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 the following : $10 \times 1 = 10$

i) Banker's algorithm solves the problem of

a) deadlock avoidance b) deadlock recovery

c) deadlock prevention d) mutual exclusion.

ii) A thread is a

a) task b) process

c) program d) light weight process.

iii) The time to move the disk arm to the desire cylinder in hard disk is known as

a) rotational latency b) seek time

c) positional time d) disk time.

iv) Thrashing

a) reduces page I/O

b) decreases the degree of multiprogramming

c) implies excessive page I/O

d) improves the system performance.

v) ..... provides an interface to the operatin system for the user.

a) Kernel b) Micro-kernel

c) Shell d) None of these.

vi) Which scheduling policy is most suitable for a time shared operating system ?

a) Shortest job first

b) Round Robin

c) First come first serve

d) Priority.

vii) Compaction is used to solve the problem of

a) external fragmentation

b) internal fragmentation

c) both (a) and (b)

d) none of these.

viii) RAID configuration disk is used to provide

a) fault tolerance

b) nearest cylinder next

c) high data density

d) none of these.

ix) The scheduler which selects jobs from the pool of jobs and loads to the ready queue is

a) long term b) short term

c) medium term d) none of these.

x) Part of the program where the shared memory accessed and which should be executed indivisibly, is called

a) semaphores b) directory

c) critical section d) mutual exclusion.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. 3 × 5 = 1

2. Name one essential property of the following types operating systems :

(a) Batch, (b) Interactive, (c) Time-sharing, (d) Real tim (e) Network.

3. What are the differences between a trap and a interrupt ? What is the use of each function ?

4. What is the purpose of the command interpreter ? Wh is it usually separate from the kernel ?

5. Given n processes to be scheduled on one processor how many possible different schedules are there ? Giv a formula in terms of n.

6. Consider a system consisting of four resources of th same type that are shared by three processes, each o which needs at most two resources. Show that th system is deadlock free.

GROUP – C

(Long Answer Type Questions)

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

7. a) What do you mean by scheduler ? Explain different types of scheduler. Explain CPU scheduling criteria.

   b) For the process listed in the table, draw a chart illustrating their execution using FCFS, SJF, SRTF (SRJF), Round Robin (quantum = 2) and calculate average turn-around time and average waiting time.

Process	Arrival Time	Processing Time
A	0	8
B	1	4
C	2	9
D	3	5

1 + 3 + 3 + 8

8. a) What is critical section problem ? What are the requirements a critical section problem must satisfy ?

   b) What is deadlock ? What are the necessary conditions for deadlock to occur ?

   c) Consider a system with five processes P_0 through P_4 and have three resource types A, B, C. Find out the number of instances of each resource type and retrieve the safe sequence.

	MAX			NEED			AVAILABLE		
	A	*B*	*C*	*A*	*B*	*C*	*A*	*B*	*C*
P_0	7	5	3	7	4	3	2	3	0
P_1	3	2	2	0	2	0			
P_2	9	0	2	6	0	0			
P_3	2	2	2	0	1	1			
P_4	4	3	3	4	3	1			

1 + 3 + 1 + 4 + 6

9. a) State producer-consumer problem. Give a solution to the producer-consumer problem using semaphore. Justify your solution guarantees Mutual Exclusion.

b) What is paging ? Differentiate between internal and external fragmentations. What is thrashing ?

c) What is TLB ? What do you mean by 'Belady's Anomaly' ?

d) Having 3 physical memory frames show the behaviour of LRU and FIFO and optimal page replacement algorithm for the page address string like 2, 3, 2, 1, 5, 2, 4, 5, 3, 2, 5, 2.

1 + 2 + 2 + 1 + 2 + 1 + 6

10. a) What is a record in a file ? For a file having multiple records what are the different indexing strategies there ? Explain each strategy very briefly with relative advantages and disadvantages.

b) Draw the disk read/write head movement diagram for SSTF, SCAN, C-SCAN and FIFO, for the track requests as

25, 75, 35, 100, 95, 175, 78, 125, 90, 35.

1 + 2 + 4 + 8

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

a) Process life cycle

b) Orphan process and Zombie process

c) *i*-node

d) Segmentation

e) Peterson Solution for CS.