Fifth Semester B.E. Degree Examination, June/July 2013
Operating Systems

Time: 3 hrs. Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. List and explain services provided by an operating system that are designed to make using computer systems more convenient for users. **(08 Marks)**

   b. Is separation of mechanism and policy desirable while designing an operating system? Discuss with an example. **(04 Marks)**

   c. With a neat diagram of VM-WARE architecture, explain the concept of Virtual Machine (VM) and the main advantage of using VM architecture. **(08 Marks)**

2 a. What is a Process Control Block (PCB)? What are the different states in which a process can be in its life cycle, discuss with the help of a state transition diagram. **(05 Marks)**

   b. Is CPU scheduling necessary? Discuss the five different scheduling criteria used in comparing scheduling mechanisms. **(06 Marks)**

   c. Consider the following set of processes, with length of the CPU burst time given in milliseconds:

Process	Arrival time	Burst-time	Priority
P₁	0	10	3
P₂	0	1	1
P₃	3	2	3
P₄	5	1	4
P₅	10	5	2

   i) Draw four Gantt charts illusterating the execution of these processes using FCFS, SJF, a non preemptive priority and RR (Quantum = 2) scheduling.

   ii) What is the turn around time of each processes for each of the scheduling algorithms in (i).

   iii) What is the waiting time of each process for each of the scheduling algorithm in (i).
   (09 Marks)

3 a. Describe an N-process solution to critical section problem which uses test and test ( ) atomic instruction. Also explain how the algorithm satisfies all the requirements of critical section. **(08 Marks)**

   b. Servers can be designed to limit the number of open connections. For example, a sever may wish to have only N socket connections at any point in time. As soon as N connections are made, the server will not accept another incoming connection until an existing connection is released. Explain how semaphores can be used by a server to limit the number of concurrent connections. **(04 Marks)**

   c. Explain the range of monitors with a schematic view of its structure; write a monitor solution to bounded-buffer problem. **(08 Marks)**

4 a. What is a dead lock? Consider the traffic deadlock depicted in the figure given below, explain that the four necessary conditions for dead lock indeed hold in this example. **(05 Marks)**
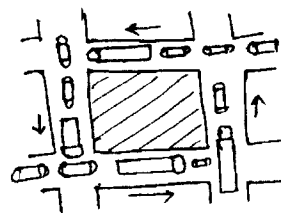
Fig.Q.4(a)

b. Consider the following snapshot of a system:

	Allocation	Max	Available
	ABC	ABC	ABC
P_0	002	004	102
P_1	100	201	
P_2	135	137	
P_3	632	842	
P_4	143	157	

Answer the following questions using Banker's algorithm:
Is the system in a "safe state"?
If a request from process P_2 arrives for (002) can the request be granted immediately?
(10 Marks)

c. What are the methods used to handle the dead locks? Explain how circular wait condition can be prevented from occurring. **(05 Marks)**

PART – B

5 a. What are the drawbacks of contiguous memory allocation? Given five memory partitions of 100KB, 500KB, 200KB, 300KB and 600KB (in order), how would each of the first fit, best fit and worst fit algorithms place processes of 212 KB, 417 KB, 112KB and 426 KB (in order)? Which algorithm makes the most efficient use of memory? **(06 Marks)**

b. Consider a paging system with the page table stored in memory.
   i) If a memory reference takes 200 nano seconds, how long does a paged memory reference take?
   ii) If we add associative register and 75 percentage of all page table references are found in the associative registers, what is the effective memory access time? (Assume that finding a page table entry in the associative memory/registers takes zero time, if the entry is found). **(04 Marks)**

c. Consider the following page reference string: 7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1 for a memory with three frames. How many page faults would occur for LRU, FIFO and optimal page replacement algorithms? Which is the most efficient among them? **(10 Marks)**

6 a. Explain the various file operations supported by the operating system, also differentiate mandatory lock and advisory lock mechanisms used on files by the operating system. **(05 Marks)**

b. Describe the methods used for implementing the directories. **(08 Marks)**

c. Explain various file protection mechanisms. **(07 Marks)**

7 a. Suppose that the disk drive has 5000 cylinders numbered from 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Starting from the current (location) 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) LOCK; v) C-SCAN. **(15 Marks)**

b. Discuss the strengths and weaknesses of implementing an access matrix using access lists that are associated with objects. **(05 Marks)**

8 Write short notes on:
a. Portability issues in LINUX
b. Performance of demand paging
c. Multithreading models
d. Network structure in LINUX. **(20 Marks)**

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