

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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 3. Answer any **THREE** Questions from **Part-B**

**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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 2. Answering the question in **Part-A** is compulsory  
 3. Answer any **THREE** Questions from **Part-B**

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PART -A

- | | | | |
|---|----|--|------|
| 1 | a) | Mention the objectives and functions of an operating system. | [3M] |
| | b) | Define preemption and nonpreemption. | [4M] |
| | c) | What is Semaphore? Mention its properties. | [4M] |
| | d) | List the steps needed for page replacement. | [4M] |
| | e) | What is deadlock? What are the schemes used in operating system to handle deadlocks? | [3M] |
| | f) | What are the various file accessing methods? | [4M] |

PART -B

- | | | | |
|---|----|--|------|
| 2 | a) | Explain the operating system structure and its functions. | [8M] |
| | b) | Briefly Explain the different types of systems: parallel systems, distributed systems and real-time systems? | [8M] |
| 3 | a) | Explain the steps involved in process creation and process termination. | [8M] |
| | b) | Demonstrate FIFO and Round Robin CPU scheduling algorithms with suitable example. | [8M] |
| 4 | a) | What is the critical section? What are the minimum requirements that should be satisfied by a solution to critical section problem? | [8M] |
| | b) | Give a solution for readers-writers problem using conditional critical regions? | [8M] |
| 5 | a) | Explain the concept of demand paging in detail with neat diagrams. | [8M] |
| | b) | Given memory partition of 100 KB, 500 KB, 200 KB and 600 KB (in order). Show with neat sketch how would each of the first-fit, best-fit and worst fit algorithms place processes of 412 KB, 317 KB, 112 KB and 326 KB (in order). | [8M] |
| 6 | a) | Explain the techniques used to prevent the deadlocks. | [8M] |
| | b) | Explain Banker's deadlock-avoidance algorithm with an illustration. | [8M] |
| 7 | a) | Discuss the different file allocation methods with suitable example. | [8M] |
| | b) | Compare and contrast free space management and swap space management. | [8M] |

III B. Tech I Semester Supplementary Examinations, October/November- 2020

OPERATING SYSTEMS

(Common to Computer Science and Engineering, 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

(22 Marks)

1. a) Explain any three main functions of an Operating System. [3M]
- b) With a neat diagram, explain various states of a process. [4M]
- c) What are the advantages of inter-process communication and also explain various implementations of inter-process communication? [4M]
- d) Explain various ways to handle a page fault. [4M]
- e) What are the various ways of aborting a process in order to eliminate deadlocks? [4M]
- f) Discuss various issues involved in selecting appropriate disk scheduling algorithm. [3M]

PART –B

(48 Marks)

2. a) Discuss the services provided by the operating system for efficient system operation. [8M]
b) What is a System call? Explain in detail the system call sequence to copy the contents of one file to another file. [8M]
3. a) What are the advantages of inter-process communication? How communication takes place in a shared-memory environment? Explain. [6M]
b) Assume the following workload in a system: [10M]

Process	Arrival Time	Burst Time
P1	5	5
P2	4	6
P3	3	7
P4	1	9
P5	2	2
P6	6	3

Draw a Gantt chart illustrating the execution of these jobs using Round robin scheduling algorithm and also Calculate the average waiting time and average turnaround time.

4. a) Define the hardware instruction Test And Set() and Swap() also give the mutual exclusion implementation with both. [6M]
b) How semaphores can be used to deal with n-process critical section problem? Explain. [10M]

5. a) Given free memory partitions of 100 K, 500 K, 200 K, 300 K, and 600 K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 212 K, 417 K, 112 K, and 426 K (in order)? [8M]
- b) Define Virtual Memory. Explain the process of converting virtual addresses to physical addresses with a neat diagram. [8M]
6. a) How does deadlock avoidance differ from deadlock prevention? Write about deadlock avoidance algorithm in detail. [8M]
- b) Explain the bankers algorithm with a suitable example. [8M]
7. A disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53. The queue of pending requests, in FIFO order, is 98, 183, 37, 122, 14, 124, 65, 67. [16M]
- Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms?
- i) FCFS ii) SSTF iii) SCAN iv) LOOK v) C-SCAN vi) C-LOOK.

III B. Tech I Semester Regular Examinations, November - 2015

OPERATING SYSTEMS

(Common to CSE and IT)

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 compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Define Operating System. List the objectives of an operating system. [3M]
- b) With a neat diagram, explain various states of a process. [4M]
- c) Give the Peterson's solution to the Critical section problem. [4M]
- d) Distinguish between Logical and Physical address space. [3M]
- e) What are the necessary conditions for the occurrence of deadlock? [4M]
- f) What are the various attributes that are associated with an opened file? [4M]

