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Supplementary/Improvement Examination 2023

Course Name: Operating Systems
Time: 3 Hours

Paper Code: BTCSE403/ BTCSEAI 403
Maximum Marks: 75

Follow proper numbering for answering the questions.

Q.No.	Questions	Marks	CO	BL								
Section-A (All questions are compulsory)		7×5=35										
1	What are the conditions of Deadlock?	5	CO1	L1								
2	List roles and responsibilities of Operating system?	5	CO2	L4								
3	Free memory holes of sizes 15K, 10K, 5K, 25K, 30K, 40K are available. The processes of size 12K, 2K, 25K, 20K is to be allocated. How processes are placed in first fit, best fit and worst fit. Calculate internal as well as external fragmentation.	5	CO5	L1								
4	With the help of diagram explain Page Fault?	5	CO3	L4								
5	Assume arrival order is: P1, P2, P3, P4, P5 at time 0,1,2,3,4 respectively and a smaller priority number implies a higher priority. Draw the Gantt charts for preemptive and non-preemptive priority scheduling. Calculate Average Turnaround Time and Average Waiting Time.	5	CO3	L3								
6	What do you mean by Deadlock Avoidance? Explain the use of Banker's Algorithm for Deadlock Avoidance with illustration.	5	CO5	L1								
7	What is paging and page Table? Explain the conversion of Virtual Address to Physical Address in Paging with example.	5	CO4	L4								
Section-B (Attempt any four questions)		4×10=40										
1	A system has three types of resources R1 R2 R3 and their number of units are 3, 2, 2 respectively. Four processes P1 P2 P3 p4 are currently competing for these resources in following number. i. P1 is holding one unit of R1 and is requesting for one unit of R2. ii. P2 is holding two units of R2 and is requesting for one unit each of R1 and R3. iii. P3 is holding one unit of R1 and is requesting for one unit of R2. iv. P4 is holding two units of R3 and requesting for one unit of R1. Determine which of the processes are deadlock in this state with explanation.	10	CO2	L3								
2	What is the difference between a preemptive and non-preemptive scheduling algorithms? Explain FCFS scheduling algorithm. Find the average turnaround time and average waiting time for the processes given in the table below. <table><tr><td>Process</td><td>CPU Burst time in (ms)</td></tr><tr><td>P1</td><td>24</td></tr><tr><td>P2</td><td>3</td></tr><tr><td>P3</td><td>3</td></tr></table>	Process	CPU Burst time in (ms)	P1	24	P2	3	P3	3	10	CO4	L1
Process	CPU Burst time in (ms)											
P1	24											
P2	3											
P3	3											

3	Consider 3 processes P1, P2 and P3, which require 5, 7 and 4 time units and arrive at time 0, 1 and 3. Draw the Gant chart, process completion sequence and average waiting time for: (i) Round robin scheduling with CPU quantum of 2 time units. (ii) FCFS.	10	CO3	L1
4	What is a race condition? Explain how a critical section avoids this condition? What are the properties which a data item should possess to implement a critical section? Describe a solution to the Dining philosopher problem so that no races arise.	10	CO5	L4
5	Given page reference string: 1,2,3,2,1,5,2,1,6,2,5,6,3,1,3,6,1,2,4,3. Compare the number of page faults for: i. LRU ii. FIFO iii. Optimal page replacement algorithm.	10	CO3	L3
6	Suppose that a disk drive has 5000 cylinders, numbered 0 through 4999. The drive is serving a request at cylinder 143. FIFO order is, 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 starting from head position. What is total distance using: i. SSTF ii. SCAN iii. C-SCAN	10	CO5	L6

BL-Bloom's Taxonomy Levels (1- Remembering, 2- Understanding, 3- Applying, 4- Analysing, 5- Evaluating, 6- Creating)