# END SEMESTER EXAMINATION

### MAY-2012

## COE/SW-213  OPERATING SYSTEMS DESIGN

*Time: 3:00 Hours*                                    *Max. Marks : 70*

**Note :**   Answer any *FIVE* questions.
Assume suitable missing data, if any.

1[a]  What are the basic functions of an operating system?  Explain each in brief and also discuss different states of a process with the help of state transition diagram.                                                      **6**

[b]  What do you understand by race condition?  Give example of arising of race condition in concurrent processing.                              **4**

[c]  Compare and contrast real time and time sharing operating system with example.                                                            **4**

2[a]  Consider a system with a set of processes $P_1$, $P_2$ and $P_3$ and their CPU burst times, priorities and arrival times being mentioned as below:-

| Process | CPU burst time | Arrival time | Priority |
|---------|----------------|--------------|----------|
| $P_1$   | 5              | 0            | 2        |
| $P_2$   | 15             | 1            | 3        |
| $P_3$   | 10             | 2            | 1        |

assuming 1 to be highest priority, calculate the following:-

(i) Average waiting time using FCFS, SJF (Preemptive and non preemptive) and priority (Preemptive and non preemptive) scheduling mechanism.

(ii) Assume time quantum to be 2 units of time.  Calculate average waiting time and average turn around time using Round-Robin scheduling.

[b]  What are the necessary conditions to hold dead lock in a system? Explain the resource allocation graph algorithm to deal with dead lock problem.                                                            **6**

3[a]  What are semaphores?  What is the role of critical section in process synchronization?  Describe producer consumer problem with its possible solution.                                                          **7**

[b] What is page fault? Given references to the following pages by a program 7, 0, 1, 2, 0, 3, 4, 2, 3, 0, 3 and there are three frames available in the memory, by using following page replacement algorithm

(i) FIFO   (ii) LRU   (iii) Optimal

how many page faults will occur?                                    7

4[a] Discuss the Contigous, Linked and Indexed file allocation schemes. Which allocation scheme will minimize the amount of space required in directory structure and why?                                    7

[b] Describe the Banker's algorithm for safe allocation. Consider a system with 5 processes $P_0$ to $P_4$ and three resource types A, B, C resource A has 7 instances, B has 2 and C has 6 instances suppose at $t_0$ time we have following state:-

| Process | Allocation | | | Request | | | Available | | |
|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | A | B | C | A | B | C |
| $P_0$ | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| $P_1$ | 2 | 0 | 0 | 2 | 0 | 2 | | | |
| $P_2$ | 3 | 0 | 3 | 0 | 0 | 0 | | | |
| $P_3$ | 2 | 1 | 1 | 1 | 0 | 0 | | | |
| $P_4$ | 0 | 0 | 2 | 0 | 0 | 2 | | | |

(i) Is the given system in dead lock state?
(ii) Suppose $P_2$ makes an additional request (0,0,1) what will be the effect of this request to the system?

5[a] Compare and contrast paging and segmentation and also discuss the cause of thrashing and what steps are taken by system to eliminate this problem?                                    7

[b] Suppose the moving head disk with 200 tracks is currently serving a request for track 143 and has just finished a request for track 125 if the queue of requests is kept in FIFO order: 86, 147, 91, 177, 94, 150.
What is the total head movement for following scheduling schemes:-
(i) FCFS   (ii) SSTF   (iii) C-SCAN.                                    7

6[a] Explain various types of schedulers available. Write the differences among them also. What are the objectives of CPU scheduling?   7

[b] Describe the segmented paging scheme of memory management and the hardware required to support the system.      7

7      Write short notes on following:-      14
  (i) Dead lock avoidance and Dead lock prevention
  (ii) Multilevel queue and multilevel feedback queue scheduling.
  (iii) CPU bound and I/O bound processes.