



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

Paper Code : CS-603

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) A page fault occurs
- a) when the page is not in the memory
 - b) when the page is in the memory
 - c) when the process enters the blocked state
 - d) when the process is in the ready state.

- ii) Which is the fastest of the following ?
- a) Cache memory
 - b) RAM
 - c) CD-ROM
 - d) Register.
- iii) What is a shell ?
- a) It is a hardware component
 - b) It is a command interpreter
 - c) It is a part in compiler
 - d) It is a tool in CPU scheduling.
- iv) A thread is a
- a) Task
 - b) Program
 - c) Process
 - d) Lightweight process.
- v) Round Robin scheduling is essentially the preemptive version of
- a) FIFO
 - b) Shortest Job First
 - c) Shortest Remaining Time First
 - d) Longest Time First.
- vi) In order to allow only one process to enter its critical section, binary semaphores are initialized to
- a) 0
 - b) 1
 - c) 2
 - d) 3.

vii) Banker's algorithm for resource allocation deals with

- a) Deadlock prevention
- b) **Deadlock avoidance**
- c) Deadlock recovery
- d) Mutual exclusion.

viii) Which of the following page replacement algorithms suffers from Belady's anomaly ?

- a) Optimal
- b) LRU
- c) **FIFO**
- d) Both (a) and (b).

ix) The mechanism that brings a page into memory only when it is needed, is called

- a) Segmentation
- b) Fragmentation
- c) **Demand paging**
- d) Page and replacement.

x) If UNIX command *chmod 756* is applied to a file, then *others* will have

- a) **Read and write permission**
- b) Read and execute permission
- c) Write and execute permission
- d) None of these.

xi) Which of the following resources can cause deadlocks ?

- a) Read only files
- b) **Shared programs**
- c) Printers
- d) All of these.

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

- a) Output
- b) **Throughput**
- c) Efficiency
- d) Capacity.

GROUP - B

(Short Answer Type Questions)

Answer any three of the following. $3 \times 5 = 15$

2. a) What is kernel ?
b) State the functions of system call. $2 + 3$
3. a) What do you mean by real time system ?
b) Differentiate between soft and hard real time system. $2 + 3$
4. a) What is Medium Term scheduler ?
b) Describe the functions of short-term and long-term scheduler. $2 + 3$

5. a) What is deadlock ?
 b) Justify the following statement.
 "Cycle in resource allocation graph does not always imply the occurrence of deadlock." 1 + 4
6. a) Explain Race condition in context of process synchronization.
 b) What are semaphore and mutex ? 3 + 2

GROUP - C**(Long Answer Type Questions)**

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

7. a) What is thread ? Draw and explain thread life cycle.
 b) Differentiate between process and thread.
 c) Explain user and kernel thread in detail.
 (1 + 5) + 3 + 6
8. a) Explain the different states of a process using state transition diagram.
 b) What do you mean by preemptive and non-preemptive scheduling ?
 c) What is dispatcher ?

- d) Consider the following four processes, with the length of CPU-burst time given in milliseconds :

Processes	Arrival time	Burst time
P1	0	12
P2	0	10
P3	1	4
P4	4	10
P5	2	12

Draw the Gantt chart using RR scheduling with time slice 3ms. Calculate average waiting time and average turn around time. 4 + 3 + 2 + 6

9. Write a program using 'signal' to demonstrate a race condition.
10. Write a program using 'fork' to demonstrate the mother-child relationship of processes.
11. a) What is overlay ?
 b) What are the advantages of segmentation over paging ?
 c) Explain the difference between internal fragmentation and external fragmentation. Which one occurs in paging system ? How the problem of external fragmentation be solved ?
 d) State the advantages and disadvantages of single contiguous memory allocation.

$$2 + 3 + (2 + 1 + 3) + 4$$

12. a) What is the purpose of modify bit in page table ?

b) Consider the following page reference string :

7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1

How many page faults would occur for the following replacement algorithms, assuming 3 frames are available and initially none of pages in main memory ?

i) Optimal replacement

ii) FIFO replacement.

c) What is Thrashing ?

d) Explain Belady's anomaly.

$$2 + 8 + 2 + 3$$

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