**BRAC UNIVERSITY**

**Department of Computer Science and Engineering**

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| **Examination: Semester Final**  **Duration: 2 Hours 30 minutes** | **Semester :Summer 2019**  **Full Marks:64** |

CSE 321: Operating Systems

Answer the following questions.

Figures in the right margin indicate marks.

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| Name: | ID: | Section: |

**Section-A [CO6] [Answer any Two (2)]**

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| **1.** | a) | Assume that page size = 3KB and Physical Memory = 36KB. If CPU generates logical addresses 5, 9, 2 and 16 respectively then **developed** the users’ view of memory which is mapped into physical memory? | 4 |
| b) | In a particular time the snapshot of Main memory given below for dynamic partition. Apply worst fit and best fit algorithms to place processes with the space requirement of 26k, 30k, 15k, 20k, and 6k. **Explain** which algorithm makes the most effective use of memory? | 4 |
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| **2.** | a) | **Explain** in which term Paging is more beneficial than Contiguous allocation. **Illustrate** page fault steps and describe briefly. | 2+4 |
| b) | **List** disadvantage of Static and Dynamic memory allocation. | 2 |
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| **3.** | a) | CPU generates page no sequences are as follows: 3, 0, 0, 1, 1, 7, 0, 3, 0, 4, 4, 3, 4, 2, 1, 2, 0, 4, 3, 1, 7, 0, 4, 3, 1, 1, 7, 0 and there are only 5 frames to accommodate. **Calculate** he number of page fault for optimal and LRU Page replacement algorithm. Also find the efficiency for both of the page replacement algorithm. | 6 |
| b) | **Define** demand paging. | 2 |
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| **Section-B [Answer All Questions]** | | | |
| **4. CO5** | a) | **Solve** the graph of process synchronization drawn below using semaphore variables. [Note: Each node represents a statement (S) which is running independently. Write code using P() and V() operations only] | 4 |
| b) | Suppose, in our office, we have a set of resource types, R = {R1, R2, R3, R4} and a set of processes, P = {P1, P2, P3, P4, P5}. All the resource types in R have 3, 1, 4, and 2 instances respectively. Processes are organized such that P1 is holding 2 instances of R1, P2 is holding 1 instance of R3, P3 is holding 1 instance of R4, P5 requests 2 instances of R3, P4 requests 1 instance of R4, P3 requests 1 instance of R2, P2 requests 1 instance of R1, P2 is holding 1 instance of R2, P1 is requesting 1 instance of R4, P3 is holding 1 instances of R3.**Construct** a resource allocation graph for the above scenario and **identify** weather there is deadlock or not. | 4 |
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| **5. CO5** |  | Suppose, we have the following scenario in an OS. There are five processes and four resource types. Answer the following questions using Banker’s Algorithm.   |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Processes** | **Max** | | | | **Allocation** | | | | **Available** | | | | | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** | **A** | **B** | **C** | **D** | | P1 | 4 | 2 | 3 | 3 | 2 | 2 | 1 | 0 | 1 | 1 | 2 | 1 | | P2 | 3 | 4 | 2 | 0 | 1 | 2 | 0 | 0 | | P3 | 1 | 4 | 3 | 1 | 1 | 2 | 2 | 0 | | P4 | 3 | 3 | 0 | 2 | 1 | 1 | 0 | 2 | | P5 | 2 | 1 | 4 | 2 | 1 | 1 | 3 | 2 |      1. **Calculate** Need matrix 2. Is this system in safe state? If yes, then **show** the safe sequence or if no, then provide necessary explaination? 3. If a request (0,1,1,0) from process P3 arrives for additional resources, **analyze** whether Banker’s algorithm can grant the request or not. | 2+3+3 |
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| **6. CO3** |  | **List** the optimization criteria of CPU scheduling?  The SJF CPU scheduling technique preempts an executing process. Using the SJF policy, **construct** a Gantt Chart and **compute** the waiting time for the 6 processes tabulated below (time in milliseconds):   |  |  |  | | --- | --- | --- | | **Process** | **Burst Time** | **Arrival Time** | | P1 | 8 | 3 | | P2 | 12 | 10 | | P3 | 8 | 13 | | P4 | 6 | 14 | | P5 | 7 | 19 | | P6 | 8 | 88 | | 1+4+3 |
|  |  |  |  |
| **7. CO1** | a) | **Write** five major activities of an operating system in regard to process management. | 4+4 |
| b) | **Write** what is the main advantage for an operating system designer of using virtual machine architecture? How does the guest operating system function on the host operating system? [Hint: VMWare]. |
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| **8. CO2** | a) | Can a process make a transition from the running to the ready and waiting state? **Explain** why or why not? | 4+4 |
| b) | **Define** IPC? **Discuss** two models of IPC. |
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| **9.**  **CO4** | a) | In a multithreading program state **write** how a thread can be canceled. | 3+5 |
| b) | **Define** the resources that are used in thread creation and how do they **differentiate** from those resources used when a process is created? |
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