



Name :

Roll No. :

Invigilator's Signature :

CS/M.Tech (CSE)/SEM-1/CSEM-104/2010-11

2010-11

OPERATING SYSTEMS

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.*

1. Answer in Yes or No for the following : 10 × 1 = 10

- a) Embedded computers run real time systems.
- b) When the CPU is interrupted, it immediately transfers execution to a fixed location.
- c) Whenever an I/O interrupt occurs, the operating system does not know exactly which device is interrupting.
- d) In a hierarchical storage structure, the same data may appear in different levels of the storage system.
- e) The operating system is not providing mechanism for deadlock handling.

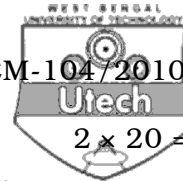


- f) A process remains in running state for a long time.
- g) In first-come, first-served scheduling algorithm, processes have smallest waiting time.
- h) In resource allocation graph, multiple instances of a resource can be handled easily.
- i) Banker's algorithm detects safe state.
- j) Physical address space associated with paging is contiguous.

2. Answer any *five* questions :

5 × 4

- a) Operating system provides services to the users and programs. Explain in brief two such services.
- b) What do you mean by system calls ? What is Win32 API ?
- c) What do you mean by system programs ? Give some examples of services provided by system programs.
- d) What are short-term scheduler and long-term scheduler ?
- e) Give an example of pre-emptive scheduling.
- f) What is hold and wait condition in necessary conditions for deadlock characterization ?
- g) What are external fragmentation and internal fragmentation ?



Answer any *two* questions.

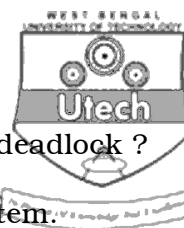
2 × 20 = 40

3. a) Draw the diagram depicting the different states of a process. 6
- b) What do you mean by the context of a process ? What is context switch ? 3 + 3
- c) Explain the difference between a thread and a process. What is the difference between user level thread and kernel level thread ? 4 + 4
4. Consider the following set of processes, with the length of the CPU-burst time given in milliseconds.

Process	Burst Time	Priority
P_1	10	3
P_2	1	1
P_3	2	3
P_4	1	4
P_5	5	2

The processes are assumed to have arrived in the order P_1, P_3, P_4, P_5 all at time 0 except P_2 which arrives at time $t = 2$.

- a) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, a non-pre-emptive priority, a smaller priority number means higher priority, and RR (quantum = 1) scheduling. 3 + 3 + 3
- b) What is the turn-around time of each process for each of the scheduling algorithms in part (a). 5
- c) What is the waiting time of each process for each of the scheduling algorithms in part (a) ? 6



5. a) What are the necessary conditions for a deadlock ? 3
- b) 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 :

- i) What is the content of the matrix need ? 3
- ii) Is the system in a safe state ? 7
- iii) If a request from process P_1 arrives for (0, 4, 2, 0), can the request be granted immediately ? 7
6. a) What is Address Binding ? Give three types of binding in the multistep processing of a user program. 2 + 6
- b) Given memory partitions of 100 kB, 500 kB, 200 kB, 300 kB and 600 kB (in order). How would each of the first, best fit, and worst fit algorithms place processes of 212 kB, 417 kB, 112 kB and 426 kB (in order) ? Which algorithm makes the most efficient use of memory ? 10
- c) Why are page sizes always powers of 2 ? 2