**BRAC UNIVERSITY**

**Department of Computer Science and Engineering**

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| Examination: Final  Duration: 1 Hour 50 Minutes | Summer 2022  Full Marks: 35 |

CSE 321: Operating Systems

Answer all the following questions on the answer script. Answer on question paper will not be accepted.

Figures in the right margin indicate marks.

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| 1.  **CO5** | 1. **Explain** Data integrity problem with an example. 2. **Name** the three conditions that any solution for the critical section must meet. In a programming contest each group consists of three members. But due to lack of PC collection, each group will be given one PC to write and submit program. All members can discuss or solve a problem together. All members can also see the monitor together. **Identify** critical section (CS) for the scenario. 3. For Peterson’s problem, the conditions below will apply.  * Each statement will take 3ms to complete. * For process 0: i=0,j=1; and for process 1: i=1,j=0. * Context switching will occur after every 9ms. * In the critical section area, there are only 2 statements. * The remaining section area contains only 1 statement. * Information common to both processes:   turn=0;  flag[0]=FALSE;  flag[1]=FALSE;  **Complete** the following table **up to 45ms** in the timeline considering the above conditions and information. In the table, you will write the corresponding lines of code each process executes in that time slot.  Process 0  Process 1  Time 0  45 | [2]  [1+1]  [5] |
| 2.  **CO5** | |  |  |  |  |  | | --- | --- | --- | --- | --- | | Available | | | | | | A | B | C | D | E | | 1 | 5 | 4 | 4 | 5 |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Allocation | | | | | | |  | A | B | C | D | E | | T0 | 7 | 0 | 0 | 2 | 1 | | T1 | 2 | 1 | 0 | 0 | 1 | | T2 | 0 | 6 | 3 | 3 | 1 | | T3 | 0 | 2 | 1 | 2 | 1 | | T4 | 0 | 1 | 0 | 0 | 2 |  1. Consider the following snapshot of a system.  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Max | | | | | | |  | A | B | C | D | E | | T0 | 7 | 0 | 1 | 3 | 2 | | T1 | 2 | 7 | 5 | 0 | 4 | | T2 | 2 | 8 | 5 | 6 | 1 | | T3 | 1 | 6 | 4 | 6 | 3 | | T4 | 2 | 2 | 1 | 0 | 5 |   i) Using the Banker’s Safety algorithm, **determine** whether or not the state is unsafe. If the state is safe, illustrate the order in which the processes may complete. Otherwise, illustrate why the state is unsafe. You must **calculate** the Need matrix.  ii) If a request from process T1 arrives for (0, 4, 2, 0, 2), can the request be granted immediately? **Explain** with proper calculations. | [3+2]  [4] |
| 3.  **CO6** | 1. **Explain** why Paging is more beneficial than Contiguous allocation. If page size is 2KB, then how many frames will be needed in Main memory for process size of 73, 506 Bytes? Is there any internal fragmentation? - If yes, calculate the value. 2. **Explain** how the operating systems perform and hardware mechanism for logical to physical address translation for Segmentation. 3. Consider a static partitioned allocation with partition size 200, 250, 450, 160, 320, 150 and 600 units. You have to load five processes into this partitioned physical memory of the system. Space requirement of these processes are 146, 425, 240, 89 and 450 units. 4. **Show** the allocation of these processes using First Fit and Best Fit and Worst Fit algorithm. 5. **Identify** which algorithm is better based on memory usage. 6. **Find** if there have been any external fragmentation in this scenario? **Explain** for ‘yes’ or ‘no’. 7. Considering MVT memory management technique at a certain time the memory looks like the following figure.  |  | | --- | | **OS** | | **J5=50k** | | **10k** | | **J4=70k** | | **30k** | | **J3=70k** | | **26k** |   Gray portion of the memory are free spaces. A job J6=55K arrives in the ready queue.  Can you accommodate J6 in the memory? **Justify** your answer. If not, then **what** can be done to accommodate the new job? | [2+2]  [2]  [5]  [1]  [2]  [3] |