

No. of Printed Pages : 4

Sl. No.

C0-R4.B2 : OPERATING SYSTEM

DURATION : 03 Hours

MAXIMUM MARKS : 100

Roll No. :

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Answer Sheet No. :

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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 a Dispatcher ? What is dispatch latency ?
 - (b) What are the steps for accomplishing input output data transfer ? What do you mean by bus arbitration ?
 - (c) Differentiate between counting semaphore and binary semaphore.
 - (d) What are the benefits and limitations of VPN ?
 - (e) Briefly explain about CDFS (Compact Disc File System).
 - (f) Differentiate between security and protection in the context of an operating systems.
 - (g) How Deadlocks are handled in a Distributed Systems ? Explain. (7x4)

2.
 - (a) While synchronizing threads, why is it important that we make no assumptions about the relative speeds of the threads ? Give an example as to when such assumption would help you to create an algorithm for mutual exclusion ?
 - (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 (9+9)

3.
 - (a) A system has four resources types, namely R1, R2, R3 and R4 with instances 5, 3, 5 and 3 respectively. Five processes with a maximum resource claim for these resources are: P1 (2, 2, 1, 1), P2(1, 2, 1, 2), P3(1, 1, 2, 1), P4(3, 1, 2, 0), and P5(2, 1, 1, 0). The resource allocations are P1 with (1, 1, 0, 0), P2 with (0, 1, 1, 0), P3 with (1, 0, 1, 1), P4 with (2, 1, 2, 0), and P5 with (1, 0, 1, 0).
 - (i) Determine whether the system will be in a safe state or not ? Justify your statement.
 - (ii) To change the system state of part (i), i.e., if it was in SAFE state, then it is to be changed to UNSAFE state and vice versa. Find out the minimum number of resource type(s) and their instance(s) that are required to be appended to change the state of part (ii).
 - (b) Consider the following heap, which show the free space and hatched region are in use

50	200	300	400	600
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The sequence of requests for blocks of size 300, 50, 150, 100 can be satisfied if we use :

 - (i) Either first fit or best fit policy
 - (ii) First fit but not best fit policy
 - (iii) Best fit but not first fit policy
 - (iv) None of the above

Give proper reason for your choice of answer. (12+6)

4. (a) What are the benefits of multithreaded programming ? Compare user threads and kernel threads.
- (b) A certain computer system has the segmented paging architecture for virtual memory. The memory is byte addressable. Both virtual and physical address spaces contain 216 bytes each. The virtual address space is divided into 8 non-overlapping equal size segments. The memory management unit (MMU) has a hardware segment table, each entry of which contains the physical address of the page table for the segment. Page tables are stored in the main memory and consists of 2 byte page table entries. What is the minimum page size in bytes so that the page table for a segment requires at most one page to store it ?
- (c) Explain the Buddy system of memory allocation. (5+8+5)
5. (a) Differentiate between Kernel Mode and User Mode frameworks.
- (b) Briefly explain the security features of modern operating systems. (9+9)
6. (a) Briefly explain about the possible threats in an operating system.
- (b) Although DMA does not use the CPU, the maximum transfer rate is still limited. Consider reading a block from the disk. Name three factors that might ultimately limit the rate transfer.
- (c) Differentiate between stateful and stateless servers. (6+6+6)
7. (a) Mention the various types of Disk scheduling algorithms. Explain the following terminologies related to Disk scheduling algorithms.
- (i) Seek Time
- (ii) Rotational Latency
- (iii) Transfer Time
- (iv) Disk Access Time
- (b) What is Leader Election Algorithm in Distributed Systems ? Explain the process of Bully Election Algorithm for electing the coordinator in Distributed Systems with suitable example. (8+10)

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SPACE FOR ROUGH WORK