

**ALCCS**

Time: 3 Hours

**JUNE 2015**

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.

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- Q1.** a. Explain the dual mode operations of monitor mode and user mode.  
 b. Name the scheduler responsible for:  
     (i) swapping out partially executed programs  
     (ii) controlling the degree of multiprogramming  
     (iii) shifting a process from ready state to running state  
     (iv) selecting a proper mix of CPU bound and I/O bound processes  
 c. How do one-time passwords help in user authentication?  
 d. Explain file system mounting.  
 e. What is a critical section? Mention the properties that a solution to the critical section should satisfy.  
 f. What is streaming in multimedia systems and what are its different types?  
 g. How is a stateful service different from a stateless service in distributed file systems?  
(7 x 4)
- Q2.** a. What are virtual machines and what are their advantages? (4 + 2)  
 b. Draw a resource allocation graph for the following scenario and determine whether the system is in a deadlock or not. Justify your answer.  
 $P = \{P1, P2, P3\}$   
 $R = \{R1, R2, R3, R4\}$   
 No. of instances of R1, R2, R3 and R4 are 1, 2, 1 and 3 respectively.  
 $E = \{P1 \rightarrow R1, R1 \rightarrow P2, R2 \rightarrow P1, R2 \rightarrow P3, P2 \rightarrow R3, P2 \rightarrow R2,$   
 $R3 \rightarrow P3, R4 \rightarrow P3\}$  (3 + 1 + 2)  
 c. Explain the four main benefits of multithreaded programming. (6)

**Code: CT31**
**Subject: OPERATING SYSTEM**

- Q3. a.** Consider the following set of processes, with the length of CPU burst time given in milliseconds:

| Process | Arrival Time | Burst Time | Priority       |
|---------|--------------|------------|----------------|
| P1      | 0            | 8          | 4              |
| P2      | 1            | 5          | 3              |
| P3      | 3            | 6          | 2              |
| P4      | 5            | 2          | 1<br>(Highest) |

- (i) Draw Gantt charts illustrating the execution of these processes using

- (1) FCFS
- (2) SJF (preemptive) or SRJF
- (3) a non-preemptive priority based
- 4) round robin with time quantum = 2

- (ii) What is the average waiting time of each of the scheduling algorithms given in part (i)? **(6 + 4)**

- b. What is address binding? What are three different address binding options? Draw the diagram also depicting the stages. **(8)**

- Q4. a.** Explain segmentation. Consider the following segment table:

| Segment | Base | Length |
|---------|------|--------|
| 0       | 200  | 600    |
| 1       | 1200 | 20     |
| 2       | 40   | 150    |

What are the physical addresses for the following logical addresses?

- (i) 1, 30      (ii) 2, 100      (iii) 4, 10      (iv) 0, 412 **(4 + 2)**

- b. What are Semaphores? How do they implement mutual exclusion. **(2+4)**

- c. What is linked allocation of disk blocks? What are its advantages and disadvantages? **(6)**

- Q5. a.** Consider the following page reference string

2, 4, 1, 2, 3, 2, 0, 1, 2, 4, 0, 4, 3, 2, 3, 4

How many page faults would occur with LRU and FIFO page replacement algorithms assuming three frames? All frames are initially empty. **(4 + 4)**

- b. Explain naming and transparency in distributed file system **(5)**

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- c. Explain Bully algorithm and Ring algorithm in Distributed Synchronization

**(2.5 + 2.5)**

- Q6.** a. Suppose the read/write head is at track 97, moving towards track 0 (the lowest numbered track on the disk) and the disk request queue contains read/write requests for the sectors on tracks 84, 155, 103, 96, 15, 24, 87, 114, 55 and 197, respectively. The highest track number is 199. Calculate the total number of head movements needed to satisfy the requests in the queue using

(i) SSTF

(ii) SCAN

(iii) C-SCAN

(iv) LOOK

**(4 x 3)**

- b. Write short notes on

(i) need-to-know principle

(ii) encryption

**(2 + 4)**

- Q7.** a. Explain character and block devices in Unix System. **(6)**

- b. Briefly explain the four main characteristics of real time systems. **(6)**

- c. What is the wait-die and wound-wait scheme of deadlock prevention in distributed synchronization? **(6)**