

P1317

[3864]-402

**B.E. (Computer Engineering)**

**OPERATING SYSTEMS**

**(2003 Course)**

*Time : 3 Hours]*

*[Max. Marks : 100*

*Instructions to the candidates :*

- 1) *Answers to the two sections should be written in separate books.*
- 2) *Figures to the right indicate full marks.*
- 3) *Neat diagrams must be drawn wherever necessary.*
- 4) *Assume suitable data, if necessary.*

**SECTION - I**

- Q1)** a) What is Mutual Exclusion? State the requirements to support Mutual Exclusion. Explain hardware approach for Mutual Exclusion with its advantages and disadvantages. [8]
- b) What is binary and general semaphore? Write implementation of both the semaphore primitives. Also write an implementation of general semaphore using binary semaphore. [8]

OR

- Q2)** a) Write a solution to reader/writer problem using semaphore with writers have priority. [6]
- b) Is busy waiting always less efficient than a blocking wait? Explain. [2]
- c) What is monitor construct? Write a solution to dining philosopher problem using a monitor. [8]

- Q3)** a) What is deadlock? Explain with example. What is difference among deadlock avoidance, detection and prevention? Also state the four necessary conditions that create deadlock. [8]
- b) Differentiate between authentication and threat. Explain how security is ensured for authorized access by using encryption technique. [8]

OR

**Q4)** a) Write Banker's algorithm for deadlock avoidance. [12]

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 reductions of the resulting allocation table.

- A fourth process arrives, with a maximum memory need of 60 and an initial need of 25 units.
  - A fourth process arrives, with a maximum memory need of 60 and an initial need of 35 units.
- b) Compare public and private key cryptography. What are merits and demerits of each? [4]

**Q5)** a) Explain UNIX file system characteristics and UNIX file system organization. Write UNIX shell commands with its syntax and examples for following functionalities – [10]

- Creation of a file.
  - Displaying all the file attributes.
  - Modifying file access permissions.
- b) Write and explain Block Read Ahead algorithm. Explain its advantages if any. [8]

OR

**Q6)** a) Explain various kernel level data structures involved in process management subsystem with their role and inter relationship with each other. [8]

- b) In the algorithm getblk, if kernel removes a buffer from the free list, it must raise the processor priority level to block interrupts before checking the free list. Why?

For the following sequence of blocks use getblk algorithm to allocate a buffer for a disk block and explain with neat diagram all scenarios for retrieval of buffer.

Use  $\text{< mod } 3 \text{ >}$  hash function.

Existing Buffer sequence and Status is – (21, busy), (62, busy), (34, busy), (90, busy), (17, busy), (44, busy), (30, free), (32, delayed write), (120, free) Request is for allocation for block numbers – 44, 59, 67, 88, 120. [10]

## SECTION - II

- Q7) a) What is a role of super block in assigning inode to a new file and in allocation of disk blocks? Explain in detail with examples. [10]  
b) Write an algorithm for mknod and read system call. [8]

OR

- Q8) a) Write namei algorithm. Which system calls uses namei algorithm and in what context? Explain in brief. [10]  
b) What is inode? Explain the fields of disk inodes. [4]  
c) Compare the permissions a process must have for the following operations and comment – [4]  
i) Creating a new file requires write permission in a directory.  
ii) Creating an existing file requires write permission on the file.

- Q9) a) Draw and explain Unix process state transition diagram in detail. [8]  
b) What is region? Explain with example conversion of virtual addresses to physical addresses in UNIX. Also explain the role of data structures involved in that. [8]

OR

- Q10) a) Which are the functions of clock interrupt handler in UNIX? Explain in detail kernel and user process profiling. [8]  
b) What are signals? How kernel handles a signal? Explain in detail with example. Which system call process uses to send a signal explain with example? [8]

- Q11)** a) How page faults are handled in UNIX? Explain with examples. [8]  
b) What is control terminal in UNIX? Explain. Explain the algorithm for user logging into a system. [8]

OR

- Q12)** a) Write a note on disk driver. Also list out utility programs that deals directly with the disks. [8]  
b) State and explain in detail various conditions for swapping processes in and swapping processes out in UNIX. [8]

□□□□