USN | | | | | | | | | | |

RV COLLEGE OF ENGINEERING®

(An Autonomous Institution affiliated to VTU)

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

Computer Science and Engineering

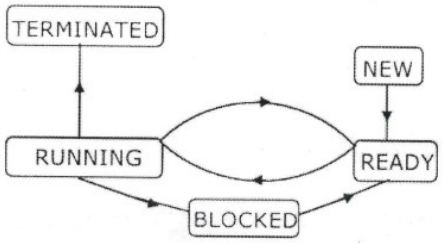
OPERATING SYSTEM

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	What is the scheduler called for the following transition diagram 	02
	1.4	Justify why thread is called light weight process.	02

	1.5	Consider the following fragment
		$int\ a = 5;$
		$if\ (fork() == 0)$
		{
		$a = a + 5;$
		$printf(\text{“}\%d\ \%d\ \backslash n\text{”}, a, \&a);$
		}
		$else$
		{
		$a = a - 5;$
		$printf(\text{“}\%d\ \%d\text{”}\ |n\text{”}, a, \&a);$
		}
		Let u, v be the values printed by the parent process, and x, y be the values printed by the child process. Then mention the values of u, v, x and y.
			02

	1.6	Illustrate with an example, how a improper use of semaphore leads to deadline	02
	1.7	Consider three processes (process id 0,1,2 respectively) with compute time bursts $2, 4$ and 8 time units. All processes arrive at time zero. Consider the longest remaining time first ($LRTF$) scheduling algorithm. In $LRTF$ ties are broken by giving priority to the process with the lowest process id. Calculate the average turnaround time	02

	1.8	Consider a paging system with TLB. If it takes 20 ns to search TLB and 100 ns to access the memory what is the effective memory access time with 98% hit ratio?	02
	1.9	A System has 12 magnetic tape drives and 3 processes: $P0, P1$ and $P2$. Maximum needs(process-wise : $P0$ through $P2$ top to bottom) $P0$ 10 $P1$ 2 $P2$ 2 Determine the sequence of allocation that does not lead to deadline.	02
	1.10	Consider we have the following reference string: 5,0,4,4,0,3,0,4,1,0,2,0,5,3,0,1. Find the page fault of virtual memory using LRU algorithm and $FIFO$, where we used 4 frames?	02

PART-B

2	a	Discuss various approaches to design operating system structure.	06
	b	With a neat diagram illustrate process transition diagram.	06
	c	Illustrate differences between user level thread and kernel threads.	04
3	a	Consider the following set of processes with a length of the CPU burst time given in milliseconds	

$Process$	$Arrival\ Time$	$Burst\ Time$	$Priority$
$P1$	0	7	3
$P2$	3	2	2
$P3$	4	3	1
$P4$	4	1	1
$P5$	5	3	3

i) Draw Gnatt charts illustrating the execution of these processes using SJF preemptive priority and Round Robin (Time slice = $1ms$).

ii) Compute the waiting times in each of the three schedules and find which of them provides results in the minimal average waiting time and turnaround time.

Find out the time in which there are maximum number of processes in ready queue in the above scenario. 10

b Illustrate Critical Section Problems with necessary conditions 06

OR

4 a Illustrate race condition with an example 08

b Give Peterson solution for two process synchronization 08

5	a	What is deadlock? Explain. Also explain in brief, deadlock characteristics.	04
	b	Give solution for following critical section problems: i) Dining philosopher problems ii) Reader Writer problem.	12
		OR	
6	a	Give semaphore solution for the Producer Consumer bounded buffer problem	04

	b	Consider the following snap-shot of a system The available resources are $A = 3, B = 3$ and $C = 2$. 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 (1 0 2), can the request be granted immediately?	12

$Process$	$Allocation$			Max		
	A	B	C	A	B	C
$P0$	0	1	0	7	5	3
$P1$	2	0	0	3	2	2
$P2$	3	0	2	9	0	2
$P3$	2	1	1	2	2	2
$P4$	0	0	2	4	3	3

7	a	What are logical and physical memories? Illustrate how logical address space is mapped to physical address space using basic paging scheme?	06
	b	How many page faults occur for the $FIFO, OPTIMAL, LRU$ for the following reference string, with four page frames? 1,2,3,4,5,3,4,1,6,7,8,7,8,9,5,4,5,4,2	10
8	a	Explain the following allocation schemes: i) Continuous Allocation ii) Linked Allocation iii) Indexed Allocation.	06
	b	Suppose on a disk with 5000 cylinders, numbers 0 to 4999. The drive is currently serving at cylinder 143. The queue of pending requests in $FIFO$ order is 86,1470,913,1774,948,1509,1022,1750,130. Starting from current position what is the total number of disks moves for the following algorithms. i) $SSTF$ ii) $SCAN$ iii) $LOOK$.	10