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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

October 2023 Semester End Main Examinations

Programme: B.E **Semester: IV**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 19CS4PCOPS **Max Marks: 100**
Course: Operating Systems

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) What are parallel systems? Explain their advantages. **6**

b) Discuss the fundamental approaches for users to interface with the operating systems. **6**

c) Explain in detail the benefits of process cooperation. **8**

UNIT - II

2 a) The following processes are scheduled using pre-priority, RR algorithms. Each process is assigned a numerical priority-with higher no indicates higher the priority. In addition to the listed process system also has an idle task (which consumes no CPU resources and is identified as P-idle.) This task has priority-0 and is scheduled whenever the system has no other available processes to run. The length of time quantum=10units. If a process is preempted by a higher priority process, the preempted process is placed at the end of Q. (i) Show the scheduling order of the processes using Gantt chart. (ii)What is the TAT & WT for each process? (iii) What is the CPU utilization rate? **10**

Process	Priority	Burst-Time	Arrival
P1	40	20	0
P2	30	25	25
P3	30	25	30
P4	35	15	60
P5	5	10	100
P6	10	10	105

b) **10**

Process	Arr-Time	Burst-Time	Priority
P1	0	7	3
P2	3	2	2
P3	4	3	1
P4	4	1	1
P5	5	3	3

Lower number---Highest priority

i. Draw Gantt chart for SRTF, PREEMPTIVE-PRIORITY & RR (TQ=1)

ii. Compute the waiting time in each of 3 schedules in (i) and find which of them provides results in minimal average waiting time & average turn-around Time.

iii. Find out the time during which there are maximum number of processes in ready queue in the above scenario.

UNIT - III

3 a) Write the code for Reader's and Writer's problem and briefly explain how it is considered as a classic synchronization problem **5**

b) Considering a system with five processes P_0 through P_4 and three resources of type A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t_0 following snapshot of the system has been taken: **10**

process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P0	0	1	0	7	5	3	3	3	2
P1	2	0	0	3	2	2			
P2	3	0	2	9	0	2			
P3	2	1	1	2	2	2			
P4	0	0	2	4	3	3			

i. What will be the content of the Need matrix?

ii. Is the system in a safe state? If Yes, then what is the safe sequence?

iii. Consider process P_1 requests one additional instance of resource type A and two instances of resource type C. Can the request be immediately granted, is the system in a safe state if yes, then what is the safe sequence?

c) What are deadlocks? Define the necessary conditions for deadlock. **5**

UNIT - IV

4 a) On a system using simple segmentation, compute the physical address for each of the logical addresses, given the following segment table. If the address generates a segment fault, indicate so. **10**

(i) 0, 99 (ii) 2, 78 (iii) 1, 265 (iv) 3, 222 (v) 0, 111

Segment	Base	length
0	330	124
1	876	211
2	111	99
3	498	302

b) Given references to the following pages by a program— 0,9,0,1,8,1,8,7,8,7,1,2,8,2,7,8,2,3,8,3 how many page faults will occur if the program has 3 page frames available to it and uses: FIFO, LRU and optimal page replacement. **10**

OR

5 a) On a system using simple segmentation, compute the physical address for each of the logical addresses, given the following segment table. If the address generates a segment fault, indicate so. **10**

(i) 0, 300 (ii) 2, 800 (iii) 1, 600 (iv) 3, 1100 (v) 1, 1111

Segment	Base	length
0	1100	500
1	2500	1000
2	200	600
3	4000	1200

b) Given references to the following pages by a program - 0,1,4,2,0,2,6,5,1,2,3,2,1,2,6,2,1,3,6,2 How many page faults will occur if the program has 3 page frames available to it and uses: FIFO, LRU and Optimal page replacement. **10**

UNIT - V

6 a) On a system using contiguous allocation, compute the number of the physical block corresponding to the logical block given the file is stored starting at the indicated physical block(assume the block numbers start with 1) **10**

(i) starting physical block:1000; logical block:12
(ii) starting physical block:75;logical block:2000
(iii)starting physical block:150; logical block:25

b) On a disk with 1000 cylinders, 0-999 compute the number of tracks the disk arm must move to satisfy all the requests in the disk queue. assume the last request serviced was at track 756 and the head is moving toward track 0. The queue in FIFO order contains requests for the following tracks: 811, 348, 153, 968, 407, 500. Perform the computations for the following scheduling algorithms. FIFO, SSTF, SCAN, LOOK, C-SCAN, C-LOOK. Draw the corresponding graph **10**

OR

7 a) Explain Linked File Allocation method with a figure. Discuss its advantages and disadvantages. **10**

b) Suppose a disk has 50 cylinders named 0 to 49. The Read/Write head is currently serving at cylinder 15. The queue of pending request is in order: 4, 40, 11, 35, 7, 14 starting from the current head position. What is the total distance travelled (in cylinders) by the disk arm to satisfy the request using the following algorithm? **10**

i. First Come First Served (FCFS)
ii. Shortest Seek Time First (SSTF)
iii. LOOK
iv. SCAN

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