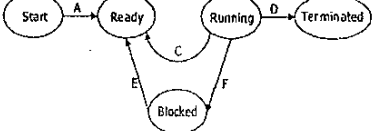


Max Marks: 100

1.	<p>a) What is an open source Operating System? Identify 3 advantages and 3 disadvantages of open source operating systems?</p> <p>b) In the following process state transition diagram for a uniprocessor system, assume that there are always some processes in the ready state:</p>  <p>i) Is the scheduler a preemptive or a non-preemptive?  ii) Name the arrows in the diagram.  iii) Briefly explain different process states given in the diagram.</p>	6															
	<p>c) For each of the following pairs of terms, define each term, making sure to clarify the key difference(s) between the two terms.</p> <p>i) "Signal" and "Pipe"  ii) "C program" and "Shell program"</p>	8															
2.	<p>a) Consider a variant of the RR scheduling algorithm where the entries in the ready queue are pointers to the PCBs</p> <p>a) What would be the effect of putting two pointers to the same process in the ready queue?  b) What would be the major advantages and disadvantages of this scheme  c) How would you modify the basic RR algorithm to achieve the same effect without the duplicate pointers?</p>	6															
	<p>b) Consider the following set of processes, with the length of the CPU burst given in milliseconds.</p> <table border="1" data-bbox="306 1463 894 1682"> <thead> <tr> <th>Process</th><th>Burst time</th><th>Arrival time</th></tr> </thead> <tbody> <tr> <td>P1</td><td>28</td><td>56</td></tr> <tr> <td>P2</td><td>14</td><td>72</td></tr> <tr> <td>P3</td><td>19</td><td>5</td></tr> <tr> <td>P4</td><td>35</td><td>39</td></tr> </tbody> </table> <p>i) Draw the Gantt Charts for executing this process using the following scheduling algorithm:  SJN, Round Robin(quantum=10)</p> <p>ii) What is the average turnaround time for each algorithm?</p> <p>iii) What is the average waiting time for each of the scheduling algorithm?</p>	Process	Burst time	Arrival time	P1	28	56	P2	14	72	P3	19	5	P4	35	39	8
Process	Burst time	Arrival time															
P1	28	56															
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	c)	P is a set of processes. R is a set of resources. E is a set of request or assignment edges. The sets P, R, and E are as follows: $P = \{P_1, P_2, P_3\}$ , $R = \{R_1, R_2, R_3\}$ . $E = \{P_1 \rightarrow R_1, P_1 \rightarrow R_3, P_3 \rightarrow R_2, R_1 \rightarrow P_3, R_3 \rightarrow P_2, R_2 \rightarrow P_2\}$ . R1 has two instances. R2 has one instance. R3 has one instance. (a) Draw the resource-allocation graph. (b) Is there any deadlock in this situation? Briefly Explain.	6
3.	a)	Under what circumstances do page faults occur? With a diagram, describe the actions taken by the operating system when a page fault occurs.	5
	b)	Consider a system with three smoker processes and one agent process. Each smoker continuously rolls a cigarette and then smokes it. But to roll and smoke a cigarette, the smoker needs three ingredients: tobacco, paper, and matches. One of the smoker processes has paper, another has tobacco, and the third has matches. The agent has an infinite supply of all three materials. The agent places two of the ingredients on the table. The smoker who has the remaining ingredient then makes and smokes a cigarette, signaling the agent on completion. The agent then puts out another two of the three ingredients, and the cycle repeats. Write an algorithm to synchronize the agent and the smokers.	10
	c)	Consider a memory system with a cache access time of 10 ns and a memory access time of 110ns – assume the memory access time includes the time to check the cache. If the effective access time is 10% greater than the cache access time, what is the hit ratio H?	5
4.	a)	With a block diagram, explain the file read operation.	6
	b)	What are the advantages and disadvantage of tree structured directory?	4
	c)	Consider a file currently consisting of 100 blocks. Assume that the file control block (and the index block, in the case of indexed allocation) is already in memory. Describe the type of operations required for contiguous, linked, and indexed (single-level) allocation strategies, if, for one block, the following conditions hold. In the contiguous allocation case, assume that there is no room to grow in the beginning, but there is room to grow in the end. Assume that the block information to be added is stored in memory. (a) The block is added at the beginning. (b) The block is added at the end.	10
5.	a)	Consider a system where free space is kept in a free space list. i) Suppose that the pointer to the free space list is lost. Can the system reconstruct the free space list? ii) Suggest a scheme to ensure that the pointer is never lost as a result of memory failure.	4
	b)	With a neat diagram, explain Direct memory access (DMA).	6
	c)	Given a disk with 200 tracks numbered from 0 to 199. At time 0 there is a queue of read requests, the head is positioned over track 89 and moving towards the lower tracks. The disk queue of pending requests is (in order of arrival) 2, 156, 78, 192, 19, 127, 90, 100 Two further request on track numbers 140 and 60 arrive when servicing the request for track number 127. Starting from the current head position of 89 for SSTF and SCAN disk scheduling algorithms: i) Draw a diagram showing the disk head movements ii) Calculate the total distance that the disk head moves to satisfy all the requests	10