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Third Semester MCA Degree Examination, June/July 2013
Operating Systems

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. What is an operating system? Explain the various services provided by an OS. (10 Marks)
 b. Explain the following systems:
 i) Clustered
 ii) Distributed
 iii) Time sharing
 iv) Hand held. (10 Marks)

- 2 a. What do you mean by a process? Explain the process state and the process control block with a neat diagram. (10 Marks)
 b. Define system calls with example. Also explain various types of schedulers. (10 Marks)

- 3 a. Consider the following processes, which have arrived at the ready queue with the burst time and the arrival time given in milliseconds as shown below:

Process	Burst time	Arrival time	Priority
P ₁	8	0	3
P ₂	4	1	2
P ₃	9	2	4
P ₄	5	3	1

Draw the Gantt chart and calculate the average waiting time using the following algorithm:

- i) FCFS (10 Marks)
 ii) SJF (preemptive)
 iii) Priority (preemptive)
 iv) RR (Q = 4). (10 Marks)
- b. Define a deadlock. What are the necessary conditions for a deadlock to occur? (06 Marks)
 c. Explain any two prevention mechanisms to prevent a system from deadlock. (04 Marks)
- 4 a. Explain Banker's algorithm in detail. (10 Marks)
 b. What do you mean by a critical section? Explain the Readers-writers problem using semaphore in detail. (10 Marks)

- 5 a. Consider a system with five processes P₁ through P₅ and three resource types P, Q and R. Resource type P has 7 instances, resource type Q has 5 instances and resource type R has 10 instances. Suppose that at time T₀, the following snapshot of the system has been taken:

	Allocation			Max		
	P	Q	R	P	Q	R
P ₁	0	1	0	3	5	7
P ₂	0	0	2	2	2	3
P ₃	2	0	3	2	0	9
P ₄	1	1	2	2	2	2
P ₅	2	0	0	3	3	4

Answer the following questions:

- i) What is the content of need matrix?
 - ii) Is the system is in safe state?
 - iii) If a request from process P_1 arrives for two additional instances of resource type Q, can this request be granted immediately?
 - iv) If a request from process P_4 arrives for (0, 3, 3) can this request be granted immediately? **(10 Marks)**
- b. Explain the difference between internal and external fragmentation. **(05 Marks)**
 - c. Explain TLB in detail. **(05 Marks)**
- 6**
- a. How many page faults occur for the following reference string with four frames using the following algorithms? i) FIFO; ii) LRU; iii) Optimal.
1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2. **(10 Marks)**
 - b. Explain various frame allocation methods with an example. **(04 Marks)**
 - c. What are the actions taken by an operating system when a page fault occurs? **(06 Marks)**
- 7**
- a. Explain various memory allocation methods for files. **(10 Marks)**
 - b. Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4999. The drive is currently serving a request was at cylinder 143, and the previous request was at 125. The queue of pending requests, in FIFO order is:
86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130.
Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?
i) FCFS; ii) SSTF; iii) SCAN; iv) LOOK. **(10 Marks)**
- 8**
- Write short notes on the following:
- a. Thrashing
 - b. Seek time and rotational latency
 - c. Belady's anomaly
 - d. File system mounting. **(20 Marks)**
