Enroll. No._____

MARWADI UNIVERSITY

Faculty of Engineering

Information and Communication Technology [B. TECH]

SEM: 4th MU FINAL EXAM/ MU FINAL REMEDIAL WINTER: 2022

Subject: - Operating System (01CT0409) **Date:- 22/12/2022**

Total Marks:-100 **Time: - 03:00 Hours**

Instructions:

1. **All Questions are Compulsory.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Question: 1.

(a) Objective MCQ [10]

1) A binary semaphore is a semaphore with integer values:
   a) 1
   b) -1
   c) 0.8
   d) 0.5

2) Which one of the following is the address generated by CPU?
   a) Physical address
   b) Absolute address
   c) Logical address
   d) None of these

3) If the quantum time of round robin algorithm is very large, then it is equivalent to:
   a) First in first out
   b) Shortest Job Next
   c) Lottery scheduling
   d) None of the above

4) Which of the following process scheduling algorithm may lead to starvation
   a) FIFO
   b) Round Robin
   c) Shortest Job Next
   d) None of the above

5) A process is _____
   a) A program in main memory
   b) Program in cache memory
   c) program in secondary storage
   d) program in execution

6) Threads is not shared among which of the following?
   a) Stack
   b) Program Counter
   c) Both Stack and Program Counter
   d) None

7) Main memory of a computer system is?
   a) Non-volatile

b) Volatile
c) Restricted
d) Unrestricted

8) For which of the following purposes in Banker's algorithm is used?
a) Preventing deadlock
b) Solving deadlock
c) Recover from deadlock
d) None

9) What is meant by ready state of a process?
a) When the process is scheduled to run after some execution
b) When the process is currently using the CPU
c) When the process is dependent on the execution time of some other process
d) None of these

10) Which of the type of OS reads and reacts in terms of actual time?
a) Quick sharing OS
b) Time sharing OS
c) Real time OS
d) Batch OS

(b) Define the following terms- (Answer in one sentence) [10]
1. Operating System
2. Response time
3. Sector
4. Semaphore
5. Page fault
6. Context Switching
7. Thread
8. Critical Section
9. Turnaround time
10. Interrupt

Question: 2.

(a) What is Semaphore? Explain semaphore operation for producer consumer problem with code. [08]

(b) What are system calls? Explain different categories of system calls with example. [08]

OR

(c) What are the functionalities of Operating System? Explain in detail. [08]

Question: 3.

(a) Consider the following set of processes with the length of CPU burst time given in the milliseconds. [08]

Process	Arrival Time	Burst Time/Service Time	Priority
A	0	3	5
B	2	6	3

C	4	4	1
D	6	5	2
E	8	2	4

Draw Gantt charts and Calculate average turnaround time and average waiting Time for First-come first served scheduling and Round Robin (Quantum=4) scheduling algorithm.

(b) Differentiate between Threads and Process? Explain the types of threads. [04]

(c) Explain the contiguous file allocation and its advantages and disadvantages. [04]

OR

(d) Consider the following set of processes with the length of CPU burst time given in the milliseconds [08]

Process	**Arrival Time**	**Burst Time/Service Time**	**Priority**
P1	0	21	2
P2	0	3	1
P3	0	6	4
P4	0	2	3

Draw Gantt charts illustrating the execution of these processes using FCFS, SJF and calculate average turnaround time and average waiting time.

(e) What are the different criteria for evaluating the CPU scheduling algorithm? [04]

(f) Briefly explain the following- [04]
1. Mutual Exclusion
2. Critical Section Problem

Question: 4.

(a) What is deadlock? Explain the conditions that lead to deadlock. [08]

(b) Explain IPC Problem – Readers & Writers Problem. [08]

OR

(c) What do you mean by Semaphore? Explain its uses and its implementation. [08]

(d) What is meant by Thrashing? Explain various causes of thrashing. [08]

Question: 5.

(a) Suppose that a disk drive has 200 cylinders, numbered 0 to 199. The drive is Currently serving a request at cylinder 100, The queue of pending requests, 55, 58, 39, 18, 90, 160, 150, 38, 184 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling in FCFS. [06]

(b) Explain in detail how a system call is processed. Explain any two system call. [06]

(c) Explain any two File Allocation Methods. [04]

OR

(d) Consider an imaginary disk with 51(0-50) cylinders. A request comes in to read a block on cylinder 11. While the seek to cylinder 11 is in progress, new requests come in for cylinders 1, 36, 16, 34, 9 and 12 in that order. Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of following Disk Scheduling algorithms in FCFS. [06]

(e) What is Virtual Memory? Explain the concept of demand paging. [06]

(f) Write short notes- [04]
1. Remote Procedure Call (RPC)
2. Worms and Virus

Question: 6.

(a) For the Page Reference String: 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6 [08]
Calculate the Page Faults applying (i) Optimal and (ii) LRU Page Replacement Algorithms for a Memory with Four frames. Remember all frames are initially empty, so your first unique pages will all cost one fault each.

(b) Explain the concept of dirty bit for improving the performance during page fault. [04]

(c) List out any 5 extensions and attributes of files. [04]

OR

(d) For the Page Reference String: [08]
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0. 1. 7, 0, 1
Calculate the Page Faults applying (i) FIFO and (ii) Optimal Page Replacement Algorithms for a Memory with three frames. Remember all frames are initially empty, so your first unique pages will all cost one fault each.

(e) Explain following- [08]
1. I/O Buffering
2. Multiprocessor Operating System
3. Kernel I/O Subsystem
4. Process State Diagram

---Best of Luck---

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– Bloom'S Taxonomy Report –

Sub: Operating System (01CT0409)
Sem.: IV
Branch: Information and Communication Technology

Que. Paper weightage as per Bloom's Taxonomy

LEVEL	% of weightage	Question No.	Marks of Que.
Remember/Knowledge	46.51%	1(a), 1(b), 2(a), 2(b), 2(c), 3(f), 4(b), 4(c), 4(d), 5(f), 6(c)	80
Understand	20.93%	3(b), 3(c), 3(e), 4(a), 5(c), 5(e), 6(e)	36
Apply	9.30%	3(a), 3(d)	16
Analyze	4.66%	5(b), 6(b)	08
Evaluate	18.60%	5(a), 5(d), 6(a), 6(d)	32
Higher order Thinking/ Creative	0%	NIL	0

Chart/Graph of Bloom's Taxonomy