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Paper Code : BCA-301

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) Virtual memory is

      a) an extremely large main memory

      b) an extremely large secondary memory

      c) an illusion of extremely large storage provision

      d) a type of memory used in super computers.

ii) The time required for read-write head to travel to target cylinder called

a) latency time b) seek time

c) transfer time d) none of these.

iii) The number of processes completed per unit time is known as

a) output b) throughput

c) efficiency d) capacity.

iv) Context swiching is

a) part of spooling

b) part of poling

c) part of interrupt handing

d) part of interrupt servicing.

v) Which of the following is also known as multilevel adaptive scheduling ?

a) Multilevel queue scheduling

b) Multilevel scheduling

c) Multilevel feedback queue scheduling

d) None of these.

vi) Which of the following requirements must be met by a solution to critical-section problem ?

a) Bounded waiting b) Progress

c) Mutual exclusion d) All of these.

vii) Which of the following algorithms suffers from Belady's anomaly ?

a) Optimal page replacement

b) LRU page replacement

c) FIFO page replacement

d) None of these.

viii) FIFO scheduling is

a) Preemptive scheduling

b) Non-preemptive scheduling

c) Deadline scheduling

d) Fair share scheduling.

ix) The time elapsed between the job submission and its completion is

a) Response time

b) Waiting time

c) Turnaround time

d) Terminal response time.

x) Dispatcher of an OS

a) invokes a pager during page fault

b) is a scheduler

c) gives control of CPU to the process selected by long term scheduler

d) gives control of CPU to the process selected by short term scheduler.

xi) Which of the following is used for implementing control synchronization ?

a) Semaphore b) Precedence Graph .

c) Monitors d) Peterson's algorithm.

GROUP – B

(Short Answer Type Questions)

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

2. a) What is an Operating System ? What are the functions of Operating System ?

b) Explain "multitasking is logical extension of multiprogramming". 3 + 2

3. Describe shared resource system and message passing system. $2\frac{1}{2} + 2\frac{1}{2}$

4. a) Discuss Belady's anomaly.

   b) What is "thrashing" ? 4 + 1

5. Differentiate between external fragmentation and internal fragmentation.

6. What is race condition ? Explain Peterson solution for avoiding race condition.

GROUP – C

(Long Answer Type Questions)

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

7. Suppose that the following processes arrive for execute at the time indicated :

Process	Arrival Time	Duration
P1	0	6
P2	2	4
P3	3	7
P4	5	2

Draw Gantt chart and determine average waiting time using

(i) FCFS, (ii) RR, (iii) SJF (preemptive) algorithm. 5 + 5 + 5

8. a) Consider the following resource allocation state involving processes P0, P1, P2, P3, P4 and P5 and resources R0, R1, R2 and R3 :

Process	Allocation				Max				Available			
	R0	R1	R2	R3	R0	R1	R2	R3	R0	R1	R2	R3
P0	1	0	0	2	2	3	5	3	1	2	3	3
P1	0	0	2	0	2	1	3	5				
P2	1	0	3	0	1	2	3	2				
P3	1	2	3	4	2	3	3	6				
P4	1	0	0	3	2	4	5	6				
P5	0	1	3	2	3	5	7	8				

Answer the following questions using banker's algorithm.

i) What is the content of matrix need ?

ii) Is the system in a safe state ?

iii) If a request from process P1 arrives for (5, 2, 7, 9) can the request be granted immediately ?

b) Differentiate between process switching and context switching.

c) Under which condition does page fault occur ?

10 + 3 + 2

9. a) What is critical section problem ? What are the requirements that the solution to critical section problem must satisfy ?

   b) What is semaphore ? How is it accessed ? Explain the Dining philosopher's problem and give the solution of it using monitor. 5 + 10

10. Consider the following page reference string :

    1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6

    How many page faults would occur using FIFO, Optimal, LRU and LFU replacement algorithm ? Assume four frames. 3 + 4 + 4 + 4

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

    a) Multi-Queue Scheduling

    b) Resource Allocation Graph (RAG)

    c) Round Robin Scheduling Method

    d) Readers-Writers Problem

    e) Virus and Worm.