

2009
OPERATING SYSTEMS

GROUP - A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following:
- i) If a process has 32k bytes logical address space and the page size is 2048 bytes then the number of frames of that process is
 - a) 4
 - ✓c) 16
 - b) 8
 - d) 32
 - ii) What is a shell?
 - a) it is a hardware component
 - ✓b) it is a command interpreter
 - c) it is a part in compiler
 - d) it is a tool in CPU scheduling
 - iii) Variable partition memory allocation can lead to
 - ✓a) external fragmentation
 - c) both (a) and (b)
 - b) internal fragmentation
 - d) none of these
 - iv) Suppose that a process is in BLOCKED state waiting for some I/O service. When the service is completed, it goes to the
 - a) RUNNING state
 - c) SUSPENDED state
 - ✓b) READY state
 - d) TERMINATED state
 - v) IPC stands for
 - a) Internal Program Controller
 - c) ✓Interprocess Communication
 - b) Internal Process Controller
 - d) None of these
 - vi) SPOOLING stands for
 - ✓a) Spontaneous Peripheral Operation Online
 - b) Small Peripheral Operation Online
 - c) Simultaneous Peripheral operation Online
 - d) None of these
 - vii) Page fault occurs when
 - a) the page is corrupted by application software
 - ✓b) the page is not in main memory
 - c) the page is in main memory
 - d) one tries to divide a number by 0
 - viii) Page stealing is
 - a) a sign of efficient system
 - b) taking larger disk spaces for pages paged out
 - c) taking page frames from other working sets

- d) one of the tuning goals
- ix) The general structure of process consists of
 - a) critical section
 - b) reminder section
 - c) race condition
 - d) both (a) & (b)
- x) Scheduling a process from Ready Queue to CPU is done by
 - ✓a) Short Term Scheduler
 - b) Middle Term Scheduler
 - c) Long Term Scheduler
 - d) Dispatcher

GROUP – B

(Short Answer Type Questions)

Answer any three of the following.

2. a) What is “response time”?
 b) With the help of a state transition diagram, explain various states of a process.
 c) What is a zombie process and how it may manifest itself?
3. Suppose a disk drive has 300 cylinders, numbered 0 to 229. The current head position of the disk is at 90. The queue of pending requests, in FIFO order is 36, 79, 15, 120, 199, 270, 89, 170. Calculate the average cylinder movements for the Shortest Seek Time First (SSTF) algorithm. Mention any one disadvantage of SSTF.
4. a) Describe process control block with proper explanation.
 b) What is the process of system calls?
5. a) Mention one characteristic each of Time Sharing System and Batch Processing System.
 b) What are the advantages and disadvantages of having unequal size partitions in fixed partitioning scheme?
6. a) Why are page sizes always powers of 2?
 b) What is the difference between logical and physical addresses?

✓

GROUP – C

(Long Answer Type Questions)

Answer any three of the following.

7. a) Consider the following snapshot of a system where r_i ($i = 1 \dots 4$) denote resources types P1 to P5 denote processes. The vector 'Available' has usual meaning.

Available

r1	r2	r3	r4
2	1	0	0

Current Allocation:

maximum demand:

Process	r1	r2	r3	r4	r1	r2	r3	r4
P1	0	0	1	2	0	0	1	2
P2	2	0	0	0	2	7	5	0
P3	0	0	3	4	6	6	5	6
P4	2	3	5	4	4	3	5	6
P5	0	3	3	2	0	6	5	2

- i) Is this system currently in a safe state? Justify the answer.
ii) If a request from P3 arrive for (0, 1, 0, 0), can that request be safely granted immediately?

b) Consider the following set of process. CPU burst time of them is given in milliseconds.

Process	CPU Burst Time (ms)
P1	15
P2	5
P3	7
P4	10

Draw the Gantt chart for Round Robin scheduling where time quantum $q = 4$ milliseconds.

Calculate the average waiting time and turn around time.

Mention the advantages and disadvantages of round Robin scheduling.

8. a) Consider a system with a 32-bit logical address space, a two-level paging scheme, 4 byte page table entries, 1 kB pages and a 4 entry TLB. The page-table base register access time is 0 ns, TLB access time 10 ns and memory access time is 100 ns.

- i) How many address bits are needed for the page offset?
ii) How much memory in bytes is required to store the outer page table entirely in main memory?

b) i) Given references to the following pages by a program,

0, 9, 0, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7

How many page faults will occur if the program has three (3) page frames available to it and uses FIFO replacement strategy and LRU replacement strategy.

- ii) Which replacement strategy in the above performs better and why?
9. a) On a simple paged system, if references satisfied by the associative registers take 100 ns and references through the main memory page table take 180 ns, what must the hit ratio be to achieve an effective access time of 125 ns?
b) What are the two major differences between segmentation and paging?
c) How paging implemented in hardware?
d) What is internal fragmentation?
10. a) What is context switching? Why is it considered to be an overhead?
b) What are the differences between process and thread?
c) "All unsafe states may not lead to deadlock." – Why or why not?
d) What is thrashing? What is its effect on the system?
11. Write short notes on the following:
a) Kernel level thread
b) Scan disk scheduling algorithm
c) Linked file allocation technique
d) Belady's anomaly
e) Shortest Job First (SJF) scheduling