CS/B.Tech (CSE)/NEW/SEM-6/CS-603/2013

2013
OPERATING SYSTEM

Time Allotted : 3 Hours   *Full Marks* : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A
(Multiple Choice Type Questions)

1. Choose the correct alternatives for the following :

                                                                $10 \times 1 = 10$

   i)   Translation look aside Buffer is a kind of

        a)   interrupt   b)   cache

        c)   virtual memory   d)   i/o device.

   ii) Address generated by CPU is generally referred to as

        a)   Logical   b)   Relational

        c)   Virtual   d)   Physical.

   iii) Paging suffers from

        a)   Internal fragmentation

        b)   External fragmentation

        c)   both (a) & (b)

        d)   none of these.

iv) Which of the following algorithm generally suffers from Belady's anomaly

    a) Optimal   b) FIFO

    c) LRU   d) all of these.

v) Concurrent processes

    a) overlap in space   b) do not overlap in time

    c) overlap in time   d) both (a) and (c).

vi) Thread is referred to as

    a) lightweight process   b) process

    c) program   d) set of processes.

vii) Swap space generally resides on

    a) main memory   b) files

    c) programs   d) disk.

viii) Disk I/O is generally done in terms of

    a) Sectors   b) Bytes

    c) Blocks   d) Bits.

ix) The first block of a file system is

    a) Superblock   b) Inode blocks

    c) Data block   d) Boot block.

x) Encryption is the process of

    a) hiding information

    b) authenticating information

    c) both (a) & (b)

    d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2. a) What are the operations on a semaphore ?   1

   b) What are the problems with these operations if these follow the classical definition ?   2

   c) What is the possible remedy to the above problem ?   2

3. Consider the following set of processes with corresponding arrival times and burst times :

Process	Arrival Time (units)	CPU Burst Time (Units)
P1	0	6
P2	3	10
P3	5	8
P4	7	5
p5	10	6

Draw the Gantt chart considering Round Robin scheduling policy with time quantum = 4 units. Calculate individual turnaround time and average waiting time.   1 + 2 + 2
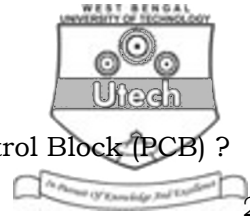
4. a) What are the contents of process control Block (PCB) ?

2

b) Under what conditions the following state transition occurs with respect to a process ?

   i) Run to Ready,

   ii) Blocked (or wait) to Ready 3

5. a) What are the relative advantages and disadvantages of user level thread and kernel level thread ? 3

   b) What is thrashing ? 2

6. a) What is seek time ? What is rotational latency ? 3

   b) What are the advantages of SCAN disk scheduling technique over circular SCAN disk scheduling technique ? 2
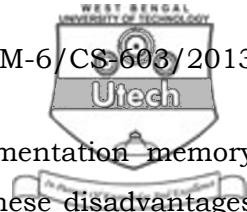
GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. 3 × 15 = 45

7. a) Consider the following page reference string and a memory consisting of 4 frames : 1, 2, 3, 4, 5, 6, 1, 2, 3, 4, 5, 6

   Find the number of page faults considering

   i) FIFO page replacement strategy

   ii) LRU page replacement strategy.

   Comment on the results obtained. 4 + 4 + 1

b) What are the disadvantages of segmentation memory management technique ? How can these disadvantages be avoided if segmentation with paging is used ? 4

c) Why are page sizes always powers of 2 ? 2

8. a) Consider the following snapshot of a system :

Process	Allocation	Max	Available
	A B C D	A B C D	A B C D
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using banker's algorithm :

i) What is the content of need Matrix ?

ii) Is the system in safe state ?

iii) If the request for P1 arrives for (0,4,2,0) can the request be granted immediately ? 3 + 4 + 3

b) What are the four necessary conditions for deadlock to occur in a system ? Explain. 5

9. a) Differentiate between Blocking *vs* Non-Blocking input-output. 4

b) What is Direct Memory Access ? How is it performed ? What are its benefits ? 5

c) A system has 8 physical frames. There are 7 processes in the system of which 4 processes have 2 pages each and 3 processes have 1 page each. The system uses inverted page table. Find the total number of page table entries in the system. Justify your answer. 4

d) Why is context switching considered to be time consuming ? 2

10. a) Explain the working of Shortest Seek Time First (SSTF) disk scheduling policy. What are its advantages and disadvantages ? 4

b) Suppose a disk drive has 300 cylinders, numbered 0 to 299. The current position of the desk arm is 90. The queue of pending requests, in FIFO order is 36, 79, 15, 120, 199, 270, 89, 170. Calculate the average movements for the following algorithms :

i) FCFS

ii) SSTF. 8

c) Explain the worst fit algorithm for memory management. What are its benefits ? 3
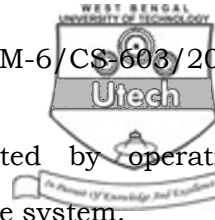
11. a) Explain any one technique adopted by operating systems for protection of objects in the system. 4

   b) What are the advantages and disadvantages of linked file Allocation Technique ? 3

   c) How does Indexed file Allocation Technique overcome the above disadvantages ? 3

   d) What is compaction ? What are its overheads ? 3

   e) What is the difference between starvation and deadlock ? 2

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