III B. Tech I Sem – Semester End Examinations – Regular – Dec 2022

**Subject Name: Operating Systems Subject Code: R204GA05503**

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**Scheme of Evaluation**

**SRIT R20**

**AY: 2022-23**

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| **PARTA**  **(Compulsory Question)**  **\*\*\*** | | | |
| **1 Answer the following: (5 X 02 = 10 Marks)** | | | |
| a) | Virtualization uses software to create an abstraction layer over computer hardware that allows the hardware elements of a single computer—processors, memory, storage and more—to be divided into multiple virtual computers, commonly called virtual machines | | 2M |
| b) | Shared memory is a faster inter process communication system. It allows cooperating processes to access the same pieces of data concurrently. It speeds up the computation power of the system and divides long tasks into smaller sub-tasks and can be executed in parallel. | | 2M |
| c) | Paging is a function of memory management where a computer will store and retrieve data from a device's secondary storage to the primary storage. Memory management is a crucial aspect of any computing device, and paging specifically is important to the implementation of virtual memor | | 2M |
| d) | RAID (redundant array of independent disks) is a way of storing the same data in different places on multiple hard disks or solid-state drives (SSDs) **to protect data in the case of a drive failure**. | | 2M |
| e) | Malware, or malicious software, is any program or file that is intentionally harmful to a computer, network or server. | | 2M |
| **PARTB**  **(Answer all five units, 5 X 10 = 50 Marks)** | | | |
| **UNIT-1** | | | |
| 2 | a) | 1. Multiprogramming is mostly used to maximize CPU utilization by organizing applications always to have one program to execute. On the other hand, multitasking aims to enhance reaction time by sharing computing resources across several users. 2. Multiprogramming is primarily focused on increasing CPU use. The programs are organized so that the CPU will never idle; it will always execute one program after another. On the other hand, multitasking tries to improve CPU reaction time. 3. Multiprogramming is built on the concept of context switching, which is a usual procedure that allows the CPU to transition from one process to another while using a single processor machine. The Process Control Block (PCB) preserves the state of an active process for the CPU to resume from the same location. On the other hand, multitasking is based on time-sharing, and it completes tasks in the same amount of time for each activity or process. 4. Both the terms have almost identical meanings and the common term used in modern operating systems, although they serve different purposes. Multiprogramming is primarily dependent on a computer's ability to store programs for a longer period to decrease CPU idle time. The scheduling algorithm is used to allocate processes. The operating system runs a portion of one program at a time, followed by a portion of another program, etc. On the other hand, the CPU permits numerous processes to operate concurrently through time-sharing and executes them properly in a multitasking operating system. 5. Multiprogramming takes maximum time to execute any process, whereas multitasking takes minimum time to execute any process. 6. Multiprogramming may be done on a computer with a small amount of RAM or ROM memory; it doesn't need a huge memory. On the other hand, multitasking necessitates a huge amount of memory storage to complete all jobs or processes simultaneously.   Any five differences 1x5=5M | 5M |
|  | b) | There are four intefaces that the user can interact with the operating systems. They are CLI, GUI, Touch screen, and Batch Processing. (1M)  Discussion of each interface briefly (1x4=4M) | 5M |
| **(OR)** | | | |
| 3 | a) | There are different resources managed by the operating system. They are process, file, memory, Mass-storage, caching and I/O subsystem. (1M)  Explanaton of any four Managements like process management, file-system management, memory management, Mass-storage Management etc. (1Mx4=4M) | 5M |
|  | b) | Representing overall system services available in operating systems in the form of diagram (2M)  Explantion about the services in the diagram(3M) | 5M |
| **UNIT-2** | | | |
| 4 | a) | Process Definition (1M)  Process state diagram (2M)  Explanation of Process state diagram (2M) | 5M |
|  | b) | Critical Section Problem Defintion (1M)  Explanation of Critical Section Problem using petersons solution.(4M) | 5M |
| **(OR)** | | | |
| 5 | a) | CPU Scheduling meams assiging CPU to the avaible process or jobs in the ready queue effiecintly.(1M)  Illustrate any CPU Scheduling algorithm with gantt chart (4M) | 5M |
|  | b) | Semaphore Definition (1M)  Explanation of Semaphore with an example (4M) | 5M |
| **UNIT-3** | | | |
| 6 | a) | Basic Meaning of Swapping (1M)  Related diagram to do swapping with explanation (2 + 2 = 4M)  8 | 5M |
|  | b) | There are several ways to handle deadlock. First idea is no Process should not enter the dead lock state. Based on this idea there are two ways:  1. Deadlock Avoidance  2. Deadlock Prevention.  Next Idea is Allow process to enter into the Deadlock state. Once Entered What action has to taken. In this, We use  3. Deadlock Detection.  For the above answer carry 2M.  Now Explaination of any one Deadlock Mechanisms carry 3M. | 5M |
| **(OR)** | | | |
| 7 | a) | Thrashing is when the page fault and swapping happens very frequently at a higher rate, and then the operating system has to spend more time swapping these pages. This state in the operating system is known as thrashing. Because of thrashing, the CPU utilization is going to be reduced or negligible. (2M)  9  Diagram (1M)  Explanation about possible causes of thrashing.(2M) | 5M |
|  | b) | Definition of LRU algorithm (1M)  Solve the LRU algorithm by considering an example (4M) | 5M |
| **UNIT-4** | | | |
| 8 | a) | Classification of various disk scheduling algortihms (1M)  Expalnation of any two disks scheduling Algorithms. (4M) | 5M |
|  | b) | I/O subsystem Design with explanation having the following related diagram (2+3=5M) | 5M |
| **(OR)** | | | |
| 9 | a) | Diagram of RAID structure Levels shown below**(2M)**  Explanation about each level **(3M)** | 5M |
|  | b) | Explanation of sequential access method and Direct Acess method with a suitable examples (3M)  Explantion of other acess methods like indexing (2M) | 5M |
| **UNIT-5** | | | |
| 10 | a) | Definiton of System threat (1M)  Explantion of System threats like worms. Internet worms, Port Scanning, Denail of Service (1 X 4M = 4M) | 5M |
|  | b) | Implemtion of Acess Matrix is carried out in different ways:   1. Sparse Matrix 2. Global Table 3. Access list of Objects 4. Capability list for each Domain 5. Lock-key   Put 1 Mark for Above Classification and 4 Marks for any two Access Matrix Implementation. | 5M |
| **(OR)** | | | |
| 11 | a) | Specifying Cryptography Principle (1M)  Consider any two crytography methods for explanation (4M) | 5M |
|  | b) | There are three types of Attacks exist. They are Active Attacks, Passive Attacks and Man-in-the-middle attack.(1M)  Diagram (1M)  Explanation about these attacks(3M) | 5M |