Reg. No. : | | | | | | | | | | | |

Question Paper Code: U4C03

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Fourth Semester

Computer Science and Business Systems

21UCB403-OPERATING SYSTEM

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What are the primary differences between Network Operating System and   CO1- U
    Distributed Operating System?

2. What are the differences between Batch processing system and Real Time   CO1- U
    Processing System?

3. What is a process scheduler? State the characteristics of a good process   CO2- U
    scheduler?

4. Name two hardware instructions and their definitions which can be used for   CO2- U
    implementing mutual exclusion.

5. What are Swapping   CO3- U

6   Define contagious memory allocation   CO3- U

7   What is virtual memory? Mention its advantages   CO4- U

8   What are the steps required to handle a page fault indemand paging?   CO4- U

9   List the advantages of Virtualization.   CO5- U

10 What is the reason for using virtual machines instead of original hardware?   CO5- U

PART – B (5 x 16= 80 Marks)

11. (a) Explain the inter process communication in detail.   CO1- U   (16)

Or

    (b) What are the various components of operating system structure   CO1- U   (16)
         and explain the simple and layered approach of operating system
         in detail.

12. (a) Consider the following set of processes, with the length of the   CO2-App   (16)
CPU – burst time in given ms:

Process Burst time	(B.T)	Arrival time(A.T)
P1	8	0.00
P2	4	1.000
P3	9	2.001
P4	5	3.001
P5	3	4.001

Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, Priority and RR (quantum=2) scheduling. Also calculate waiting time and turnaround time for each scheduling algorithms.

Or

(b) Explain the FCFS, preemptive and non-preemptive versions of   CO2-App   (16)
Shortest-Job First and Round Robin (time slice = 2) scheduling algorithms with Gantt charts for the four Processes given. Compare their average turnaround and waiting time.

Process	Arrival Time	Waiting Time
P1	0	8
P2	1	4
P3	2	9
P4	3	5

13. (a) A system has three types of resources R1 R2 R3 and their number   CO3- App   (16)
of units are 3, 2, 2 respectively. Four processes P1 P2 P3 P4 are currently competing for these resources in following number.

 1. P1 is holding one unit of R1 and is requesting for one unit of R2.

 2. P2 is holding two units of R2 and is requesting for one unit each of R1 and R3.

 3. P3 is holding one unit of R1 and is requesting for one unit of R2.

 4. P4 is holding two units of R3 and requesting for one unit of R1.

Determine which if any of the processes are deadlock in this state

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(b)	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, worst fit. Calculate internal as well as external fragmentation. What is the size of the physical address space in a paging system which has a page table containing 64 entries of 11 bits including valid / invalid bit and a page size of 512 bytes?	CO3- App	(16)

14. (a) Consider a disk with 200 tracks and the queue has random requests from different processes in the order: CO4-App (16)

        55, 58, 39, 18, 90, 160, 150, 38, 184

Initially arm is at 100.

Find the Average Seek length using FIFO,SSTF, SCAN and C-SCAN algorithm

<div align="center">Or</div>

(b) Consider the following page reference string CO4-App (16)

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

How many page faults would occur for the following replacement algorithms, assuming three frames that all frames are initially empty?

a. LRU page replacement.

b. FIFO page replacement

c. Optimal page replacement

15. (a) Discuss about the evolution of virtual machines.Also explain how virtualization could be implemented in operating systems. CO5- U (16)

<div align="center">Or</div>

(b) Why can VMMs not implement trap-and-emulate-based virtualization on some CPUs? Lacking the ability to trap-and-emulate, what method can a VMM use to implement virtualization. CO5- U (16)

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