Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2018

Course: Operating System [CSBC2003] **Semester: III**
Programme: BCA
Time: 03 hrs. **Max. Marks: 100**
Instructions:

SECTION A

S. No.		Marks	CO
Q 1	Differentiate between system calls and API calls.	**5**	**CO1**
Q 2	Recall the different modes of operating system.	**5**	**CO1**
Q 3	Concurrent processes require concurrent access, explain semaphores in this condition.	**5**	**CO2**
Q 4	How is memory allocation done using first fit and best fit strategies?	**5**	**CO5**
	SECTION B		
Q 5	Elaborate need of CPU scheduling [2 marks]. What is a scheduler [2 Marks]? Give details of long term and short term schedule and also highlight the relevance of each [6 marks].	**10**	**CO3**
Q 6	Characterize a deadlock using its necessary conditions [5 marks]. Also suggest approaches to prevent a deadlock from occurring [5 marks]. **OR** Elaborate the paging technique using a well-drawn figure and discuss the various page replacement algorithms.	**10**	**CO2**
Q 7	Consider a paging system with the page table stored in memory. a) If a memory reference takes 50 nanoseconds, how long does a paged memory reference take? b) If we add TLBs, and 75 percent of all page-table references are found in the TLBs, what is the effective memory reference time? (Assume that finding a page-table entry in the TLBs takes 2 nanoseconds, if the entry is present.)	**10**	**CO3**
Q 8	Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms, assuming three and four frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each. • LRU replacement • FIFO replacement • Optimal replacement	**10**	**CO3** **CO4**

SECTION-C			
Q 9	Consider the following snapshot of a system: *Allocation* *Max* *Available* *A B C D* *A B C D* *A B C D* P_0 0 0 1 2 0 0 1 2 1 5 2 0 P_1 1 0 0 0 1 7 5 0 P_2 1 3 5 4 2 3 5 6 P_3 0 6 3 2 0 6 5 2 P_4 0 0 1 4 0 6 5 6 Answer the following questions using the banker's algorithm: a. What is the content of the need matrix? b. Is the system in a safe state? c. If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately?	**20**	**CO1** **CO2**
Q 10	Evaluate using a suitable example a Resource Allocation graph and outline all the information that resource allocation algorithm conveys. [10 Marks] Elaborate the approaches to avoid deadlocks, where there is a single instance of resource type and where there are multiple instances of resource type. [10 marks] **OR** Write short notes on: 1. Buddy System Allocation 2. Inverted page table 3. Safe and Unsafe state 4. Interprocess communication.	**20**	**CO2** **CO4** **CO5**

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SECTION A

S. No.		Marks	CO
Q 1	Explain the difference between internal and external fragmentation.	**5**	**CO1**
Q 2	Elaborate the various strategies to identify a free location in memory.	**5**	**CO5**
Q 3	Highlight the need of Interprocess communication also discuss the applicable strategies.	**5**	**CO2**
Q 4	Highlight the need of page replacement. Also discuss the basic approach.	**5**	**CO4**
	SECTION B		
Q 5	Explain paging with TLB using suitable diagram.	**10**	**CO3**
Q 6	Using suitable example elaborate the below mentioned page replacement algorithms. a) Optimal Page Replacement b) FIFO Page Replacement c) LRU Page Replacement	**10**	**CO4**
Q 7	What is critical section and what is critical section problem? Examine all possible solutions to handle critical section problem.	**10**	**CO3** **CO4**
Q 8	Consider a paging system with the page table stored in memory. a) If a memory reference takes 200 nanoseconds, how long does a paged memory reference take? b) If we add associative registers, and 75 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.) **OR** Using suitable example elaborate the below mentioned CPU scheduling algorithms. a) FCFS b) SJF c) Priority Scheduling d) Round robin	**10**	**CO3** **CO4**

SECTION-C			
Q 9	Consider the following snapshot of a system: *Allocation* *Max* *Available* *A B C D* *A B C D* *A B C D* P_0 2 0 0 1 4 2 1 2 3 3 2 1 P_1 3 1 2 1 5 2 5 2 P_2 2 1 0 3 2 3 1 6 P_3 1 3 1 2 1 4 2 4 P_4 1 4 3 2 3 6 6 5 Answer the following questions using the banker's algorithm: a) Illustrate that the system is in a safe state by demonstrating an order in which the processes may complete. b) If a request from process P1 arrives for (1, 1, 0, 0), can the request be granted immediately? c) If a request from process P4 arrives for (0, 0, 2, 0), can the request be granted immediately?	**20**	**CO1** **CO2** **CO3**
Q 10	d) Explain internal and external fragmentation and show how does it affects the performance of operating system. [6 Marks] e) Defend the statement "Paging does not suffer from either external or internal fragmentation". [4 Marks] **OR** In context to deadlock explain the following: [20 Marks] a) Deadlock Characteristics b) Deadlock Prevention c) Deadlock Avoidance d) Deadlock Recovery	**20**	**CO1** **CO2** **CO3**