APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

08 PALAKKAD CLUSTER

Q. P. Code: CSE0820111-I (Pages: 3)

Name: .....

Reg. No: .....

FIRST SEMESTER M.TECH. DEGREE EXAMINATION MARCH 2021

Branch: Computer Science and Engineering Specialization: Computer Science and Engineering

08CS6011 OPERATING SYSTEM DESIGN

(Common to CSE)

Time: 2 hour 15 minutes **Max. Marks: 60**

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks
1. a	Explain the difference between the *CreateProcess* and the *fork* system call	3
	Answer b or c	
b	Explain system call flow of control with suitable diagram.	6
c	Explain how the register values are moved around in a context switch caused by an interrupt.	6

Q. No.	Module 2	Marks
2. a	What is the difference between synchronization and mutual exclusion?	3
	Answer b or c	
b	A system has three processes (P1, P2, P3) and three reusable resources (R1, R2, R3). There is one instance of R1, two instances of R2 and three instances of R3. P1 holds an R1 and an R3 and is requesting an R2. P2 holds an R3 and is requesting an R1 and an R2. P3 holds two R2 and an R3 and is requesting an R1. a) Draw the resource allocation graph for this situation b) Write all the cycle(s) in the graph. c) Does a deadlock exist? Why?	6

c The following program consists of 3 concurrent processes and 3 binary semaphores. The semaphores are initialized as S0=1, S1=0, S2=0. How many times will process P0 print '0'? Justify your answer. 6

Process P0	Process P1	Process P2

while (true)
{
wait (S0);
print (0);
release (S1);
release (S2);
}
	wait (S1);
	Release (S0);
		wait (S2);
		release (S0);

Q. No.	Module 3	Marks
3. a	In loading programs into memory, what is the difference between load-time dynamic linking and run-time dynamic linking?	3

Answer b or c

b Suppose that for a particular process under execution, the following page reference string is encountered : 6

1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 5, 4, 2.
How many page faults occur on the following page replacement algorithms for the above given page reference string assuming four frames?

i) Optimal page replacement
ii) LRU page Replacement Algorithm

c Compare the list and bitmap methods used in keeping tracks of blocks. 6

Q. No.	Module 4	Marks
4. a	Define latency, transfer and seek time with respect to disk I/O.	3

Answer b or c

b	Suppose a disk drive has 200 cylinders, numbered 0 to 199. The driver is currently serving a request at cylinder 53. The queue of pending request in FIFO order is: 98, 183, 37, 122, 14, 124, 65, 67. Starting from the current head position what is the total distance in cylinders that the disk to satisfy all the pending request for each of the following disk scheduling algorithms? i) SSTF ii) FCFS	6
c	What are the various ways in which primary memory can be used to enhance performance of disks?	6

Q. No.	Module 5	Marks
5. a	Contiguous allocation of files leads to disk fragmentation. Is this internal or external fragmentation? Justify your comment.	4
	Answer b or c	
b	Draw and explain the layout of file system. Define the contents of the file system descriptors. What are the possible choices for the location of the file descriptor.	8
c	Explain the file system objects and the major operations possible on them. List the main data structures used in the file system and with a suitable figure show how they are connected to each other.	8

Q. No.	Module 6	Marks
6. a	Give any four Operating system examples of caching	4
	Answer b or c	
b	Describe on mechanisms for protecting hardware resources. How protection information can be represented.	8
c	Explain the model of resource management. Explain the tasks and goals of resource manager.	8