

ALCCS - NEW SCHEME

Time: 3 Hours

FEBRUARY 2013

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE:

- Question 1 is compulsory and carries 28 marks. Answer any FOUR questions from the rest. Marks are indicated against each question.
- Parts of a question should be answered at the same place.

- Q.1**
- What is semaphore? What is its use?
 - List the different actions taken by a time sharing scheduler.
 - What is cooperating process? Give reasons for providing an environment that allows process cooperation?
 - List the action taken by event handler when a process makes an I/O request?
 - Why are segmentation and paging sometimes combined into one scheme?
 - Write the functions of Virtual File System (VFS) layer?
 - What are the components of a Linux system?

(7 × 4)

- Q.2**
- What is an operating system? Discuss the various functions of operating system. (8)
 - What are the benefits of Multithreaded Programming? (4)
 - State various scheduling criteria that must be kept in mind while choosing different scheduling algorithms. (6)

- Q.3**
- What is critical-section problem? Give a classic Peterson's solution to the critical-section problem. (2+6)

- Consider the following system snapshot using data structures in the Banker's algorithm, with resources A, B, C, and D and process P0 to P4:

	Max				Allocation				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	6	0	1	2	4	0	0	1	3	2	1	1
P1	1	7	5	0	1	1	0	0				
P2	2	3	5	6	1	2	5	4				
P3	1	6	5	3	0	6	3	3				
P4	1	6	5	6	0	2	1	2				

Code: CT31

Subject: OPERATING SYSTEM

Using Banker's algorithm, answer the following questions:

- (i) How many resources of type A, B, C, and D are there?
- (ii) What are the contents of the Need matrix?
- (iii) Is the system in a safe state? Why?
- (iv) If a request from process P4 arrives for additional resources of (1,2,0,0), Can the Banker's algorithm grant the request immediately? Show the new system state and other criteria. (2+2+2+4)

Q.4 a. Describe the First fit, Best fit and Worst fit allocation algorithms. Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 212K, 417K, 112K, and 426K (in order)? Which algorithm makes the most efficient use of memory? (4+6)

b. Consider a demand-paging system with the following time-measured utilizations:

CPU utilization	20%
Paging disk	97.7%
Other I/O devices	5%

Which (if any) of the following will (probably) improve CPU utilization? Explain your answer.

- (i) Install a faster CPU.
- (ii) Install a bigger paging disk.
- (iii) Increase the degree of multiprogramming.
- (iv) Decrease the degree of multiprogramming.
- (v) Install more main memory.
- (vi) Install a faster hard disk or multiple controllers with multiple hard disks.
- (vii) Add prepaging to the page fetch algorithms.
- (viii) Increase the page size. (8)

Q.5 a. Why do some systems keep track of the type of a file, while others leave it to the user or simply do not implement multiple file types? Which system is "better"? (4)

b. Discuss the following RAID levels:

- (i) RAID Level 3
- (ii) RAID Level 4
- (iii) RAID Level 5 (3×3)

c. Write the principles that may be employed to improve the efficiency of I/O operations. (5)

Q.6 a. List the basic issues that the designer of a communication network must address. (5)

b. How cached data are verified for its validity in distributed file system? (5)

c. Explain the different approaches for implementing mutual exclusion in a distributed environment. (8)

Q.7 Write short notes on the following:

- (i) Port Scanning
- (ii) Process Migration
- (iii) Semaphore and its use
- (iv) Types of viruses

(4 × 4½)