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RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

III Semester B. E. Fast Track Examinations Oct-2020

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 four classes of operating system.	02
	1.2	List any four design principles for design of operating system	02

	1.3	Write the ouput of the following program:
		$int\ main\ ()$
		{
		$if\ (fork\ ()::fork\ )$
		$fork();$
		$print\ (\text{“1”});$
		$return\ 0;$
		}
			02

	1.4	Justify the statement, “ thread is a light weight process”	02
	1.5	Differentiate between fork and vfork system calls	02
	1.6	Consider three processes (process id $0,1\ \&\ 2$ respectively) with compute time burst $2,4$ and 8 times units. All processes arrive at time zero. Considering longest remaining time first ($LRTF$), calculate the average turnaround time ($LRTF$).	02
	1.7	Illustrate with example how an improper use of semaphore leads to deadlock.	02
	1.8	Consider a paging system with TLB. If it takes $20\ ns$ to search TLB and $100\ ns$ to access a memory, what is the effective memory access time with 98 percent hit ratio.	02
	1.9	Justify the statement: “Presence of cycle in Resource Allocation Graph is not sufficient condition for dead lock”.	02
	1.10	Differentiate between monolithic level & microkernel	02

PART-B

2	a	Discuss various approaches to design operating system structure.	06
	b	Write a program to demonstrate following $UNIX$ system calls: i) Fork ii) Wait iii) Exec (any variant).	06

	c	Give a proper insight into "How evolution in computing influenced different classes of operating system".	04
3	a	Compare process scheduling protocols- First came first serve ($FCFS$), shortest job first, priority and round robin on basis of their performance and algorithm complexity.	06
	b	Give solution for the following critical section problem: i) Producer consumer problem ii) Dining philosopher problem.	10
		OR	
4	a	Consider a following set of processes with a length of the CPU burst time given in milliseconds. $Process$ | $Arrival\ Time$ | $Burst\ Time$ | $Priority$ P_1 | 0 | 7 | 3 P_2 | 3 | 2 | 2 P_3 | 4 | 3 | 1 P_4 | 4 | 1 | 1 P_5 | 5 | 3 | 3 i) Draw Gantt chart illustrating the execution of these processes using shortest job first (preemptive), priority (preemptive) and round robin (time slice = $2\ ms$) ii) Compute average waiting, average turnaround and average response time.	10
	b	Describe the process scheduling in linear operating system.	06
5	a	Given five memory partitions of $100\,KB, 500\,KB, 200\,KB, 300\,KB$ and $600\,KB$ in order, how would first fit, best fit and worst fit algorithms place processes of $212\,KB, 417\,KB, 112\,KB$ and $426\,KB$ in order? Which algorithm makes the most efficient use of memory?	08
	b	With a neat diagram explain the basic paging scheme of memory management. Also discuss the hardware support for paging.	08
		OR	
6	a	What are logical and physical address space? Justify how memory management helps programmer to have larger logical address compared to available physical memory.	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 facility will occur by $LRU, FIFO$ and optimal page replacement algorithms, assuming 5 free frames.	08
7	a	What is thrashing? What are the causes for thrashing? Discuss the mechanism to prevent it.	06

	b	Suppose on a disk with 5000 cylinders, number 0 to 4999. The drive is currently serving a request at cylinder 143. The queue of pending requests in $FIFO$ order is $B6, 1470, 913, 1774, 948, 1509, 1022, 1250, 130$ starting from the current position what is the total number of disk moves for the following algorithms i) shortest seek time first ($SSTF$) ii) $SCAM$ iii) $LOOK$.	10
8	a	What is deadlock? Explain. Discuss different ways of handling deadlock.	08
	b	Consider the following snapshot of a system.	

$Process$	$Allocation$				Max			
	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2
P_1	1	0	0	0	1	7	5	0
P_2	1	3	5	4	2	3	5	6
P_3	0	6	3	2	0	6	5	2
P_4	0	0	1	4	0	6	5	6

The available resources are $A = 1, B = 5, C = 2$ and $D = 0$.

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 $P1$ arrives for (0 4 2 0), can the request be granted immediately. 08