Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

Fourth Semester

Information Technology

CS3451 - Introduction to Operating Systems

(Common to Computer Science and Engineering)

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Justify how operating system acts as a resource allocator.	L2	1	2
2.	What is system call? Give an example.	L1	1	2
3.	Consider the 3 process, P1, P2 and P3 as shown in the table. Find the completion order of the 3 process under the RR (CPU quantum of 2 time units).	L2	2	2
4.	Differentiate safe sate and unsafe state.	L2	2	2
5.	Consider a logical address space of 16 pages of 2048 words mapped into memory of 64 frames. Calculate the minimum number of bits required for the logical address and physical address.	L2	3	2
6.	List out the benefits of virtual memory.	L2	3	2
7.	Why rotational latency is usually not considered in disk scheduling?	L1	4	2
8.	What is the disadvantage of linked allocation and how it is overcome in the indexed allocation of disk space?	L2	4	2
9.	What hardware assistance for virtualization can be provided by modern CPUs?	L2	5	2
10.	How are iOS and Android similar? How are they different?	L2	5	2

Process	Arrival time	Burst time
P1	0	5
P2	1	7
P3	3	4

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	The services and functions provided by an operating system can be divided into two main categories. Briefly describe the two categories, and discuss how they differ.	L2	1	8
		ii	How does the distinction between kernel mode and user mode function as a rudimentary form of protection (security) system?	L2	1	8
			Or			
	b		What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in microkernel architecture? What are the disadvantages of using the microkernel approach?	L2	1	16

12.	a	i	Describe about message passing model of inter-process communication.	L2	2	8
		ii	Explain about the various multithreading models with a neat diagram.	L2	2	8

Or

	b			L3	2	16

Name	Allocation A B C	Max A B C	Available A B C
Raghu	1 0 1	6 6 7	3 2 2
Varsha	2 1 1	4 2 3	
Jai	2 0 1	4 4 3	
Vishnu	2 1 1	3 2 2	
Sathish	3 3 2	5 4 5	

The above scenario shows the details of resources allocated to five persons at the beginning and also the maximum needs of resource types A, B AND C in order to finish their job. Evaluate the following

a) The Need of each person.
b) Is the above state a safe state?
c) If Sathish requests for (1,0,2), can this request be granted immediately?

13.	a		What is the effect of allowing two entries in a page table to point to the same page frame in memory? Analyze how this effect could be used to decrease the amount of time needed to copy a large amount of memory from one place to another. What effect would updating some byte on the one page have on the other page?	L4	3	16

Or

	b	i	What is the cause of thrashing? How does the system detect thrashing? Once it detects thrashing, what can the system do to eliminate this problem?	L2	3	8
		ii	Describe about any two methods for disk free space management.	L2	3	8
14.	a		Suppose that a disk drive has 7000 cylinders numbered 0 to 6999, the drive is currently serving a request at cylinder 130 and the previous request was at cylinder 130 and the previous request was at cylinder 170, the queue of pending requests in FIFO order, is 160, 2685, 799, 4611, 250, 5211, 2010, 78, 6666 and 1250. Starting from the current head position, What is the total distance that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms? a). FCFS b). SSTF c). C-SCAN d). LOOK	L3	4	16

Or

	b	i	Explain any two schemes for defining the logical structure of a directory.	L2	4	8
		ii	Discuss about the indexed allocation of disk space. What are its advantages?	L2	4	8

15.	a	Examine why can VMMs not implement trap-and-emulate-based virtualization on some CPUs? Lacking the ability to trap-and-emulate, what method can a VMM use to implement virtualization?	L4	5	16
		Or			
	b i	Describe some of the challenges of designing operating systems for mobile devices compared with designing operating systems for traditional PCs.	L2	5	8
	ii	Explain why Java programs running on Android systems do not use the standard Java API and virtual machine.	L4	5	8