No. of Printed Pages : **2**

Sl. No.

B1.4-R5 : OPERATING SYSTEMS

NOTE :

1. Answer question 1 and any FOUR questions from 2 to 7.

2. Parts of the same question should be answered together and in the same sequence.

Total Time : 3 Hours **Total Marks : 100**

1. (a) What is Memory Management ? Why is it required ?

(b) How input output data transfer is accomplished ? Give the steps involved.

(c) What is a Thread ? What are the benefits of multithreaded programming ?

(d) What is a Dispatcher ? Also explain dispatch latency.

(e) How the Home Directories in Windows and Linux are defined ?

(f) What is Demand Paging ? What are the advantages of using demand paging ?

(g) What is Hypervisor ? What are the types of hypervisors ? **(7x4)**

2. (a) What is System Software ? Discuss the need of System Software.

(b) What do you understand by asymmetric encryption ? Explain in detail.

(c) What is Polling ? Explain in detail. **(6+6+6)**

3. (a) Explain Memory and I/O Devices Interfacing (Memory Mapped I/O).

(b) Consider a system with a total of 150 units of memory, allocated to three processes as shown :

Process	Max	Hold
1	70	45
2	60	40
3	60	15

Apply the banker's algorithm to determine whether it would be safe to grant each of the following requests. If yes, indicate a sequence of terminations that could be guaranteed possible. If no, show the reduction of the resulting allocation table.

If a fourth process arrives, with a maximum memory need of 60 and an initial need of 25 units.

(c) What is a Semaphore ? Discuss the semaphore related operations. **(6+6+6)**

4. For this problem, assume a demand paged virtual memory system with a page size of 100 words (decimal values throughout). A process running on this system generates a sequence of logical addresses, given in the table below.

10	11	104	170	73	309	185	245	246	434	458	364

Assume the process is allotted exactly two page frame, and that none of its pages are resident (in page frames) when the process begins execution.

(a) Determine the page number corresponding to each logical address and fill them into a table with one row and 12 columns. This is often called a reference string for the process.

(b) Consider the reference string determined in part (a). Determine which references result in page faults, assuming FIFO page replacement is used, indicating your conclusions by placing Fs in the corresponding cells of a table with one row and 12 columns. The page fault rate is the number of page faults divided by the total number of references made. What is the page fault rate for this case ? Round your answer to an integer percentage.

(c) Also, do the calculations as asked above in (b) using LRU algorithm. **(6+6+6)**

5. (a) Explain Bully Algorithm that is used to elect the coordinator in distributed systems. What happens if two processes initiate an election simultaneously ?

(b) How virtualization is implemented at Operating System level ? What are the advantages and limitations of OS level virtualization ? Explain.

(c) What happens if an interrupt occurs while servicing an interrupt ? Explain in brief. **(8+6+4)**

6. (a) Let us assume a disk with rotational speed of 15,000 rpm, 512 bytes per sector, 400 sectors per track and 1000 tracks on the disk, average seek time is 4 ms. We want to transmit a file of size 1 MByte, which is stored contiguously on the disk.

(i) What is the transfer time for this file ?
(ii) What is the rotational delay in this case ?
(iii) What is the total time to read 1 sector ?
(iv) What is the total time to read 1 track ?

(b) Consider a disk system with 8 sectors per track and 512 bytes per sector. The disk rotates at 3000 rpm and has an average seek time of 15 msec. Also, consider a file consisting of 8 blocks. Compute the total time for accessing the entire file if the following allocation algorithms are used.

(i) contiguous allocation
(ii) indexed allocation

(c) What do you understand by program threats ? Explain in detail with a suitable example. **(8+4+6)**

7. (a) What are basic differences between Windows and Linux Operating Systems ?

(b) Compare and Contrast between considering the recent modifications and updates done in recent days in specifically in terms of General files, Directory files, Device files, User types, file name conventions used in Windows and Linux Operating Systems.

(c) What do you understand by revocation of access rights ? Explain with the help of an example. **(4+8+6)**

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