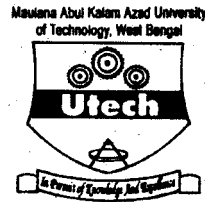


CS/MCA/ODD SEM/SEM-3/MCA-301/2016-17



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

Paper Code : MCA-301

OPERATING SYSTEM & SYSTEM SOFTWARE

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) The Operating System acts as a/an
 - a) Resource Manager
 - b) Interface
 - c) both (a) and (b)
 - d) none of these.

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[Turn over

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- ii) Which of the following is responsible for selecting a process among the Swapped-out processes and bringing it in the main memory ?
- a) Short-term scheduler
 - b) Medium-term scheduler
 - c) Long-term scheduler
 - d) None of these.
- iii) A process with multiple threads of control is referred to as a
- a) Multithreaded process
 - b) Single-threaded process
 - c) Lightweight process
 - d) Heavyweight process.
- iv) Which of the following Operating System modules performs the function of setting up the execution of the selected process on the CPU ?
- a) CPU scheduler
 - b) Job scheduler
 - c) Dispatcher
 - d) None of these.

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- 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 requirement 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 algorithm suffers from Belady's anomaly ?
- a) Optimal page replacement
 - b) LRU page replacement
 - c) FIFO page replacement
 - d) None of these.
- viii) In resource allocation graph a directed arc from a resource to a process is known as
- a) Request edge b) Claim edge
 - c) Assignment edge d) none of these.

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- ix) If there are 32 segments, each of size 1K, then the logical address should have
- a) 13 bits
 - b) 14 bits
 - c) 15 bits
 - d) 16 bits.
- x) Which of the following is used for implementing control synchronization ?
- a) Semaphore
 - b) Precedence Graph
 - c) Monitors
 - d) Peterson's algorithm.
- xi) Dirty bit is used to show the
- a) page with corrupted data
 - b) the wrong page in memory
 - c) page that is modified after being loaded into cache memory
 - d) page that is less frequently assessed.

GROUP - B

(Short Answer Type Questions)

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

2. a) What is the difference between Process and Program ?
- b) With the help of a state transition diagram, explain various states of a process. $2 + 3$

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3. Calculate average turnaround time using SJF (Pre-emptive and non pre-emptive) Scheduling algorithm :

$2 \times 2\frac{1}{2}$

<u>Process</u>	<u>Arrival Time</u>	<u>CPU Burst</u>
P_0	0	6
P_1	2	4
P_2	3	10
P_3	7	9

4. a) Discuss necessary condition for Deadlock.
 b) What is 'Resource allocation graph' ? $2 + 3$
5. Differentiate between External fragmentation and Internal fragmentation.
6. What is Belady's anomaly ? What is thrashing ? $3 + 2$

GROUP - C

(Long Answer Type Questions)

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

7. a) Differentiate between Paging and Segmentation.
 b) In a demand-paging scheme, how many pages must be loaded from a process to avoid thrashing ?
 c) Consider the following page reference string :

1, 2, 3, 4, 1, 2, 5, 1, 2, 3, 4, 5

Assume four frames.

How many page faults would occur for OPT replacement algorithm ? $4 + 6 + 5$

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8. Calculate the average cylinder movements for the following algorithms : 5 × 3

- i) FCFS
- ii) SSTF
- iii) SCAN
- iv) C-SCAN
- v) LOOK

whereas assume that, Work Queue is 23, 89, 132, 42, 187 and there are 200 cylinders numbered from 0-199 and the disk head starts at number 100.

9. a) Explain if it is possible to have a deadlock involving one single process.
- b) What are the differences between deadlock Prevention and deadlock Avoidance approaches for handling deadlock ?
- c) Consider the following snapshot of a system :

Process	Allocation				Request				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P_0	0	0	1	2	0	0	1	2	1	5	2	0
P_1	1	0	0	0	1	7	5	0				
P_2	1	3	5	4	2	3	5	6				
P_3	0	6	3	2	0	6	5	2				
P_4	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's Algorithm :

- i) What is the content of matrix need ?

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- ii) Is the given system in a safe state ?
- iii) If a request from P_1 arrives for (0,4,2,0) can the request be granted immediately ?

$$2 + 5 + (2 + 3 + 3)$$

10. a) Explain contiguous allocation and linked list allocation for implementing file storage.
- b) Explain critical section problem. State how to solve critical section problem.
- c) What are the tasks of loader ?
- d) What are the tasks of linker ? $5 + 6 + 2 + 2$

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

- a) Process control block
- b) Translation look-aside buffer (TLB)
- c) Context switching
- d) Threads
- e) Direct memory access (DMA).

