SOMAIYA
VIDYAVIHAR UNIVERSITY

Maximum Marks: 100	Semester: August 2022 – December 2022 Examination: ESE Examination (KT)		Duration:3 Hrs.
Programme code: 75 Programme: Minor Programme in Computer Engineering		Class: TY	Semester: V(SVU 2020)
Name of the Constituent College: K. J. Somaiya College of Engineering		Name of the department: Comp	
Course Code: 116m75C501	Name of the Course: Operating System		
Instructions: 1)Draw neat diagrams 2) All questions are compulsory 3) Assume suitable data wherever necessary			

Que. No.	Question	Max. Marks
Q1	Solve any **Four**	20
i)	With respect to System Software, Describe linkers and loaders.	5
ii)	Describe the System Boot Process.	5
iii)	Illustrate the Process State Transition Diagram with suitable diagram.	5
iv)	How can Semaphores be utilized for Process synchronization?	5
v)	Define Bit Vectors and Free Block List with respect to Free Space management.	5
vi)	With respect to Memory Management, Describe Internal and External Fragmentation.	5

Que. No.	Question	Max. Marks
Q2 A	Solve the following	10
i)	Differentiate between Symmetric and Asymmetric Multiprocessors.	5
ii)	Define shells. Further Comment on the different types of shells.	5
OR		
Q2 A	Illustrate the different types of Operating System Structures with the help of suitable examples.	10
Q 2 B	Solve any **One**	10
i)	Describe the working of fork() and exec() system call for Process Creation. Further Discuss the different scenarios of Process Termination.	10
ii)	Compare and Contrast between Multilevel Queue and Multilevel Feedback Queue Scheduling Algorithms with the help of suitable diagrams.	10

Que. No.	Question	Max. Marks
Q3	Solve any **Two**	20
i)	Consider the methods used by processes P1 and P2 for accessing their critical sections whenever needed, as given below. The initial values of shared boolean variables S1 and S2 are randomly assigned. Method Used by P1 while (S1 == S2) ; Critical Section S1 = S2; Method Used by P2	10

	while (S1 != S2) ; Critical Section S2 = not (S1); Analyse the methods and State whether Mutual Exclusion and Progress Requirement are being satisfied or not. Justify your answer.	
ii)	Discuss how Mutual Exclusion can be implemented with Test & Set () and Swap() Instructions.	10
iii)	An operating system uses the banker's algorithm for deadlock avoidance when managing the allocation of three resource types X, Y and Z to three processes P0, P1 and P2. The table given below presents the current system state.	10

	Allocation			Max		
	X	Y	Z	X	Y	Z
P0	0	0	1	8	4	3
P1	3	2	0	6	2	0
P2	2	1	1	3	3	3

There are 3 units of type X, 2 units of type Y and 2 units of type Z still available. The system is currently in safe state. Consider the request for additional resources by P1. P1 requests 2 units of X, 0 units of Y and 0 units of Z. Determine whether the request by P1 should be granted or rejected.

Que. No.	Question	Max. Marks
Q4	Solve any Two	20

i)	Consider a disk queue with requests for I/O to blocks on cylinders in order 43, 33, 127, 87, 17, 99, 20. The head is initially at cylinder number 60, moving towards larger cylinder numbers on its servicing pass. The cylinders are numbered from 0 to 199.
	If the following Disk Scheduling algorithms are applied:-
	    a) C-LOOK
	    b) C-SCAN
	    c) SSTF(Shortest Seek Time First)
	    d) SCAN
	    e) FCFS
	For all the algorithms, Find the order in which the requests will be serviced. Further Calculate the total head movement (in number of cylinders) incurred while servicing these requests.
		10

ii)	With respect to File Management, Illustrate the various File Allocation Methods with suitable diagrams.	10
iii)	With respect to Memory Management, Illustrate the Hierarchical and Hashed Page Table Structure with Suitable diagrams.	10

Que. No.	Question	Max. Marks
Q5	(Write notes / Short question type) on any four	20
i)	Distinguish between Unix and Linux.	5
ii)	Differentiate between User Level Thread and Kernel Level Thread.	5

iii)	Discuss the various approaches utilized for recovery from deadlock.	5
iv)	Discuss Process Synchronization. Further, Comment on Buffering needed for Inter Process Communication.	5
v)	Describe the Inodes Control Structure utilized for File management in Unix.	5
vi)	Explain how Page table can be implemented with Translation lookaside Buffer.	5