

ALCCS

FEBRUARY 2009

Code: CS31

Subject: OPERATING SYSTEMS

Time: 3 Hours

Max. Marks: 100

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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Q.1**(7 x 4)**

- a. Discuss the two models of interprocess communication highlighting their strengths and weaknesses
- b. Discuss file storage in MS-DOS. Calculate the number of entries required in the FAT table given these parameters: Disk capacity-30Mbyte, Block size-512 bytes, Blocks/cluster-2.
- c. Explain what is multi-level scheduling.
- d. Discuss the various implications of assigning a new timestamp to a transaction that is rolled back. Also discuss how the system process transactions that were issued after the rolled-back transaction but having timestamps smaller than the new timestamp of the rolled back transaction.
- e. Explain the concept of virtual memory system with an example.
- f. Discuss the memory organization of buddy system with its merits and demerits.
- g. Briefly discuss Network OS, Multiprocessor OS, and Distributed OS.

Q.2

- a. Following is the snapshot of a CPU

Process	CPU Burst	Arrival Time
P1	10	0
P2	29	1
P3	03	2
P4	07	3

Draw the Gantt chart and calculate the turnaround time and waiting time of the jobs for FCFS (First Come First Served), SJF (Shortest Job First), SRTF (Shortest Remaining Time First) and RR (Round Robin with time quantum 10) scheduling algorithms. Arrival Time is only applicable to SRTF algorithm.

- b. Calculate the number of disk accesses needed to read 20 consecutive logical blocks of a file in a system with (i) contiguous allocation (ii) linked allocation (iii) indexed allocation. **(2 x 9)**

- Q.3** a. Consider a system consisting of 'm' resources of the same type being shared by 'n' processes. Resources can be requested and released by processes only one at a time. Show that the system is deadlock free if the two conditions hold
 - (i) The maximum need of each process is between 1 & m resources.
 - (ii) The sum of all maximum needs is less than m+n.

- b. Round robin schedulers normally maintain a list of all runnable processes, with each process occurring exactly once in the list. What would happen if a process occurred twice in the list? Can you think of any reason for allowing this? **(2 x 9)**

- Q.4** a. In a paged segmented system, a virtual address consists of 32 bits of which 12 bits are a displacement, 11 bits are a segment number and 9 bits are a page number. Calculate (i) page size (ii) maximum segment size (iii) maximum number of pages (iv) maximum number of segments.

b. Explain the Symbolic address, Relocatable address, Absolute address in memory management with an example. **(2 x 9)**

- Q.5** a. Why the interrupt disable method to achieve mutual exclusion does not work for multiprocessor system? Explain.

- b. Using a diagram, show how an indexed allocation of a file may be done for a disk based system with the following characteristics?

- | | | |
|-------|---|--------------------------------|
| (i) | blocks each of 1024 bytes (may be modeled as a 6×5 matrix). | A System has a disk of 30 |
| (ii) | of 112 bytes | File f1 of 11 logical records |
| (iii) | of 13 bytes | File f2 of 890 logical records |
| (iv) | data stream | File f3 of 510 bytes of binary |
| (v) | of 95 bytes | File f4 of 4 logical records |
- (6+12)**

- Q.6** a. How do system calls differ from ordinary library routines, as both are supplied by the language?

- b. Describe using a diagram how a logical address consisting of 24 bits could be converted to a segment address supporting upto 256 segments. What would be the maximum size of each segment? **(2 x 9)**

- Q.7** a. Explain the concept of transaction atomicity. Where transaction atomicity is applicable in OS?

- b. Suppose that a disk drive has 5000 cylinders, 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending request in FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130. Calculate the total distance (in terms of cylinder), starting from current head position, for the following disk scheduling algorithms. (a) FCFS (b) SSTF (c) SCAN (d) C-SCAN. **(2 x 9)**