



Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech(CSE)/SEM-1/PGCS-104/2009-10

2009

OPERATING SYSTEM

Time Allotted : 3 Hours

Full Marks : 70

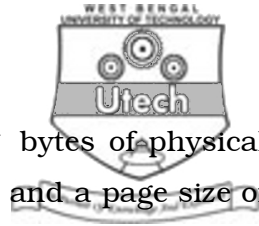
The figures in the margin indicate full marks.

*Candidates are required to give their answers in their own words
as far as practicable.*

Answer any seven questions. $7 \times 10 = 70$

1. Answer any five questions : $5 \times 2 = 10$

- a) Is a non-pre-emptive scheduling algorithm a good choice for an interactive system ? Briefly explain.
- b) In what way is shortest-job-first scheduling just a particular form of priority scheduling ?
- c) Round-Robin scheduling behaves differently depending on its time quantum. Can the time quantum be set to make round-robin behave the same as any of the following algorithms ? If so, how ?
 - i) First-come first-served
 - ii) Shortest job first.
- d) On a system with n CPUs, what is the maximum number of processes that can be in the ready, run and blocked states ?



- e) On a simple paging system with 2^{24} bytes of physical memory, 256 pages of logical memory and a page size of 2^{10} bytes, how many bytes are in a page frame ?
- f) What is the principal disadvantage of too much multiprogramming ?
2. a) What are the three criteria to be satisfied to design a protocol to solve critical section problem ? 3
- b) Write a solution for Readers Writers Problem. 7
3. a) What do you mean by external and internal fragmentations ? 4
- b) How is logical address translated to physical address in paging scheme ? 6
4. a) Explain in brief the process state transition diagram. 4
- b) What are the differences between user level thread and kernel supported thread ? 4
- c) What is the function of CPU-scheduler ? 2
5. Given references to the following pages by a program :
- 0, 3, 0, 1, 8, 1, 8, 7, 8, 7, 1, 2, 8, 2, 7, 8
- How many page faults will occur if the program has three page frames available to it and uses the following ? 10
- a) FIFO Algorithm
- b) LRU Algorithm
- c) Optimal Algorithm.



6. a) Consider the following snapshot of a system :

	Allocation				Max				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 the banker's algorithm :

- What is the content of the matrix need ?
 - Is the system in a safe state ?
 - If a request from process P_1 arrives for
(0, 4, 2, 0) can the request be granted immediately ? 2 + 3 + 2
- b) Explain the circular wait condition for deadlock. 3
7. For the processes listed below, draw Gantt chart and calculate average waiting time and average turn-around-time :

Process	Arrival time	Burst time
A	0.000	3
B	1.001	6
C	4.001	4
D	6.001	2

using :

- FCFS
- Shortest job first (pre-emptive)
- Shortest job first (non-pre-emptive)
- Round-Robin.

$$4 \times 2 \frac{1}{2}$$



8. What is monitor ? Write a solution for Dining Philosopher's problem. 3 + 7

9. a) Assume that the amount of memory on a system is inversely proportional to the page fault rate. Each time memory doubles, the page fault rate is cut in half. Currently the system has 32 Mb of memory. When a page fault occurs, the average access time is 1 ms, 1 μ s otherwise. Overall, the effective access time is 300 μ s. How much additional memory would be needed to cut the effective access time to 100 μ s ? Assume that the total memory in the system must be a power of 2.

6

b) Explain in brief demand paging.

4

10. Write short notes on any *two* of the following :

2 \times 5

a) Swapping

b) Realtime systems

c) Thrashing

d) Segmentation.

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