



**MAULANA ABUL KALAM AZAD UNIVERSITY OF
TECHNOLOGY, WEST BENGAL**

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 × 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 switching 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. $3 \times 5 = 15$

- 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.
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