

AMIETE – CS (OLD SCHEME)

Time: 3 Hours

JUNE 2012

Max. Marks: 100

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

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2 × 10)

- a. Which of the following is not part of the monitor?
- (A) Control card interpreter (B) Device drivers
(C) Loader (D) None of these
- b. The smallest block that can be read or written on a disk is called ____.
- (A) sector (B) track
(C) cylinder (D) controller
- c. Which is not an activity of an operating system in regard to secondary-storage management?
- (A) Free-space management.
(B) Storage allocation
(C) Disk scheduling
(D) The creation and deletion of directories
- d. When a job is completed, or when the degree of multiprogramming hasn't yet been reached, Which scheduler is invoked?
- (A) Long term scheduler (B) Short term scheduler
(C) Medium term scheduler (D) None of these
- e. Number of jobs in the current mix of running/waiting jobs _____.
- (A) Occurs when we have one CPU-bound job and many I/O-bound jobs
(B) Occurs when we have many CPU-bound jobs and many I/O-bound jobs.
(C) Occurs when we have many CPU-bound jobs and one I/O-bound job
(D) None of the above

- f. _____ is a sequence of instructions which, when executed as an atomic unit, takes the database from a consistent state to a consistent state.
- (A) algorithm (B) transaction
(C) process (D) List
- g. A base register used to give the lowest physical address for a process is called _____.
- (A) Overlay (B) limit Register
(C) relocation Register (D) None of these
- h. The collection of all tracks of the same radius on a multiplatter disk is called _____.
- (A) surface (B) track
(C) sector (D) cylinder
- i. Which of the following is false?
- (A) A tree structure where links can go from one branch to a node earlier in the same branch or other branch, allowing cycles is called general graph.
(B) in general graph directory structure, Searching for a particular file may result in searching the same directory many times
(C) In general directory structure, deletion of the file may result in the reference count to be nonzero even when no directories point to that file.
(D) None of these
- j. File Allocation Table (FAT) is used in
- (A) MS-DOS (B) OS/2
(C) UNIX (D) All of the above

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

- Q.2** a. What are the main differences between operating systems for mainframe computers and personal computers? What is the main difficulty that a programmer must overcome in writing an operating system for a real-time environment? (3)
- b. When are caches useful? What problems do they solve? What problems do they cause? If a cache can be made as large as the device for which it is caching (for instance, a cache as large as a disk), why not make it that large and eliminate the device? (4)
- c. What are the three major activities of an operating system in regard to
- (i) Process management
(ii) Memory management
(iii) Secondary-storage management (9)

- Q.3**
- a. Describe the differences among short-term, medium-term, and long-term scheduling. (6)
 - b. What two advantages do threads have over multiple processes? What major disadvantage do they have? Suggest one application that would benefit from the use of threads, and one that would not. (4)
 - c. Suppose that the following processes arrive for execution at the times 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
P1	0.0	8
P2	0.4	4
P3	1.0	1

- (i) What is the average turnaround time for these processes with the CFS scheduling algorithm? Draw Gantt chart.
- (ii) What is the average turnaround time for these processes with the SJF scheduling algorithm? Draw Gantt chart. (6)

- Q.4**
- a. Define and explain three classical problems of Synchronisation. (9)
 - b. Consider a system with five processes P_0 through P_4 ; 3 resource types A (10 instances), B (5 instances) and C (7 instances). Suppose snapshot at time T_0 is as follows:

	<u>Allocation</u>	<u>Max</u>	<u>Available</u>
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

Answer the following questions using the banker's algorithm:

- (i) What is the content of the matrix Need?
- (ii) Is the system in a safe state?
- (iii) If a request from process P1 arrives for (1,0,6), can the request be granted immediately? (7)

- Q.5**
- a. When do page faults occur? Describe the actions taken by the operating system when a page fault occurs. Explain using suitable diagram. (8)
 - b. What is meant by an allocation method? Explain major methods of allocating disk space. Write advantages and disadvantages of each method. (8)

- Q.6**
- a. Explain using suitable example-External and Internal fragmentation. (4)
 - b. Explain interrupt-driven I/O cycle using a suitable diagram. (6)

- c. Suppose that a disk drive has 200 cylinders, numbered 0 to 199. If the disk head is initially at cylinder 53 and the queue of pending requests, in FIFO order, is 98,183,37,122,14,124,65,67
Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk-scheduling algorithms?
- (i) FCFS (ii) SSTF (iii) SCAN (6)
- Q.7** a. What are four main reasons for building distributed systems? Briefly elaborate each of these. (8)
- b. Explain two complementary deadlock-prevention schemes using timestamps: wait-die and wound-wait scheme. Why is deadlock detection much more expensive in a distributed environment than it is in a centralized environment? (8)
- Q.8** a. Differentiate between protection and security. Explain the techniques used for protection of user files. (8)
- b. Multithreading is a commonly used programming technique. Describe three different ways that threads could be implemented. Explain how these ways compare to the Linux clone mechanism. When might each alternative mechanism be better or worse than using clones? (8)
- Q.9** a. Write a brief note on the following (Any **FOUR**):
- (i) Cryptography
(ii) Architecture of Windows-2000
(iii) Stateful vs Stateless service
(iv) RAID structure
(v) NFS (4×4)