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CS/B.Tech (IT-NEW)/SEM-5/IT-503/2013-14
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 any *ten* of the following : $10 \times 1 = 10$

i) A thread is referred to as

a) process b) light weight process

c) task d) program.

ii) CPU generates

a) logical address b) physical address

c) both (a) & (b) d) none of these.

iii) Which page replacement algorithm suffers from Belady's anomaly ?

a) LRU b) Optimal

c) FIFO d) All of these.

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iv) Which of the following loaders is executed when a system in first turned on or restarted ?

a) Compile and Go loader

b) Boot strap loader

c) Relative loader

d) Absolute loader and relative loader.

v) IPC stands for

a) Internal Program Controller

b) Inter Process Communication

c) Internal Process Controller

d) None of these.

vi) 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 b) SUSPENDED

c) READY d) TERMINATED.

vii) Which is *not* a valid process state ?

a) New b) Ready

c) Run d) Load.

viii) Which of the following memory allocation schemes suffers from external fragmentation ?

a) Segmentation b) Swapping

c) Paging d) None of these.

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ix) The default remedy of starvation is

a) ageing b) critical section

c) mutual exclusion d) all of these.

x) Which of the following is crucial time while accessing data on the disk ?

a) Seek time b) Rotational time

c) Transmission time d) Waiting time.

xi) The full form of SPOOL is

a) Shared Processor Object Oriented Language

b) Special Purpose Object Oriented Language

c) Simultaneous Peripheral Operations Online

d) None of these.

xii) Time required for read-write head to move to desired cylinder is

a) transfer time b) seek time

c) rotational latency d) none of these.

GROUP – B

(Short Answer Type Questions)

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

2. Write down all the necessary conditions of Deadlock.

3. a) What is context switch ?

b) What is translation look aside buffer ? Why is it used ? 2 + 3

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4. Consider the following set of processes with their respective CPU execution times. Assume that they have arrived in the order shown. Draw the Gantt chart for Round Robin scheduling with time quantum = 5 time uits. Calculate turnaround time of each process.

Process	Arrival time	CPU time
*P*1	0	13
*P*2	2	6
*P*3	3	10
*P*4	5	8

5. a) What do you understand by Race condition ?

b) What are the conditions for solution to Mutual Exclusion problem ? 1 + 4

6. a) What is a multiuser, multiprogram operating system ?

b) What is virtual memory concept ? How is it supported and implemented ? 2 + 3

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GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

a) Discuss the relative advantages and disadvantages of segmentation and paging.

b) Consider the following page reference string :

1, 2, 3, 4, 21, 56, 21, 2, 3, 7, 6, 3, 2, 1, 2, 36

How many page faults would occur for the following replacement algorithms ? Assume 4 frames are available.

i) LRU replacement

ii) FIFO replacement.

c) What is thrashing ? $5 + 8 + 2$

a) What is rotational latency ?

b) What are the advantages of Shortest Seek Time First and Scan disk scheduling algorithms ?

c) What are the disadvantages of First Come First Served disk scheduling algorithm ?

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d) Suppose a disk drive has 300 cylinders numbere 0-299. The current position of the arm is at 90. Th queue of the pending request in FIFO order is 36, 79 15, 120, 199, 270, 89, 170.

Calculate the average movements for the followin algorithm :

C-SCAN (arm is moving towards 299). $1 + 5 + 3 +$

9. a) Consider the following snapshot of a system wher *P*0, ... , *P*4 are the processes and *A*, *B*, *C*, *D* ar resource types.

	Allocation				Max				Available			
	A	*B*	*C*	*D*	*A*	*B*	*C*	*D*	*A*	*B*	*C*	
*P*0	0	0	1	2	0	0	1	2	1	5	2	
*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				

i) What is the content of need matrix ?

ii) Is the system in safe state ?

iii) If a request from process *P*1 arrives for 0, 4, 2, can the request be granted immediately ?

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b) What is the difference between Deadlock avoidance and Deadlock prevention techniques ?

c) Discuss any one Deadlock prevention technique with its disadvantages and advantages.

10. a) What are the advantages and disadvantages of the Best Fit algorithm ?

b) What are the advantages of the First fit algorithm ?

c) What are the differences between the two types of fragmentation in memory ?

d) Given memory partitions of 100 kB, 500 kB, 300 kB, and 600 kB (in order) :

i) How would each of the First Fit, Best Fit, Worst Fit algorithms (consider separately) place processes of 212 kB, 417 kB, 112 kB and 426 kB (in order) ?

ii) Which algorithm makes the most efficient use of memory ? 4 + 2 + 2 + (6 + 1)

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11. a) What is dynamic loading and what is dynamic linking ? How are they related ?

b) What is demand paging ? What are its advantages and disadvantages ?

c) What is Semaphore ? What are the operations on it ?

(2 + 2 + 2) + (2 + 3) + (2 + 2)

12. Write short notes on any *three* of the following : 3 × 5

a) DMA

b) Linked file allocation

c) Multilevel feedback queue scheduling

d) Time sharing OS or Batch processing OS

e) Free-space management technique (any *one*) of disk

f) Blocking and Non-blocking I/O.

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