



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

**Paper Code : IT-503**

**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 alternative of the following:**

**1×10=10**

- (i) Suppose that a process is in BLOCKED state waiting from some I/O service. When the service is completed, it goes to the  
(a) RUNNING state  (b) READY state  
(c) SUSPENDED state  (d) TERMINATED state
- (ii) Which of the following schemes suffers from external fragmentation?  
(a) Segmentation  (b) Paging  
(c) Spooling  (d) Buffering
- (iii) Where does the Swap space reside?  
(a) RAM  (b) Disk   
(c) ROM  (d) On-Chip Cache
- (iv) System calls are usually invoked by  
(a) a software interrupt  (b) polling  
(c) an indirect jump  (d) a privileged instruction
- (v) Time Sharing Operating system has  
(a) high through put  (b) low execution time  
(c) faster I/O  (d) None of these

**Turn Over**

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- (vi) Which Page replacement algorithm gives the lowest Page fault rate?  
(a) LRU (b) FIFO  
 (c) Optimal page replacement (d) None of these
- (vii) If there are 32 segments, each of size 1K, then the logical address should have  
(a) 10 bits (b) 14 bits  
 (c) 15 bits (d) 16 bits
- (viii) Which one of the following is not a valid state of a process?  
 (a) Load (b) Run  
(c) Wait (d) Terminate
- (ix) Compaction is used to solve the problem of  
 (a) external fragmentation (b) internal fragmentation  
(c) starvation (d) thrashing
- (x) To avoid race condition the maximum number of processes that may simultaneously be inside the critical section is  
(a) hundred  (b) one  
(c) two (d) three

Group - B

(Short Answer Type Questions)

Answer any three of the following.

5x3=15

2. (a) What are the necessary and sufficient conditions for deadlock to occur? 4+1=5  
(b) What is thrashing?
3. Different memory partitions of 150 K, 820 K, 360 K and 450 K (in the given order) are present. Explain how best fit algorithm can be used to place a process of 315 K.  
What are the advantages and disadvantages of using best fit over worst fit and first fit algorithms? 2+3=5
4. With example describe if resources are not properly allocated to the processes it may lead from a safe state to an unsafe state.
5. (a) What is process control block? 2+3=5  
(b) Explain whether any integer variable with similar Operations can act as semaphore or not.
6. (a) What are main features of Multiprocessor scheduling? 3+2=5  
(b) Briefly discuss Multiprocessor feedback queue scheduling.

**Group - C**

**(Long Answer Type Questions)**

**Answer any three of the following.**

15x3=45

7. (a) Mention the basic principle of RR Scheduling. Specify the impact of time quantum on its performance.
- (b) Consider the following set of processes. The CPU burst time of them are given in milliseconds:

Process	CPU burst time
P1	15
P2	5
P3	7
P4	10

Draw the gnat chart for FCFS and RR Scheduling where time quantum  $q=5$  milliseconds. Calculate the average waiting time.

- (c) Give reference to the following pages by a program,

0, 9, 0, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7

How many page fault will occur if the program has 3 page frames available in it when it uses

- (i) FIFO replacement, and <http://www.makaut.com>

- (ii) LRU replacement?

$$(2+2)+5+3+3=15$$

- (d) Explain CPU scheduling criteria.

- (a) What is semaphore? Differentiate between binary and counting semaphore.

- (b) What are the problems of busy-wait implementation of semaphore? Explain how it is solved.

- (c) Explain the difference between external fragmentation and internal fragmentation. Which one occurs in paging system?

$$(1+3)+(3+4)+4=15$$

- (a) What are the essential goals of disk scheduling? Why is each important?

- (b) A disk has 200 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 requests (in order of their arrival) are for track numbers 30, 70, 115, 143, 110, 80, 20, 25. How many times will the head change direction for the disk scheduling policies SSTF and FCFS?

$$5+5+2+3=15$$

- (c) What is the difference between logical and physical address?

- (d) What is compaction? What are the drawbacks of compaction?

- (e) What are seek time and latency time?

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- (b) Describe physical and logical formatting of disk.
- (c) Compare SSTF and C-SCAN algorithm in the context of disk scheduling.
- (d) Describe structure of FAT file system.

4+3+5+3=15

5×3=15

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

- (i) Linked File Allocation
- (ii) Segmentation
- (iii) i-node
- (iv) Belady's Anomaly
- (v) Kernel Level Thread

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