8/6/18

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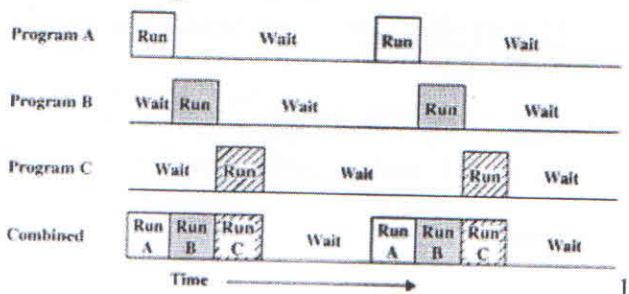
End Semester Examination Synoptic
April/May 2018

Max. Marks: 100 **Duration: 3 Hours**
Class: SE **Semester: IV**
Course Code: CE43/IT44Branch: Computer/IT
Name of the Course: Operating System Synoptic

Question No.		Max. Marks
Q.1 (a)	Explain multiprogramming operating system with neat diagram. Multiprogramming OS: 1. The problem is that I/O devices are slow compared to the processor. 2. The process execution contain cpu phase and i/o phase. When i/o phase of a process starts cpu is idle. 3. Solution is When one job needs to wait for I/O, the processor can switch to the other job, which is likely not waiting for I/O.The approach is known as multiprogramming , or multitasking  1 mark 3 marks for explanation. 2 marks for diagram	05
Q.1 (b)	Write any 4 advantages and one disadvantage of layered architecture of Operating system. Advantages: 1.Layered architecture has all the advantages of modular design. 2. In modular design, the system is divided into several modules and each module is designed independently. 3. Each layer can be designed, coded and tested independently. 4. Layered approach simplifies the design, specification and implementation of an O.S. 5. Drawback: The OS function must be carefully assigned to various layers because a layer can make use only of the functionality provided by the layer beneath it. Points: 4.for advantages 1.for disadvantage	05

Q.2 (a) For the process parameters in the table below, find average waiting time and average turnaround time for FCFS and SJF preemptive scheduling algorithms. 10

Process	Arrival Time	Burst Time
P1	0	5
P2	1	3
P3	2	8

Correct Gantt chart of both algorithms:-1 mark each , so total 2 marks
Turnaround time and waiting time for each process ½ mark, waiting time/turnaroundtime of each process ½ mark.
FCFS Gantt chart:-

P1	P2	P3
5	8	16

Waiting time for P1 = 0
Waiting time for P2 =4
Waiting time for P3 =6
Average waiting time = 10/3=3.33

Tat for P1= 5
Tat for P2=7
Tat for P3=14
Average TAT =5+7+14/3=26/3=8.66

Preemptive SJF Gantt chart:-

P1	P2	P1	P3
1	4	8	16

Waiting time for P1 = 3
Waiting time for P2 =0
Waiting time for P3 =6
Average waiting time =9/3=3

Tat for P1= 8
Tat for P2=3
Tat for P3=14
Average TAT =8+3+14=25/3=8.3

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	19	3	0
P2	10	2	2
P3	7	1	4

For the process parameters in the table above, find average waiting time and average turnaround time for non-preemptive and preemptive priority scheduling algorithm for time slice 5. Lower number indicates high priority.
Correct Gantt chart of both algorithms:-1 mark each , so total 2 marks
Turnaround time/waiting time for each process ½ mark and average waiting time/ average turnaroundtime 1/2 mark so for each algorithm there will be4 marks. Total 2 algorithms, so 8 marks.

	Preemptive Priority Gantt chart:- P1 | P2 | P3 | P2 | P1 2 | 4 | 11 | 19 | 36 Waiting time for P1 =17 Waiting time for P2 =09 Waiting time for P3 =0 Average waiting time = 36/3=12 ms Turnaround time for p1=36 Turnaround time for p2=17 Turnaround time for p3=7 Average turnaround time =36+17+7=60/3=20 Non-Preemptive Priority Gantt chart:- P1 | P3 | P2 19 | 26 | 36 Waiting time for P1 =0 Waiting time for P2 =24 Waiting time for P3 =15 Average waiting time =24+15=39/3=13 ms Turnaround time for p1=19 Turnaround time for p2=34 Turnaround time for p3=22 Average turnaround time =19+34+22=75/3=25	
Q.2 (b)	Differentiate between user level thread and kernel level thread for 5 different points. 1 mark for each point	05
Q.2 (c)	Explain multilevel feedback queue scheduling with neat diagram. Need of multilevel feedback queue -1 mark Its working 3 marks., Diagram 1 mark	05

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

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

Available			
A	B	C	D
3	2	1	1

Using Banker's algorithm, answer the following questions:-

1) How many total instances of the resource types A, B, C, D are there?

2) Whatare the contents of need matrix?

3) Find if the system is in safe state or not? If it is, find the safe sequence.

