Enrollment No......................................

Faculty of Engineering
End Sem (Odd) Examination Dec-2022
CA5CO35 Modern Operating System

Programme: MCA   Branch/Specialisation: CA

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1   i.   In domain structure, what is access-right equal to?   **1**
     (a) Object-name, rights-set   (b) Read-name, write-set
     (c) Read-name, execute-set   (d) Object-name, execute-set

   ii.   What is linux operating system?   **1**
     (a) Private operating system
     (b) Windows operating system
     (c) Open-source operating system
     (d) None of these

   iii.   A process is-   **1**
     (a) A program in high level language kept on disk
     (b) Content of main memory
     (c) A program in execution
     (d) None of these

   iv.   Which system call is used by the operating system to create a new process?   **1**
     (a) fork()   (b) exec()
     (c) pipe()   (d) open()

   v.   Which of the following is true about concurrent processes?   **1**
     (a) Do not overlap
     (b) Overlap in time
     (c) At the same time, a processor executes
     (d) None of these

   vi.   Which of the following "semaphore" can take the non-negative integer values?   **1**
     (a) Binary semaphore   (b) Counting semaphore
     (c) Real semaphore   (d) All of these

vii. In distributed system, each processor has its own _____.   **1**
(a) Local memory   (b) Clock
(c) Both (a) and (b)   (d) None of these

viii. If one site fails in distributed system then _____.   **1**
(a) The remaining sites can continue operating
(b) All the sites will stop working
(c) Directly connected sites will stop working
(d) None of these

ix. What are the characteristics of a distributed file system?   **1**
(a) Its users, servers and storage devices are dispersed
(b) Service activity is not carried out across the network
(c) They have single centralized data repository
(d) None of these

x. _____ is not possible in distributed file system.   **1**
(a) File replication   (b) Migration
(c) Client interface   (d) Remote access

Q.2 i. What is the relationship between OS and computer hardware?   **2**
    ii. How buffering can improve the performance of a computer system?   **3**
    iii. What is the need of OS? Explain types of task done by OS.   **5**
OR iv. Explain the purpose of system calls and discuss the calls related to device management and communications in brief.   **5**

Q.3 i. Compare user level thread and kernel level thread.   **3**
    ii. Consider the following set of processes, with the length of the CPU burst given in milliseconds: **7**

Process	Burst Time	Priority
P1	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 all at time 0.
What is the average waiting time and average turnaround time for these processes using PRIORITY scheduling algorithm?

OR iii. Consider the following set of 4 processes whose arrival time and burst time are given below   **7**

Process ID	Arrival Time	Burst Time
P1	3	5
P2	1	6
P3	2	2
P4	4	3

If the CPU scheduling is round robin with time quantum = 3, calculate the average waiting time and average turnaround time.

Q.4 Attempt any two:
    i. What is critical section problem? Give the conditions that a solution to the critical section problem must satisfy.   **5**
    ii. What is semaphore? How can we achieve the synchronization using semaphore for producer consumer problem?   **5**
    iii. Discuss about monitors in detail with syntax.   **5**

Q.5 Attempt any two:
    i. Explain distributed OS. What are the major issues of designing a distributed OS?   **5**
    ii. What is multiprocessing operating system and its advantages?   **5**
    iii. Discuss different algorithms for implementing mutual exclusion in distributed environment.   **5**

Q.6 Attempt any two:
    i. Explain distributed file system. Write feature of distributed file system.   **5**
    ii. What is distributed scheduling and how scheduling is done in distributed system. Why it is needed?   **5**
    iii. Discuss distributed shared memory with suitable illustrations.   **5**

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Q.1 i)   object-name, rights-set   **1**
     ii)   Open-source operating system   **1**
     iii) a program in execution   **1**
     iv)   fork()   **1**
     v)   Overlap in time   **1**
     vi)   Counting Semaphore   **1**
     vii) both local memory and clock   **1**
     viii) the remaining sites can continue operating   **1**
     ix)   Its users, servers and storage devices are dispersed   **1**
     x)   Migration   **1**

