MAULANA ABUL KALAM AZAD UNIVERSITY OF TECHNOLOGY, WEST BENGAL

MCA-301

OPERATING SYSTEM AND SYSTEM SOFTWARE

Time Allotted: 3 Hours | Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.
All symbols are of usual significance.

GROUP A
(Multiple Choice Type Questions)

1. Answer *all* questions. $10 \times 1 = 10$

(i) MS DOS supports Software

(A) multiprogramming
(B) multitasking
(C) does not support multiprogramming
(D) none of these

(ii) Mutual exclusion problem occurs between

(A) two disjoint processes that do not interact
(B) processes that share resources
(C) processes that do not share resources
(D) none of these

(iii) Memory protection is of no use in a

(A) single user system (B) non-multiprogramming system
(C) non-multitasking system (D) none of these

(iv) Page fault occurs in

(A) the page not in main memory
(B) the page in main memory
(C) one tries to divide a number by 0
(D) the page is corrupted by application software

(v) Throughput is

(A) a process that is completed per unit time
(B) completion of the whole process
(C) time for waiting in ready queue
(D) waiting to get into memory

(vi) An address generated by CPU is referred as

(A) logical address (B) physical address
(C) relational address (D) virtual address

(vii) System calls are usually invoked by

(A) a software interrupt (B) polling
(C) an indirect jump (D) a privileged instruction

(viii) Which is not a page replacement algorithm?

(A) FIFO (B) OPT
(C) LRU (D) SJF

(ix) Pre-emptive scheduling examples are

(A) FCFS (B) SJF
(C) SRTN (D) Only (B) and (C)

(x) Compaction is used to solve

(A) external fragmentation (B) internal fragmentation
(C) both of (A) and (B) (D) none of these

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

2. (a) What is an Operating System? What are the functions of Operating System? 1+3+1
   (b) When do we say a system is "multiprogramming"?

3. Calculate average waiting time and average turnaround time using SJF Scheduling algorithm 3+2

Process	Arrival Time	CPU Burst
P0	0	6
P1	2	4
P2	3	10
P3	7	9

The processes are assumed to have arrived in the order P0, P1, P2, P3 all are at time 0.

4. (a) Discuss necessary condition for Deadlock. 4+1
   (b) What is "Thrashing"?

5. Differentiate between external fragmentation and internal fragmentation. 5

6. What is race condition? Explain Peterson solution avoiding race condition. 5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

7. (a) Explain the Dekker's algorithm for Mutual Exclusion. What are the necessary conditions for Deadlock to occur? Explain. (5+5)+5
   (b) Explain Dynamic Loading and Static Loading.

8. Explain thrashing. Explain with the suitable example the Segmentation technique. What are the disadvantages of Segmentation? Can it be overcome by Paging? Explain. 3+5+4+3

9. (a) Define Belady's Anomaly. Why does it occur in one-page replacement? 5
   (b) How can Access Matrix be implemented? 4
   (c) Consider the following page replacement string 6
   7, 8, 9, 0, and 9, 1, 0, 8, 7, 9, 1
   Calculate the miss ratio by (a) LRU (b) FIFO, by considering 4 frames.

10.(a) What is TLB? What are the disadvantages for using it? 5+6+4
   (b) Find out the Effective Memory Access Time with an hit ratio of 80% and the following access time:
   (i) TLB access time = 20 ns (ii) MM access time = 100 ns
   (c) Briefly explain Indexed file allocation, and differentiate between Linked file Allocation.

11.(a) What are the different Disk scheduling algorithms? Mention at least 4 such algorithms. 5+5+5
   (b) What is Swapping? How does it help in file management technique?
   (c) Explain Compaction. Why does it become necessary in Dynamic Partitioning Technique?