a deadlock involving only one single process? Explain your answer **[2]**

(f) **[2]**
```
flag[i]=false;
while(1)
{
        while(flag[i]);
        flag[i]=true;
        <Critical Section>
        flag[i]=false;
        <Remainder Section>
}In above case
```
a. Mutual exclusion and bounded waiting are satisfied.
b. Only mutual exclusion is satisfied.
c. Mutual exclusion is violated.
d. Mutual exclusion and progress are met.

Q.2 Attempt ***Any TWO*** of the following questions. **[12]**

(a) Discuss how monitor are useful to achieve process synchronization? Also discuss primary operation of monitors compare them with the primary operations of semaphore and show how deadlock can be avoided in dining philosopher problem using Monitor.

(b)

Process	Arrival Time	Burst Time	Priority
P1	0	10	4
P2	0	3	1
P3	3	8	2
P4	4	16	3
P5	7	2	5

Draw Gantt Chart for Non preemptive Priority scheduling algorithm.
Also find Average Waiting Time, Average Turnaround Time and Average Response Time for Non preemptive priority scheduling algorithm.

(c)

Process	Arrival Time	Burst Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

Draw Gantt Chart for Shortest remaining time next scheduling algorithm.
Also find Average Waiting Time, Average Turnaround Time and Average Response Time for Shortest remaining time next scheduling algorithm.

Q.3 (a) Discuss reader-writer problem also show pseudo code for reader and writer process where reader has more priority compare to writer process. **[3]** **[3]**

(b) Discuss bakery algorithm for multiple process synchronization. **[6]**

OR

Q.3 (a) **(1)** Three concurrent processes X, Y, and Z execute three different code segments That access and update certain shared variables. Process X executes the P operation (i.e., wait) on semaphores a, b and c; process Y executes the P operation on semaphores b, c and d; process Z executes the P operation on semaphores c, d, and a before entering the respective code segments. After completing the execution of its code segment, each process invokes the V operation (i.e., signal) on its three semaphores. All semaphores are binary semaphores initialized to one. Which one of the following represents a deadlock-free order of invoking the P operations by the processes? **[3]**

(A) X : P(a) P(b) P(c) Y : P(b) P(c) P(d) Z : P(c) P(d) P(a)
(B) X : P(b) P(a) P(c) Y : P(b) P(c) P(d) Z : P(a) P(c) P(d)
(C) X : P(b) P(a) P(c) Y : P(c) P(b) P(d) Z : P(a) P(c) P(d)
(D) X : P(a) P(b) P(c) Y : P(c) P(b) P(d) Z : P(c) P(d) P(a)

(2) A computer system has 6 tape drives, with n processes competing for them. Each process may need 3 tape drives. What is the maximum value of n for which the system is guaranteed to be deadlock free? **[3]**

(b) Consider the following snapshot of a system: **[6]**

	Allocation	Max	Available
	A B C D	A B C D	A B C D
Po	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 matrix Need?
b. Is the system in a safe state?
c. If a request from process P1 arrives for (0,4,2,0), can the request be Granted immediately?