Q.2 i.   What is the relationship between operating systems and   **2**
           computer hardware?
     ii.   How Buffering can improve the performance of a Computer   **3**
           system?
           CPU and I/O Speed concept - 3 marks
     iii. What is the need of OS? Explain different types of task done by   **5**
           OS.
           Need of OS - 2 marks
           Types of Task - 3 marks
OR   iv.   Explain the purpose of system calls and discuss the calls related to **5**
           device management and communications in brief.
           Purpose of System Call - 2 marks
           Device management call- 1.5 marks
           Communication Call -1.5 marks

Q.3 i.   Compare User level thread and Kernel level thread.   **3**
           User level Thread- 1.5 marks
           Kernel Level Thread - 1.5 marks

ii.   Consider the following set of processes, with the length   **7**
       of the CPU burst given in
       milliseconds:
       Process   Burst Time Priority
       P1 2   2
       P2 1   1
       P3 8   4
       P4 4   2
       P5 5   3
       The processes are assumed to have arrived in the order P1, P2, P3,
       P4, P5, all at time 0.
       Consider the following set of processes, with the length of the
       CPU burst given in milliseconds:

Process	Burst Time	Priority
P1	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

The Processes are assumed to have arrived in the order P1, P2, P3,
P4, P5 all at time 0.
What is the average waiting time and average Turnaround time for
these processes using PRIORITY scheduling algorithm?
1. Gantt Chart - 2 marks
2. Turnaround Time Formula (TAT=CT-AT)-1 marks
3. Waiting Time Formula (WT=TAT-BT)- 1 marks
4. Average Waiting time - 1.5 marks
5. Average Turnaround time - 1.5 marks

OR iii. Consider the following set of 4 processes whose arrival time and burst time are given below **7**

Process ID	Arrival Time	Burst Time
P1	3	5
P2	1	6
P3	2	2
P4	4	3

If the CPU scheduling is Round Robin with time quantum = 3, calculate the average waiting time and average Turnaround time.
1. Gantt Chart - 2 marks
2. Turnaround Time Formula (TAT=CT-AT) - 1 marks
3. Waiting Time Formula (WT=TAT-BT) - 1 marks
4. Average Waiting time - 1.5 marks
5. Average Turnaround time - 1.5 marks

Q.4 i. What is Critical Section Problem? Give the conditions that a solution to the critical section problem must satisfy. **5**
Explanation - 2 marks
Condition for Critical section problem solution -3 marks

ii. What is a Critical Section problem? Give the conditions that a solution to the critical section **5**
problem must satisfy
What is a Critical Section problem? Give the conditions that a solution to the critical section
problem must satisfy
What is a Critical Section problem? Give the conditions that a solution to the critical section
problem must satisfy
What is semaphore? How can we achieve the synchronization using semaphore for Producer consumer problem?
Semaphore explanation - 2 marks
Producer Consumer problem solution - 3 marks

OR iii. Discuss about Monitors in detail with syntax. **5**
Monitor - 2 marks
Syntax - 3 marks

Q.5 i. Explain distributed OS. What are the major issues of designing a distributed OS? **5**
Explanation -2 marks
Designing issue - 3 marks
- Heterogeneity
- Openness
- Scalability
- Security
- Failure Handling
- Concurrency
- Transparency

ii. What is multiprocessing operating system and its advantages? **5**
Explanation - 2 marks
Advantage - 3 marks

iii. Discuss different algorithms for implementing mutual exclusion in distributed environment. **5**
Name of algorithm - 2 marks
Explanation of algorithm - 3 marks

Q.6

i. Explain distributed file system. Write feature of distributed file system. **5**
Explanation - 2 marks
Feature - 3 marks

ii. What is distributed scheduling and how scheduling is done in distributed system. Why it is needed? **5**
Explanation - 3 marks
Reason - 2 marks

iii. Discuss distributed Shared Memory with suitable illustrations. **5**
Explanation- 2.5 marks
Illustration - 2.5 marks

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