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END TERM EXAMINATION

SIXTH SEMESTER [B.TECH] MAY 2018

Paper Code: IT 310 **Subject: Operating System Design Concept**

Time : 3 Hours **Maximum Marks :75**

Note: Attempt five questions in all including Q. No. 1 which is compulsory. Select one question from each unit.

Q1. a) Explain the difference between a multiprogramming and a time sharing system.

b) Suggest a protocol which can violate circular wait condition of deadlock and prove its worthiness.

c) What is a thread and why is it called a light weight process?

d) How does a dynamic memory binding technique differ from static memory binding technique? Explain the difference between a paging and segmentation in brief.

e) Explain index file access method. **(5x5=25)**

Unit-I

Q2. a) Explain different operations on a process. **(6.25)**

b) For the following table, schedule all processes using shortest job first and round robin scheduling (time quantum=2) policies- **(6.25)**

Processes	Arrival Time	Processing Time
P1	0.00	3
P2	1.01	6
P3	4.00	4
P4	6.00	2

Q3. a) What are the various possible states of process? Explain with process transition diagram. Also explain the role of process control block. **(6.25)**

b) What is multiprocessing system? Write its advantages and disadvantages over personal system. What are various transparencies used in multiprocessing environment? **(6.25)**

Unit-II

Q4. a) Four processes P1, P2, P3 and P4 modify a variable x in such a fashion that processes P1 and P3 increment the value of x by 2 each whereas P2 and P4 decrement value of x by 2 each. Assume S represents a semapore variable with initial value as 3 and the general structure of all processes to modify x is as follows: **(6.25)**

Wait(S)

Modify variable x

Signal (S)

What can the maximum values of x once all four processes are successfully executed assuming its initial value was?

b) Write an algorithm for deadlock detection when multiple instances of resources are there. **(6.25)**

Q5. Consider a system with following current resource allocation state:
There are 5 processes (P0, P1, P2, P3, P4) and three resources (A,B,C). For each process, the current allocation and maximum requirement of resources is gives by the ALLOCATION AND MAX matrices. The currently available resources are given by AVAILABLE vector.

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P1/2

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	ALLOCATION			MAX			AVAILABLE		
	A	B	C	A	B	C	A	B	C
P0	1	1	2	4	3	3	2	1	0
P1	2	1	2	3	2	1			
P2	4	0	1	9	0	2			
P3	0	2	0	7	5	3			
P4	1	1	2	11	2	3			

a) Determine whether the state of the system is safe? **(6.25)**

b) If process P0 generates a request (3, 3, 1), for resources of type A, B and C, whether that request will be granted? Explain with reasons. **(6.25)**

Unit-III

Q6. a) Explain variable partitioning approach for contiguous allocation of memory. What do you mean by internal and external memory fragmentation? **(6.25)**

b) What do you mean by a page fault? If an instruction takes m time units if there is no page fault and n time units, if there is a page fault, what is the effective instruction time, if page fault occur once every instruction? **(6.25)**

Q7. a) Explain LRU and second chance LRU page replacement policies with suitable examples. **(6.25)**

b) What is thrashing? Suppose we are using a demand paged virtual memory with a memory access time of 100 nanoseconds and its takes 8 milliseconds to service a page fault without a dirty page write and 20 milliseconds with a dirty page write. Assuming that a dirty page write occurs on 70% of all page faults, what is the maximum page fault rate for an effective access time of 200 nanoseconds? **(6.25)**

Unit-IV

Q8. a) What do you mean by various the attributes? Explain different file access methods. **(6.25)**

b) Explain the difference between tree based and graph based directory structures. **(6.25)**

Q9. On a disk with 1000 cylinders, numbered 0 to 999, compute the number of tracks the disk arm must move to satisfy all the request in the disk queue. Assume the last request 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, and 376. Perform the computation for the following scheduling algorithms- **(12.5)**

a) FIFO b) SSTF c) SCAN d) LOOK

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P2/2