Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India

(Autonomous College Affiliated to University of Mumbai)

End Semester Examination

April/May 2018

Max. Marks: 100	
Class: S.E.	Duration: 3 Hours
Course Code: CE43/IT44	Semester: IV
Name of the Course: Operating Systems	Branch:Computer/IT

Instruction:

(1) All questions are compulsory

(2) Draw neat diagrams

(3) Assume suitable data if necessary

Q No.		Max. Marks	CO
Q.1 (a)	Explain fork and exec system calls with example program along with the expected output of the program.	06	CO1
Q.1 (b)	Differentiate between monolithic and microkernel architectures (2 distinct points only) along with neat diagram.	04	CO1
Q.2 (a)	For the process parameters in the table below, find average waiting time and average turnaround time for FCFS and preemptive SJF scheduling algorithm. Ties in preemptive SJF is broken by the Process ids, process containing lower id is executed first.	10	CO2

Process	Arrival Time	Burst Time
P1	0	6
P2	1	4
P3	3	5

OR

Assume the following processes arrive for execution at the time indicated and the length of CPU burst time given in ms.

Job	Burst Time	Priority	Arrival Time
P1	8	5	3
P2	1	1	1
P3	3	2	2
P4	2	3	3
P5	6	4	4

For the process parameters in the table above, **find average waiting time only** for non-preemptive and preemptive priority scheduling algorithm. Higher number indicates higher priority. State which of the two algorithms give maximum throughput.

Q No.		Max. Marks	CO
Q.2 (b)	Explain multithreading models with respect to user and kernel level threads.	04	CO2
Q.2 (c)	Compare long term scheduler, short term scheduler and medium term scheduler with respect to the following points: A. Selection of processes B. Frequency of execution	06	CO2

Q.3 (a)	Consider the following state of a system and answer the following questions:	10	CO3

Resource type	Total instances
A	13
B	9
C	8

Processes	Allocation			Max		
	A	B	C	A	B	C
P0	3	0	1	10	7	4
P1	1	2	0	8	5	3
P2	2	1	3	6	3	4
P3	0	3	0	9	6	3
P4	1	1	2	7	4	5

A. Find Available vector.
B. Find need matrix.
C. State whether the system is in safe state or not. If yes, find any one possible safe sequence.

Q.3 (b)	Describe deadlock detection algorithm for multiple instances of a Resource type.[Example not required.]	05	CO3

OR

Explain compare and swap construct to solve critical section problem with example(pseudo code).

Q.3 (c)	State readers' writers' problem. Solve by writing pseudo code and explain the readers' writers' problem solution using Semaphores.	10	CO3

OR

State producer consumer problem. Solve by writing pseudo code and explain the producer consumer problem solution using Semaphores. Use 3 semaphores viz. empty counting semaphore initialized to 5 , full counting semaphore initialized to 0 and mutex semaphore initialized to 1.

Q.4 (a)	On a simple paged system, associative registers hold the most active page entries and the full page table is stored in the main memory. If references satisfied by associative registers take 100 ns, and references through the main memory page table take 180 ns, what must be the hit ratio to achieve an effective access time of 125 ns?	05	CO4

OR

On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical address space, and a page size of 2^{10} bytes, answer the following:
A. How many bits are needed to store one entry in the page table (how wide is the each page table entry)? Assume each page table entry contains a valid/invalid bit in addition to the page frame number (valid or invalid bit plus the page frame number).
B. How many bits are there in a logical address?

Q.4 (b)	Consider the following reference string: a, b, c, d, c, a, d, b, e, b, a, b, c, d and the size of the frame be 4. Calculate total number of page faults and hit ratio using optimal page replacement policy.	05	CO4

Q.4 (c)	What is demand paging? What are the six steps in handling a page fault. Explain with diagram.	10	CO4
Q.5 (a)	On a disk with 1000 cylinders, numbered 0 to 999, compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. Assume the last serviced was at track 345 and the head is moving towards track 0. The queue in FIFO order contains requests for the following tracks: 123, 874, 692, 475, 105, 376. Perform the computation for the following scheduling algorithms: A. SCAN B. SSTF	10	CO5
Q.5 (b)	List file allocation methods and compare them with respect to the following points: 1. External fragmentation 2. Access time 3. Suitable for which file access methods OR Explain seven features of NTFS. Draw NTFS volume layout and explain the files in the region of system files of NTFS layout.	10	CO6
Q.5 (c)	Draw the diagram of Linux Virtual File System(VFS) concept. List the primary object types in VFS. Explain any one of them.	5	CO6