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RV COLLEGE OF ENGINEERING®

(An autonomous Institution affiliated to VTU)

IV Semester B. E. Examinations April/May-19

Computer Science and Engineering

OPERATING SYSTEMS

Time: 03 Hours ***Maximum Marks: 100***

Instructions to candidates:

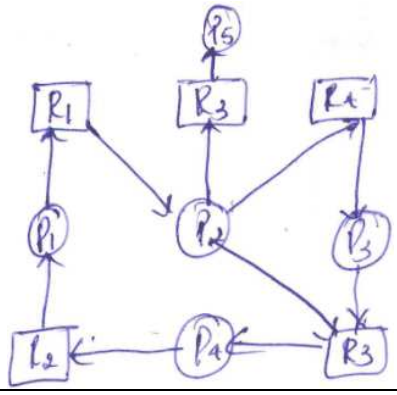
1. Answer all questions from Part A. Part A questions should be answered in first three pages of the answer book only.
2. Answer FIVE full questions from Part B. In Part B question number 2, 7 and 8 are compulsory. Answer any one full question from 3 and 4 & one full question from 5 and 6

PART A

1	1.1	List any two classes of operating systems.	02
	1.2	What is the purpose of system call?	01
	1.3	When a process is waiting to be assigned to a processor, then it is said to be in _____ state.	01
	1.4	Define convay effect and its consequence.	02
	1.5	Draw the Gantt chart for the following using Round-Robin (RR) scheduling algorithm. $Process$ | $Burst\ time$ P_1 | 24 P_2 | 3 P_3 | 3 Assume time Quantum = 4 milliseconds.	02
	1.6	What is the advantage of semaphore over other hardware-based solutions in solving critical section problem?	01
	1.7	List the conditions for deadlock situation to occur.	02
	1.8	Given the resource allocation graph with cycle, what are the conditions to determine whether there is a deadlock or not?	02
	1.9	Give one difference between logical address space and physical address space.	01
	1.10	Given the following reference string: 7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1. Determine the number of page faults using $FIFO$ page replacement.	02
	1.11	Given the following disk queue with requests for I/O to block on cylinders. 98,183,37,122,14,124,65,67. If the disk head is initially at cylinder 53. Draw the scheduling diagram for $FCFS$ disk scheduling.	02
	1.12	Suppose a process requests $10\,kb$ of memory and memory manager currently has a list of unallocated blocks of $6kb, 15kb, 20kb, 11kb$ and $16\,kb$ blocks. Identify the block allotted by best fit, first fit and worst fit strategy.	02

PART B

2	a	Explain the distinguishing features of the following operating systems: i) Batch processing. ii) Real time.	06
	b	With neat diagram, explain the process control block in detail.	05
	c	Define User Thread and Kernel Threads. Differentiate between single-threaded process and multithreaded process.	05
3	a	Define CPU-scheduling and the circumstances under which scheduling decisions may take place.	04
	b	An operating system uses SJF scheduling and priority scheduling algorithm. Consider the burst times, priority for the following process. $Process$ | $Burst\ time$ | $Priority$ P_1 | 6 | 3 P_2 | 8 | 1 P_3 | 7 | 4 P_4 | 3 | 2 Draw the Gantt chart and calculate waiting time, turnaround time, average waiting time and average turnaround time for the process.	08
	c	What is the critical section problem? Mention the requirements that must be satisfied by a critical section problem solution.	04
		OR	
4	a	The following processes arrive for execution at times indicated. $Process$ | $Arrival\ time$ | $Burst\ time$ P_1 | 0 | 2 P_2 | 1 | 3 P_3 | 3 | 1 P_4 | 3 | 7 Draw Gantt chart and calculate waiting time and turnaround time for: i) $FCFS$ scheduling ii) Perspective SJF scheduling.	08
	b	Why is a thread called LWP? Explain different threading issues. Bring out the concept of thread pool.	08
5	a	Explain the following synchronous problems with algorithms: i) Bounded-Buffer problem. ii) Peaders-Writers problem.	08
	b	Consider a system with five processes P_0 through P_4 and three resource types A, B, C. Resource type A has 10 instances, resource type B has 5 instances and resource type C has 7 instances. Consider the following snapshot of system. $Allocation$ | Max | $Available$ $A\ B\ C$ | $A\ B\ C$ | $A\ B\ C$ P_0 0 1 0 | 7 5 3 | 3 3 2 P_1 2 0 0 | 3 2 2 P_2 3 0 2 | 9 0 2 P_3 2 1 1 | 2 2 2 P_4 0 0 2 | 4 3 3 i) What is the content of matrix need? ii) Is the system in $SAFE$ state? If so, give the $SAFE$ sequence. iii) If a request from process P_1 arrives for (1,0,2) can the request be granted immediately?	08

		OR	
6	a	Explain the method of recovery from deadlock in detail.	06
	b	Design a starvation and deadlock free solution dining philosopher problem using any synchronization construct.	06
	C	For the given resource-allocation graph, construct a wait-for-graph and determine whether there is a deadlock or not. 	04
7	a	Define Paging and explain the following: i) Demand paging. ii) Fragmentation. iii) Copy on write.	08
	b	Consider the following page reference string: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 How many page faults will occur for *FIFO*, optimal page replacement and *LRV* page replacement, assuming 3 free frames?	08
8	a	Suppose that the head of a moving hard disk with 200 tracks, numbered 0 to 199, is currently serving a request at track 143 and has just finished a requests at track 125. The queue of requests is kept in *FIFO* order. 86,147,91,177,94,150,102,175,130 What is the total number of disk movements needed to satisfy these requests for the following disk-scheduling algorithms? i) *FCFS* ii) *SSTF* iii) *LOOK* iv) *SCAN*.	08
	b	Explain any two file access methods.	04
	c	Explain any two file allocation methods.	04