Ex/CSE/T/322/74/2012

Bachelor of Computer Science & Engg. Examination, 2012

(3^{rd} year, 2^{nd} semester)

OPERATING SYSTEMS

Time: 3 hours Full Marks: 100

Answer Question no.1 and any **four** from the rest

1.

a. What is inode?

b. What is the problem with Priority scheduling? Mention any possible solution to the problem.

c. What are the disadvantages of paging scheme?

d. What are the differences between a program and a process?

e. In which page replacement scheme would you occasionally have Belady's anomaly and why?

f. What is working set strategy?

g. What is monitor? What additional synchronization mechanism is required with monitor?

3+4+2+3+3+2+3

2.

a. What is response time? What is turnaround time?

Consider a system with five processes as shown below with corresponding arrival time and execution time:

Process	Arrival time	Execution time
P_0	0	11
P_1	2	6
P_2	5	14
P_3	7	7
P_4	10	8

Explain Round Robin scheduling policy and calculate waiting time and turnaround time of each process using the same with CPU time quantum 4. Show the scheduling decisions using Gantt chart.

b. Distinguish between Multilevel Queue scheduling and Multilevel Feedback Queue scheduling.

c. Explain the conditions under which a process will make transition from Run state to Wait (Blocked) state.

d. What is semaphore?

(1.5X2+3+2X2+2)+4+3+1

3.

a. What is Translation Lookaside Buffer (TLB)? What are its advantages and disadvantages? With a hit ratio of 85%, find the slow-down in memory-access time when it takes 25 ns to search TLB and 100 ns to access main memory.

b. What is Demand Paging? What are its advantages?

c. State the problems you will face if you want to achieve mutual exclusion through (i) disabling interrupts, (ii) strict alternation /ordering among processes

d. Where and when the approach of *counting* be used?

e. What are the contents of Process Control Block?

(2+2+3)+4+2X2+3+2

4.

a. How can a page be shared? Will protection be violated in a shared page? Justify.

b. Consider the following memory reference string for a 4 frame memory: 7 0 1 2 0 3 0 4 2 3 1 0 3. Using (i) First In first Out (FIFO) and (ii) Least Recently Used (LRU) page replacement strategies, find the hit ratio in both cases. Show all possible steps. Comment on the findings.

c. How is segmentation implemented? What are the disadvantages of using segmentation?

d. Why are page sizes powers of 2?

(2+2)+8+(4+2)+2

5.

a. What does *Hold and Wait* condition state? Can deadlock be prevented by denying *No preemption* condition? Why and why not?

b. A system has four processes and five resources. The current allocation and maximum requirements of each process are as follows:

	Allocated	Maximum	Available
Process 1	1 0 2 1 1	1 1 2 1 3	0 0 X 1 1
Process 2	2 0 1 1 0	2 2 2 1 0	
Process 3	1 1 0 1 0	2 1 3 1 0	
Process 4	1 1 1 1 0	1 1 2 2 1	

Currently the system is in safe state. What is the value of X?

c. Is it possible to use binary semaphore for mutual exclusion when there are *m* producers, *n* consumers and bounded buffer? Justify. What happens if the buffer is unbounded? On what conditions do producer and consumer need to wait in case of (i) bounded buffer, (ii) unbounded buffer?

d. Suppose process A is suspended on condition *a* inside a monitor and process B (inside monitor) invokes *a.signal()*. What are the possibilities of the states of A and B?

(2+3)+5+(2+2+2X2)+2

6.

a. Disk requests come into the disk driver for cylinders 56, 17, 112, 78, 24, 99, 77, 135, 167, 49 in that order. A seek takes 2 msec per cylinder move. What is the total seek time to access all blocks for the following disk scheduling policies: (i) First Come First Serve (FCFS) and (ii) C-SCAN (disk arm moving from cylinder 0 towards cylinder 199). In all cases disk arm is initially at cylinder 43. Please mention the working policy of FCFS and C-SCAN.

b. In which situation SCAN disk scheduling algorithm will produce better throughput and why? What are the advantages and disadvantages of Shortest Seek Time First (SSTF) disk scheduling algorithm?

c. Discuss contiguous file allocation strategy. What are its problems?

(4+4)+(2+4)+6

7.

a. What is capability? What is capability list? Construct the capability list using the following information: <Domain, Object, right-set> as given below:
{D1,O1, read}, {D1, O4, read & execute}, {D1, D3, switch}, {D2,O2, write}, {D2, O3, execute}, {D2, O4, write}, {D2, D1, switch}, {D3,O1, write}, {D3, O2, read}, {D3, O3, write}, {D3, D2, switch}

b. Compare and contrast the linked list approach and grouping approach for space management.

c. What is Access Matrix? What are the ways of implementing it?

(2+4+4)+5+5

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