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Printed Pages : 4 **MCA – 242**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1456 Roll No.

M. C. A.

(SEM. IV) EXAMINATION, 2006-07

OPERATING SYSTEM

Time : 3 Hours] *[Total Marks : **100***

Note : *(1) Attempt **all** questions.*
*(2) All questions carry **equal** marks.*

1 Attempt any **four** parts of the following : **5×4=20**

(a) Define the essential properties of the following types of operating system :
(i) Batch (ii) Time sharing
(iii) Real time (iv) Distributed.

(b) What is spooling? What are the advantages of spooling over buffering?

(c) Describe two kinds of off-line operation and two approaches to off-line processing.

(d) List some operations that the monitor considers illegal, and describe why each must be considered illegal?

(e) Draw the process state diagram and describe the various process states.

(f) What is a process control block? Explain all its components.

2 Attempt any **two** parts of the following : **10×2=20**

(a) Explain the short-term, medium-term and long-term scheduling. Describe the differences among them.

(b) (i) Define the difference between preemptive and non preemptive scheduling. State why strict non-preemptive scheduling is unlikely to be used in a computer centre.

(ii) Explain the operation of multilevel scheduling.

(c) Suppose the following processes arrive for execution at the time indicated. Each process will run the listed amount of time. In answering the questions, use non preemptive scheduling and base all decisions on the information you have at the time the decision must be made.

Process	*Arrival Time*	*Burst time*
P_1	0.0	8
P_2	0.4	4
P_3	1.0	1

(i) What is the average turn around time for these processes with the FCFS scheduling algorithm?

(ii) What is the average turn around time for these processes with the SJF scheduling algorithm?

3 Attempt any **two** parts of the following : **10×2=20**

(a) A multiple semaphore allows the wait and signal primitives to operate on several semaphores simultaneously. It is useful for acquiring and releasing several resources in one atomic operation. Thus, the wait primitive (for two semaphores) can be defined as follows:

Unit (S,R): While ($S \leq 0$ or $R \leq 0$) do no-op;

S : = S-1;

R : = R-1;

Show how a multiple semaphore can be implemented using regular semaphores.

(b) A file is to be shared among different processes, each of which has a unique number. The file can be accessed simultaneously by several processes, subject to the following constraint: The sum of all unique numbers associated with all the processes currently accessing the file must be less than n. Write a monitor to coordinte the access to the file.

(c) (i) What is a critical section? What is the critical section problem? List the constraints Dijkstra placed on solutions to the critical section problem.

(ii) Describe the producer-consumer problem and dining philosopher problem.

4 Attempt any **two** parts of the following : **10×2=20**

(a) (i) Describe the hardware that is required to support paging with an acceptable amount overhead.

(ii) Why are segmentation and paging sometimes combined into one scheme?

(b) Consider a paging system with a secondary-storage disk of 4MB, with an average access and transfer time of 25 miliseconds and a paged main memory of 262, 144 bytes with a 200 nanosecond access time. If we want our paging system to look to the user like a memory of 4 MB with a 400 nano second (average) access time, what percentage of accesses must occur without a page fault?

(c) Consider the following reference string:
1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6
How many page fault would occur for the following replacement algorithms, assuming three, five, or six, frames?

Remember all frames are initially empty, so your first unique pages will all cost one fault each.

(i) LRU replacement (ii) Optimal replacement.

5 Attempt any **two** parts of the following : **10×2=20**

(a) Consider a file system on a disk that has both logical and physical block sizes of 512 bytes. Assume the information about each file is already in memory. For each of the three allocation strategies (contiguous, and indexed), answer these questions:

(i) How is the logical-to-physical address mapping accomplished in this system? (For the indexed allocation, assume that a file is always less than 512 blocks long).

(ii) If we are currently at logical block 10 (the last block accessed was block 10) and want to access logical block 4, how many physical blocks must be read from the disk ?

(b) Define the following :

(i) Sector, track, cylinder

(ii) seek time, latency time

(iii) Contiguous, indexed, linked allocation

(iv) SCAN algorithm.

(c) (i) In what circumstances is the system call sequence fork exevce most appropriate? When is Vfork preferable?

(ii) What socket type should be used to implement an intercomputer file transfer program? Why? What type should be used for a program that periodically tests to see if another computer is up on the network?
