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School of Computer Science and Engineering
Continuous Assessment Test II- Fall Semester 2018-19

Course Code : CSE2005 **Duration: 90mns**
Course Name : Operating System **Slot : F1**
(Common for all batches) **Marks : 50**

Answer all the questions.

1. A dental clinic consists of a waiting room with N chairs and a treatment room. If there is no patient to be treated, the dentist plays solitaire on his computer (which can be considered as a sleeping state). If a patient enters the dental clinic, the dentist will stop playing and start treating the patient in the treatment room (think of this as the dentist being waken from his sleeping state). If the patient comes in and dentist is busy (treating another patient in the treatment room), but there are available chairs in the waiting room, the patient sits in one of the chairs and waits. Otherwise, if all chairs in the waiting room are occupied, then the patient leaves the dental clinic. Write a program to coordinate the dentist and patients using monitor. (10marks)
2. An operating system uses the Banker's algorithm for deadlock avoidance when managing the allocation of four resource types P, Q, R and S to five processes P0, P1, P2, P3 and P4. The table given below presents the current system state. Here, the Allocation matrix shows the current number of resources of each type allocated to each process and the Max matrix shows the maximum number of resources of each type required by each process during its execution. (10 Marks)

	Allocation				Max			
	P	Q	R	S	P	Q	R	S
P0	0	0	1	2	0	0	1	2
P1	1	0	0	0	1	7	5	0
P2	1	3	5	4	2	3	5	6
P3	0	6	3	2	0	6	5	2
P4	0	0	1	4	0	6	5	6

2 9 10 12

There are 1 unit of type P, 5 units of type Q, 2 units of type R and zero units of type S still available. Considering the above scenario, answer the following Questions

(a) Content of the matrix needed.
(b) Is the system is in safe state? If so, provide the sequence.
(c) Can request for P1 arrives for (0, 4, 2, 0) be granted immediately?

3. (i). Consider a paging system with the page table stored in memory.

a. If a memory reference takes 600 nanoseconds, how long does a paged memory reference take? (1 mark)
b. If we add associative registers, and 85 percent of all page-table references are found in the associative registers, what is the effective memory reference time? (Assume that finding a page-table entry in the associative registers takes zero time, if the entry is there). (3 Marks)

(ii) Consider a program consists of five partitions: S0 = 600, S1 = 14 KB, S2= 100 KB, S3 =580 KB, and S4 = 96 KB. Assume at that time, the available free space partitions of memory are 1200–1805, 50 – 160, 220-234, and 2500-3180. (6 marks)
Find the following:

a. Draw the partition scheme (i) Fixed size partition (ii) Variable size partition using First-fit, Worst-fit and Best fit.
b. Calculate the external fragmentation and the internal fragmentation?

4. (i). Draw the resource allocation graph and Wait for graph for deadlock detection. How many operations are needed in an algorithm, to detect the cycle in the graph (5 marks)

A holds R and wants S

B holds nothing wants T

C holds nothing wants S

D holds U wants S and T

E holds T and wants V

F holds W and wants S

G holds V and wants U

(ii) Suppose x86 system uses two level hierarchical paging system. The size of the secondary memory is 4GB and page size is 4KB.Calculate the number of bits for inner page and outer page if both are equal. (5 Marks).

5. Suppose that a newly-created process has 3 page frames allocated to it, and then generates the page references indicated below 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6. Compare the percentage of hit ratio and page fault ratio for LRU, FIFO and Optimal page replacement algorithm. (10 Marks)