PART -B

- 2 a) With a neat diagram, explain the layered structure of UNIX operating system. [8M]
- b) What are the advantages and disadvantages of using the same system call interface for manipulating both files and devices? [8M]
- 3 a) What is a process? Explain about various fields of Process Control Block. [8M]
- b) What are the advantages of inter-process communication? How communication takes place in a shared-memory environment? Explain. [8M]
- 4 a) What is a Critical Section problem? Give the conditions that a solution to the critical section problem must satisfy. [8M]
- b) What is Dining Philosophers problem? Discuss the solution to Dining philosopher's problem using monitors. [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? How deadlocks are detected? [8M]
- b) Explain the Resource-Allocation-Graph algorithm for deadlock avoidance. [8M]
- 7 a) Briefly explain about single-level, two-level and Tree-Structured directories. [8M]
- b) Explain and compare the SCAN and C-SCAN disk scheduling algorithms. [8M]

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III B. Tech I Semester Regular Examinations, November- 2015**OPERATING SYSTEMS**

(Common to CSE and IT)

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 compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Explain how multiprogramming increases the utilization of CPU. [3M]
- b) What are the advantages of inter-process communication? Also explain various implementations of inter-process communication. [4M]
- c) What is a Semaphore? Also give the operations for accessing semaphores. [4M]
- d) What is the purpose of Paging and Page tables? [3M]
- e) What are the various methods for handling deadlocks? [4M]
- f) Briefly explain the indexed allocation method. [4M]

PART -B

- 2 a) Explain the Dual-Mode operation of an operating system. [8M]
- b) Mention the objectives and functions of Real-Time Embedded systems. [8M]
- 3 a) With a neat sketch, explain the process state diagram. [8M]
- b) What are the criteria for evaluating the CPU scheduling algorithms? Why do we need it? [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. [10M]
- b) Discuss the Bounded-Buffer problem. [6M]
- 5 a) What is a page fault? Explain the steps involved in handling a page fault with a neat sketch. [8M]
- b) 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.
- 6 a) Write about deadlock conditions and bankers algorithm in detail. [10M]
- b) Discuss various techniques to recover from the deadlock. [6M]
- 7 a) Write in detail about file attributes, operations and types and structures. [8M]
- b) Explain in detail about various ways of accessing disk storage. [8M]

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III B. Tech I Semester Regular Examinations, November- 2015

OPERATING SYSTEMS

(Common to CSE and IT)

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PART -A

- 1 a) Explain the importance of Real-Time Embedded systems. [3M]
- b) Define Thread. Write the differences between user-level and kernel-level threads. [4M]
- c) Define Monitor. Explain how it overcomes the drawback of semaphores. [4M]
- d) Explain how demand paging affects the performance of a computer system. [4M]
- e) Write about Resource-Allocation graph. [4M]
- f) Explain the bit vector representation of free space management. [3M]

PART -B

- 2 a) What is a System call? Explain the various types of system calls provided by an operating system. [8M]
- b) What is the purpose of interrupts? What are the differences between a trap and an interrupt? Can traps be generated by a user program? Explain the purpose with an example. [8M]
- 3 a) Distinguish between preemptive and non-preemptive scheduling. Explain each type with an example. [8M]
- b) Describe the actions taken by a thread library to context-switch between user-level threads. [8M]
- 4 a) What is synchronization? Explain how semaphores can be used to deal with n-process critical section problem. [8M]
- b) Discuss Mutual-exclusion implementation with test and set() instruction. [8M]
- 5 a) Explain the difference between External fragmentation and Internal fragmentation. How to solve the fragmentation problem using paging. [8M]
- b) Discuss various issues related to the allocation of frames to processes. [8M]
- 6 a) Discuss the necessary conditions that cause deadlock situation to occur. [8M]
- b) Discuss various methods for the prevention of deadlocks. [8M]
- 7 a) Explain the Indexed allocation of disk space. [8M]
- b) Explain and compare the FCFS and SSTF disk scheduling algorithms. [8M]

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III B. Tech I Semester Supplementary Examinations, May -2016

OPERATING SYSTEMS

(Common to CSE and IT)

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 compulsory3. Answer any **THREE** Questions from **Part-B**

PART -A

- 1 a) Write short notes on device controller and driver. [3M]
- b) What is a Dispatcher? Mention its functions. [4M]
- c) Describe how the Swap () instruction can be used to provide mutual exclusion that satisfies the bounded-waiting requirement. [4M]
- d) Explain the difference between internal and external fragmentation. [4M]
- e) What are the various data structures used for implementing banker's algorithm? Provide a brief description of each. [4M]
- f) Write short notes on virtual file system. [3M]

PART -B

- 2 a) Write an overview of computer system. [10M]
- b) Describe the features of a distributed operating system. [6M]
- 3 a) What is a scheduler? List and describe different types of schedulers. [6M]
- b) Write in detail about the thread libraries. [10M]
- 4 a) Present producer-consumer problem. Explain how to solve it. [8M]
- b) Distinguish between counting and binary semaphores. Show when does the semaphore definition requires busy waiting. Suggest a solution to overcome this problem. [8M]
- 5 a) Consider the reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames. Trace FIFO, optimal, and LRU page replacement algorithms. [6M]
- b) Discuss in detail about various page table structures. [10M]
- 6 a) Explain in detail about deadlock detection techniques. [8M]
- b) Explain how to recover the system from a deadlock. [8M]
- 7 a) How to provide protection to a file system? Explain. [8M]
- b) Write in detail about the on-disk and in-memory structures used to implement a file system. [8M]

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