No. of Printed Pages : **2**

Sl. No.

C0-R4.B2 : OPERATING SYSTEM

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 the need of Memory Management ? Explain.
(b) Differentiate between load-time dynamic linking and run-time dynamic linking.
(c) What is bus arbitration ? Explain.
(d) State the main difference between logical and physical address space.
(e) Differentiate between counting semaphore and binary semaphore.
(f) What are the characteristics of Distributed Systems ?
(g) Differentiate between security and protection in the context of an operating systems. **(7x4)**

2. (a) What are the benefits of multithreaded programming ? Compare user threads and kernel threads.
(b) 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 average access time for this file ?
III. What is the rotational delay in this case ?
IV. What is the total time to read 1 sector ?
V. What is the total time to read 1 track ? **(8+10)**

3. (a) 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.
I. A fourth process arrives, with a maximum memory need of 60 and an initial need of 25 units.
II. A fourth process arrives, with a maximum memory need of 60 and an initial need of 35 units.
(b) What are the necessary conditions which can lead to a deadlock in a system ? **(12+6)**

4. (a) Consider the following segment table :

Segment	Base	Length
0	219	600
1	2300	14
2	90	100
3	1327	580
4	1952	96

What are the physical addresses for the following logical addresses ? How many of these are invalid ?

(i) 0430 (ii) 110 (iii) 2500 (iv) 3400
(v) 4112 (vi) 128

(b) Explain the Remote Procedure Calls (RPC) used in Client-Server Systems. **(12+6)**

5. (a) What are the possible security features that are usually implemented in modern operating systems ?

(b) What are the usual threats in an operating system ?

(c) What is Virtual Private Network(VPN) ? What are the benefits and limitations of VPN ? **(6+6+6)**

6. (a) What is False sharing ? When it is likely to occur ? What should be done to minimize the false sharing problem ? Explain.

(b) What happens if two processes initiate the election algorithm concurrently in Ring Algorithm ?

(c) Differentiate between stateful and stateless servers. **(6+6+6)**

7. (a) Suppose we have a Linux Operating System, where a parent process that has forked a child in the code snippet below.

```
int count = 0;
ret = fork();
if(ret == 0)
{ printf("count in child=%d\n", count);
}
else
{ count = 1;
}
```

The parent executes the statement "count = 1" before the child executes for the first time.

Now, what will be the value of count printed by the above code ?

(b) Differentiate between Authentication and Authorization.

(c) Enlist the typical Disk scheduling algorithms. Also mention the key terminologies associated with Disk scheduling algorithms. **(6+6+6)**

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