

B.Tech 5th Semester Exam., 2017

OPERATING SYSTEMS

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer (any seven) :

2×7=14

(a) The operating system manages

- (i) memory
- (ii) processes
- (iii) disks and I/O devices
- (iv) All of the above

(b) When a computer is turned on or restarted, a special type of absolute loader called _____ is executed.

- (i) compile and go loader
- (ii) boot loader
- (iii) bootstrap loader
- (iv) relating loader

(c) In which type of operating systems, the response time is very crucial?

- (i) Unix Operating System
- (ii) Real-time Operating System
- (iii) Batch Operating System
- (iv) Network Operating System

(d) Bringing a page into the memory only when it is needed is called

- (i) deadlock
- (ii) page fault
- (iii) dormant paging
- (iv) demand paging

(e) A page fault occurs when

- (i) deadlock happens
- (ii) segmentation starts
- (iii) page is found in the memory
- (iv) page is not found in the memory

(f) A program in execution is called

- (i) paging
- (ii) process
- (iii) virtual memory
- (iv) demand page

- (g) Copying a process from memory to disk to allow space for other processes is called
- (i) swapping
 - (ii) deadlock
 - (iii) demand paging
 - (iv) page fault
- (h) What does Belady's anomaly relate to?
- (i) Page Replacement Algorithm
 - (ii) Memory Management Algorithm
 - (iii) Deadlock Prevention Algorithm
 - (iv) Disk Scheduling Algorithm
- (i) The piece of code that only one thread should execute at a time is called
- (i) mutual exclusion
 - (ii) critical section
 - (iii) synchronization
 - (iv) None of the above
- (j) When a process waits indefinitely for some resources which are being used by other processes, it is called
- (i) Starvation
 - (ii) Demand Paging
 - (iii) Segmentation
 - (iv) None of the above

(Turn Over)

2. (a) Explain the layered structure of an operating system with the help of a diagram. Discuss the various functions performed by the operating system.
- (b) Explain the concept of a process. With the help of a state transition diagram, discuss the various process states. 7+7=14
3. Consider the following set of processes with the length of CPU burst time in milliseconds :

Process	Burst Time (ms)	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order P1, P2, P3, P4, P5 and all at time 0.

- (a) Draw Gantt chart, illustrating the execution of these processes using FCFS, SJF, and Round Robin (quantum = 1) scheduling.
- (b) What is turnaround time of each process for each of the above scheduling algorithms in part (a)?

- (c) What is the waiting time for each process for each of the scheduling algorithms in part (a)?
- (d) Which of the schedules in part (a), results in the overall minimal average waiting time? 14
4. (a) Explain the critical section problem with the help of an example. Discuss the requirements that need to be satisfied for a solution of the critical section problem.
- (b) Elaborate upon the conditions necessary for a deadlock situation to arise. 7+7=14
5. (a) With the help of a labelled diagram, explain how logical address is translated into physical address using paging mechanism.
- (b) What are the various memory allocation schemes? 7+7=14
6. (a) Discuss with examples the following page replacement algorithms :
- (i) FIFO
- (ii) LRU
- (b) Differentiate between external and internal fragmentations. 10+4=14

7. (a) Explain the usage of Resource Allocation Graph for Deadlock Avoidance.
- (b) What is meant by directory? Briefly discuss the various structures of a directory. 5+9=14
8. Suppose that a disk drive has 5000 cylinders, numbered 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 requests, in FIFO order, is :
- 86, 1470, 913, 1774, 948,
1509, 1022, 1750, 130
- 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? 14
- (a) FCFS
- (b) SSTF
- (c) C-SCAN
9. Write short notes on the following : 14
- (a) Process control block
- (b) Schedulers
- (c) Semaphores
