No. of Printed Pages : 4

Sl. No.

B1.4-R5 : OPERATING SYSTEMS

DURATION : 03 Hours **MAXIMUM MARKS : 100**

Roll No. : | | | | | | |

Answer Sheet No. : | | | | | | |

Name of Candidate : _____ **; Signature of Candidate :** _____

INSTRUCTIONS FOR CANDIDATES :

- Carefully read the instructions given on Question Paper, Answer Sheet.
- Question Paper is in English language. Candidate has to answer in English Language only.
- **Question paper contains Seven questions. The Question No. 1 is compulsory. Attempt any FOUR Questions from Question No. 2 to 7.**
- **Parts of the same question should be answered together and in the same sequence.**
- **Questions are** to be answered in the **ANSWER SHEET** only, supplied with the Question Paper.
- **Candidate cannot leave the examination hall/ room without signing on the attendance sheet and handing over his/her Answer Sheet to the Invigilator. Failing in doing so, will amount to disqualification of Candidate in this Module/Paper.**
- After receiving the instruction to open the booklet and before answering the questions, the candidate should ensure that the Question Booklet is complete in all respects.

DO NOT OPEN THE QUESTION BOOKLET UNTIL YOU ARE TOLD TO DO SO.

1. (a) What is the relationship between turnaround time, CPU cycle time and waiting time ?

(b) Why there is no transition from READY state to the WAITING state and WAITING state to RUNNING state ?

(c) What is the principle of locality ?

(d) A computer system has 10 instances of a non-shareable resource with N processes competing for them. Each process needs 3 instances to execute. Find the maximum value of N for which the system is guaranteed to be deadlock free.

(e) Why the speedup ratio between a multiprocessor system with N processors and single processor system is less than N ?

(f) TLB access time for a paging scheme is 30 nanoseconds and memory access time 150 nanoseconds. What is the effective access time if the TLB hit ratio is 80% ?

(g) Write the utility of SAM file in Windows.

(7x4)

2. (a) In a FAT based file system, the disk block address is of 36 bits and block size is 1 KB. The file system maintains a duplicate copy of FAT in the same disk at some other address to safeguard the file system from corrupting. What is the maximum file size possible on this disk, if entry size in FAT is 8 B ?

(b) What are the differences between a trap and an interrupt ?

(c) Can a multithreaded solution using multiple user-level threads achieve better performance on a multiprocessor system than on a single-processor system ? Discuss.

(8+5+5)

3. (a) Discuss the role of long-term scheduler, short-term schedular, medium-term scheduler and Dispatcher in CPU scheduling.

(b) Consider following set of processes, with the length of CPU burst in milliseconds :

Process	Burst Time	Arrival Time
P1	10	0
P2	29	1
P3	3	2
P4	7	3

Draw Gantt charts illustrating the execution of these processes and calculate average waiting and turnaround time using preemptive Shortest Job First (SJF) and Round Robin (Quantum = 8 milliseconds).

(c) How quantum and context switch time affect the performance of round robin scheduling algorithm ?

(4+8+6)

4. (a) Explain in brief the concept of activity, service and adapter in context of android.

(b) What requirements must be met to solve the critical section problem ? Explain in brief.

(c) Why the following solution to the dining philosopher problem using binary semaphores is not free from deadlock ?

```
semaphore chopstick [5] ;
// consider all the elements of chopstick are initialized to
1
do { wait (chopstick[i] );
wait(chopstick[(i+l)%5]);
……
//eat
……..
signal (chopstick[i] );
signal (chopstick[(i+l) % 5]);
……..
// think
……..
}while (TRUE);
```

(6+6+6)

5. (a) What is the major difference between deadlock and starvation ? Also discuss the four necessary conditions to occur deadlock.

(b) A system in an unsafe state is not necessarily deadlocked. Explain with example why this is true.

(c) Why should be paging preferred over contiguous memory allocation ? Consider a system with 256 MB physical memory and 32-bit virtual address space. Calculate the size of page table, if the size of page is 4 KB (memory is byte addressable).

(6+6+6)

6. (a) What is thrashing and how it can be avoided ?

(b) The reference string given for a process in order 1, 8, 3, 1, 8, 4, 1, 2, 4, 8, 6, 2, 1, 8, 4, 1, 6, 3, 1, 5, 1, 8, 7, 6.
What would be the page hit rate using Least Recently Used (LRU) and Least Frequently Used (LFU) page replacement algorithms if the number of frames allocated for the process is 4.

(c) What are the different frame allocation strategies ? Why global page replacement results in better system throughput than Local page replacement ?

(6+6+6)

7. (a) Suppose that a disk drive has 200 cylinders, numbered from 0 to 199. The drive is currently serving a request at cylinder 100 and the previous request was at cylinder 120. The time required for one movement is 5ms. Calculate head movements and time to serve all the pending request for SSTF and SCAN. The queue of pending requests are as follows : 5, 18, 84, 190, 86, 12, 124.

(b) What is the purpose of using a "salt" along with the user-provided password ? Where should the "salt" be stored, and how should it be used ?

(c) Why is deadlock detection much more expensive in a distributed environment than it is in a centralized environment ?

(8+6+4)

- o O o -

SPACE FOR ROUGH WORK