A = 4+1+1+3 = 9

B = 1+2+6+2+2 = 13

C = 5+3+1+1 = 10

D = 1+4+3+2+1 = 11

2) Need matrix :

	A	B	C	D
P0	2	0	1	1
P1	0	6	5	0
P2	1	1	0	2
P3	1	0	2	0
P4	1	4	4	4

3) YES , system is in safe state

Safe Sequence: P0, P2, P3, P4, P1

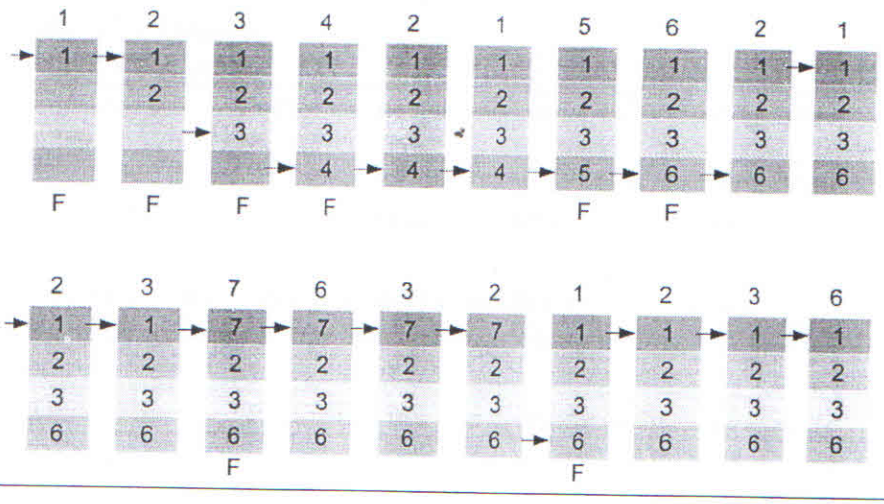
Total resource 2 marks

Need 2 marks

Safe sequence 1 mark

Safe sequence calculation 5 marks

Q.3 (b)	Describe deadlock prevention by breaking circular wait condition. Correct description – 4 marks, diagram 1 mark. OR Explain Test and Set construct to solve critical section problem with example.(pseudo code) Explanation- 2 marks Correct Pseudo code with no logical errors- 3 marks	05
Q.3 (c)	State dining philosopher's problem. Solve by writing pseudo code and explain the dining philosopher's problem solution using Monitors. problem definition- 2 marks 4 marks for pseudo code.	10

	4 marks for description of pseudo code OR State sleeping barber problem. Solve by writing pseudo code using semaphores and explain the same. problem definition- 2 4 marks for pseudo code. 4 marks for description of pseudo code.	
Q.4 (a)	A paging system has the following parameters: 2^31 bytes of physical memory; page size of 2^10 bytes; 2^16 pages of logical address space 1. How many bits are in a logical address? =10+16 2. How many bytes are in a frame? (?)=2^10 3. How many bits are in the physical address specifying the frame? =31-10=21 4. How many entries in the page table? =no of pages=2^16 5. How many bits in each page table entry? Assume each page table entry contains valid/invalid bit.=page frame+ V/I bit=22 Each question 1 mark. OR If cost of accessing main memory is 100 ns and TLB hit ratio is 90%. What is the cost of accessing the TLB if the effective memory access time is 119ms? 2 marks for formula- EAT=(1-p)*ma+p* page fault service time 119=0.9(x+100)+0.1(x+100+100) 119=0.9x+90+0.1X+20 119=x+110 x=9ns 2 marks for substituting correct values at correct places 1 mark for answer	05
Q.4 (b)	Explain memory allocation techniques with neat diagram and example Contiguous-6 marks Non contiguous-4 marks	10
Q.4 (c)	Given page reference string : 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. Calculate total number of pagefaults using optimal page replacement policy using 4 frames. Total page fault 1 mark 4 mark showing insertion and deletion of page  	5

Q.5 (a)	Given the following queue: 95, 180, 34, 119, 11, 123, 62, 64 with the read-write head initially at the track 50 and the tail track being at 199. Calculate total head movement and average seek length using FCFS and C-SCAN disk scheduling algorithm when head is moving towards decreasing track number. 1/2 Mark for diagram, 1/2 for each request calculation so for 8 request 4 marks, total head movement: 1/2mark. So for each algorithm – 5 marks total. So 5*2=10 A. FCFS – 644/8=80.5 B. C-SCAN-326/8=40.75	10
Q.5 (b)	Compare sequential and index sequential file organization methods with neat diagram. Each method working 2 marks, advantage, disadvantage and diagram 1 mark each. OR What is record blocking? Explain three methods of record blocking with neat diagram. What is record blocking- 1 mark Each method of record blocking 3 marks.	10
Q.5 (c)	Explain any five objectives of file management system. Each objective 1 mark	5