

III B. Tech I Semester Regular/Supplementary Examinations, October/November - 2017
OPERATING SYSTEMS

(Common to Computer Science and Engineering and Information Technology)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answering the question in **Part-A** is compulsory
 3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Define Operating System. List out the objectives of an operating system. [3M]
- b) Describe different attributes of the process. [4M]
- c) Define Busy Waiting? How to overcome busy waiting using Semaphore operations. [4M]
- d) Write the difference between internal and external fragmentation. [4M]
- e) Describe the Safe, unsafe, and deadlock state spaces. [4M]
- f) What are the various attributes that are associated with an opened file? [3M]

PART -B

- 2 a) What are the various components of operating system structure and explain the simple and layered approach of operating system in detail. [8M]
- b) In a multi programming and time sharing environment, several users share the system simultaneously, This situation can result in various security problem: [8M]
 - i) What are two such problem?
 - ii) Can be ensure the same degree of security in a time-shared machine as in a dedicated machine? Justify your answer.
- 3 a) Name five major activities of an OS with respect to process management and briefly describe why each is required. [8M]
- b) Write in detail about the thread libraries. [8M]
- 4 a) What is Readers-Writers problem? Give a solution to Readers-Writers problem using Monitors. [8M]
- b) What is a Critical Section problem? Give the conditions that a solution to the critical section problem must satisfy. [8M]
- 5 a) What is a Virtual Memory? Discuss the benefits of virtual memory technique. [8M]
- b) What is Thrashing? What is the cause of Thrashing? How does the system detect Thrashing? What can the system do to eliminate this problem? [8M]
- 6 a) What is a deadlock? Consider the deadlock situation that could occur in the dining philosopher's problem when the philosophers obtain the chopsticks one at a time. Discuss how the four necessary conditions for deadlock indeed hold in this setting. What are the solutions for this problem? [8M]
- b) Explain Deadlock Detection scheme for Several Instances of a resource Type. [8M]
- 7 a) Explain the three allocation methods in file system implementation. Illustrate with proper diagram. [8M]
- b) What are the objectives of file management systems? Explain the file system architecture. [8M]

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PART -A

- 1 a) Write various registers used in computer system. [3M]
- b) Identify the situations for preemption of a process. [4M]
- c) What are the functions of mutex semaphore? [3M]
- d) Write the first ,best fit memory allocation techniques. [4M]
- e) What are different conditions used in Banker's algorithm. [4M]
- f) Define boot block. How it initiated from disk? [4M]

PART -B

- 2 a) What are the functionalities of operating system? Explain in detail. [8M]
- b) Write about monolithic kernel, layered, and microkernel structures of operating systems. [8M]
- 3 a) [8M]

Process	Arrival Time	Burst Time
1	0	3
2	2	6
3	4	4
4	6	5
5	8	2

Perform non preemptive CPU scheduling algorithms on the given snapshot and analyze their performance.

- b) Write about i) Process Control Block ii) CPU scheduling algorithm evaluation. [8M]
- 4 a) What is monitor? Explain its functionalities. How it is different from semaphore in implementing synchronization. [8M]
- b) What is Producer Consumer problem? How it can illustrate the classical problem of synchronization? Explain. [8M]
- 5 a) Explain different structures and page tables with strengths and weaknesses. [8M]
- b) What do you mean by thrashing? Suggest solutions to overcome this in virtual memory. [8M]

- 6 a) In what way resource allocation graphs are used for detection of deadlocks? [8M]
Write the algorithm.
- b) Explain the different techniques to recover the system from deadlock. [8M]
- 7 a) Write the role of sector sparing in identifying the bad blocks of mass storage. [8M]
What are the other techniques available for this?
- b) Discuss in detail the file allocation techniques : sequential, indexed and linked. [8M]

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**PART -A**

- |   |                                                                                                               |      |
|---|---------------------------------------------------------------------------------------------------------------|------|
| 1 | a) What are the various security issues that arise in multiprogramming and timeshared systems?                | [3M] |
|   | b) Write the benefits of multithreaded programming.                                                           | [3M] |
|   | c) Give the Peterson's solution to the Critical section problem.                                              | [4M] |
|   | d) Explain why sharing a reentrant module is easier, when segmentation is used than when pure paging is used. | [4M] |
|   | e) Write about Resource-Allocation graph.                                                                     | [4M] |
|   | f) Briefly explain the indexed allocation method.                                                             | [4M] |

**PART -B**

- |   |                                                                                                                                                                                         |      |
|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|
| 2 | a) Differentiate protection and security.                                                                                                                                               | [4M] |
|   | b) Explain the features of a distributed operating system.                                                                                                                              | [8M] |
|   | c) Explain models of distributed systems.                                                                                                                                               | [4M] |
| 3 | a) Explain the actions taken by a thread library to context-switch between user level threads.                                                                                          | [8M] |
|   | b) What is a Scheduler? Explain different CPU Schedulers.                                                                                                                               | [8M] |
| 4 | a) What is a semaphore? List the types of semaphores and Show that, if the wait() and signal() semaphore operations are not executed atomically, then mutual exclusion may be violated. | [8M] |
|   | b) How to implement process synchronization using i)Test and Set ii) SWAP iii) Lock instructions? Explain with Pseudo code.                                                             | [8M] |
| 5 | a) What is paged segmentation? How it can be implemented? Discuss its advantages                                                                                                        | [8M] |
|   | b) Write about Least Recently Used page replacement algorithm all its variants with an example.                                                                                         | [8M] |
| 6 | a) Explain deadlock avoidance process using Resource-Allocation-Graph.                                                                                                                  | [8M] |
|   | b) Explain Deadlock detection algorithm with an example.                                                                                                                                | [8M] |
| 7 | a) How to organize the mass storage? Explain                                                                                                                                            | [8M] |
|   | b) Write in detail about file attributes, operations and types and structures.                                                                                                          | [8M] |

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**PART -A**

- 1 a) What is the importance of Real-Time Embedded systems? [3M]
- b) Define Cooperating process? What is the environment need in Cooperating processes? [4M]
- c) What are the three requirements that a solution to the critical section problem must satisfy? [3M]
- d) What is the purpose of Paging and Page tables? [4M]
- e) Discuss the usage of wait-for graph method. [4M]
- f) Explain the bit vector representation of free space management. [4M]

**PART -B**

- 2 a) Explain the various types of system calls provided by an operating system. [8M]
- b) Explain the Dual-Mode operation of an operating system. [8M]
- 3 a) Explain in detail Inter Process Communication models. [3M]
- b) Explain the Round Robin scheduling algorithm with a suitable example. [8M]
- 4 a) By illustrating the structure of process P1, explain the Petersons solution to critical section problem. [8M]
- b) State the Critical Section problem. Illustrate the software based solution to the Critical Section problem. [8M]
- 5 a) Consider the following page reference string: [8M]  
 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6  
 How many page faults would occur for the optimal page replacement algorithm, assuming three frames and all frames are initially empty.
- b) Discuss various issues related to the allocation of frames to processes. [8M]
- 6 a) Explain deadlock avoidance using banker's algorithm with suitable example. [8M]
- b) How to Recover From Deadlock situations? Discuss in detail. [8M]
- 7 a) Explain various file access methods with suitable examples. [8M]
- b) Discuss various issues involved in selecting appropriate disk scheduling algorithm. [8M]

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