PES University, Bangalore
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END SEMESTER ASSESSMENT (ESA) B.TECH. V SEMESTER- DECEMBER 2018

UE16CS302-INTRODUCTION TO OPERATING SYSTEMS

Time: 3 hrs	Answer All Questions	Max Marks: 100

1	a	In general we can consider a process to move between five process states during its existence. Discuss, with diagram, the circumstances in which a process will enter or leave each of the states.	6
	b	Identify the section of a process's memory for the following statements. i. The section that contains temporary data ii. The section that contains global variable iii. The section that contains Program code iv. The section that contains Function parameters	4
	c	What are the operations that can be performed on the process?. Write a code snippet to demonstrate these operations.	4
	d	i. What is Convoy Effect? ii. What are the parameters defined for a multilevel feedback queue scheduler?	1+5
2	a	Explain with neat diagram different threading models supported by user level threads and kernel level threads	6
	b	Write a solution to critical section problem using mutex locks. Write the function definition of acquire and release.	6
	c	Write a program to create 3 threads. Two of the threads perform work and update a "count" Variable. The third thread waits until the count variable reaches a specified value.	5
	d	List and define the three requirements that must be satisfied by the solution to critical section problem.	3
3	a	The code of the operating system resides in the main memory and users also get access to memory to execute their programs. Explain how operating system is protected form user programs and how program of user 1 is secured from the program of the user 2 program during execution. Draw the Hardware support for the same.	4
	b	What is a virtual memory? Find the hit ratio for the following sequence of page requests, using First-in First out and optimal method of page replacement . Consider number of free frames to be 3. Reference string: 1,2,4,2,1,3,2,5,6,7,2,4,2,3,5,6.	6
	c	What is thrashing ?What are the causes of thrashing and write any two solutions to increase CPU utilization in case of thrashing.	6
	d	What are the techniques used to structure page table?	4

4	a	I. The routine open() takes a number of different flags. Specify the flags to create a file for writing, if the file is already existing, change the size to 0. II. How non sequential read and writes within a file are supported by the OS? III. Write a program to print all the files and their I-node numbers present in the current working directory. (Assume header files are included)	3+ 1+ 3
	b	Consider VSFS (Very Simple File System) of size 64KB. Each block size is 4KB.super block, I-bmap and d-bmap require one block each. If the inode table occupies 20KB with inode size of 256 bytes. (note: Show all the steps involved in the calculations) I. Hom many blocks are present in the file system?. II. How many blocks are required for inode table and what are the maximum number of entries in the inode table? III. What are the maximum number of files that can be created on the file system? IV. What is the start address of inode table and data block? V. What will be the block number and sector number for the inode 32 if sector size is 512 bytes?	8
	c	Explain the architecture of fast file system.	5
5	a	Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53, a disk queue with pending requests for I/O to blocks on cylinders are 98, 183, 37, 122, 14, 124, 65, 67. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms? A. FCFS B. SSTF C. SCAN	6
	b	What is a firmware? Explain the protocol used in the canonical devices?	4
	c	How can the operating system check device status without frequent polling and thus lower the CPU overhead required to manage the device?Explain the mechanism that lowers CPU overhead.	1+ 3
	d	An application loads 100 libraries at startup. Loading each library requires exactly one disk access. The seek time of the disk to a random location is given as 10ms. Rotational speed of disk is 6000rpm. If all 100 libraries are loaded from random locations on the disk, how long does it take to load all libraries? (The time to transfer data from the disk block once the head has been positioned at the start of the block may be neglected)	6