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Paper Code : MCA-301

PUID : 03149 (To be mentioned in the main answer script)

OPERATING SYSTEMS AND SYSTEMS SOFTWARE

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) CPU performance is measured by
   a) Throughput b) Mbps
   c) MHz d) None of these.

ii) The scheduler which selects jobs from a pool of jobs and loads them into ready queue is
   a) long term scheduler
   b) Short term scheduler
   c) medium term scheduler
   d) none of these.

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iii) If a process is in BLOCKED state waiting for I/O service then after completion of the service it will go to the
   a) READY state b) TERMINATED state
   c) NEW state d) None of these.

iv) In which of the following scheduling policies context switching will never tale place
   a) Round Robin
   b) First come first serve
   c) Shortest remaining time next
   d) Pre-emptive.

v) Throughput is
   a) a process that the completed per unit time
   b) completion of the whole process
   c) time for waiting in the ready queue
   d) waiting to get into memory.

vi) Which is not a layer of Operating System ?
   a) Kernel b) Shell
   c) Application program d) Critical section.

vii) Semaphore is a
   a) function b) variable
   c) macro d) none of these.

viii) The Banker's algorithm is used

a) to prevent deadlock in operating system

b) to detect deadlock in operating system

c) to rectify a deadlocked state

d) none of these.

ix) Which one of these is not page replacement algorithm ?

a) LRU replacement

b) Memory replacement

c) Process replacement

d) Optimal replacement.

x) Which scheduling algorithm is inherently preemptive ?

a) FCFS b) SJF

c) RR d) Priority scheduling.

xi) Which of the following are not the system calls ?

a) Chmod b) Open

c) Lseek d) Gate.

xii) Thrashing

a) Reduces page I/O

b) Decreases degree of multiprogramming

c) Implies exclusive page I/O

d) Improves the system performance.

GROUP – B
(Short Answer Type Questions)

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

2. What is process ? Draw the state diagram of a process and describe it.

3. What is PCB ? Describe it with suitable diagram.

4. What is demand paging ? What is kernel ?

5. what is the problem of fragmentation and how can it be solved ?

6. Explain main purpose of an operating system.

GROUP – C
(Long Answer Type Questions)

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

7. a) Briefly explain the critical section problem.

b) Mention the criteria which must be satisfied to solve the critical section problem.

c) What is semaphore ? What are the variants ?

d) Briefly explain the role of semaphore in relation to critical section problem.

e) Differentiate between pre-emptive and non-pre-emptive scheduling of processes. 3 + 3 + 3 + 3 + 3

8. Describe the task of long term, short term and medium term scheduler with diagram. Consider the following set of processes. CPU burst times of them are given below in milliseconds.

Process	Burst time	Arrival time
P1	3	1
P2	8	0
P3	1	2
P4	5	4
P5	2	5

Draw the gnat chart and calculate average waiting time, average turnaround time for

a) FCFS

b) R. R scheduling where time quantum q = 2 milliseconds

c) SRTF. (1 + 2 + 2) × 3

9. a) What is deadlock ?

b) Describe the conditions for the occurrence of deadlock.

c) 'All unsafe states may not lead to deadlock'. Why or why not ?

d) Consider the following snapshot of a system :

Process	Allocation	Max	Availabe
	A B C D	A B C D	A B C D
P0	0 0 1 2	0 0 1 2	1 5 2 0
P1	1 0 0 0	1 7 5 0	
P2	1 3 5 4	2 3 5 6	
P3	0 6 3 2	0 6 5 6	
P4	0 0 1 4	0 6 5 6	

Answer the following questions using the Banker's algorithm :

i) What is the content of the matrix need ?

ii) Is the system a safe state ? 2 + 4 + 3 + (3 + 3)

10. a) What are seek time and latency time ? A disk has tracks (numbered 0 through 199). At a given time, it was servicing the request of reading data from track 120 and at the previous request, service was for track 90. The pending request (in order of their arrival) is for track numbers- 30 70 115 110 80 20 25.

b) How many times will the head change its direction for the disk scheduling policies

i) SSFT (shortest seek time first)

ii) FCFS (first come first serve) ? 7 + 8

11. What is RPC ? Discuss the multiprocessor classification based on Flynn's scheme and also explain advantages of Multiprocessor. 5 + 10