Total No. of printed pages = 3

CSE 181403

Roll No. of candidate

2022

B.Tech. 4th Semester End-Term Examination

Computer Science and Engineering

OPERATING SYSTEM

(New Regulation & New Syllabus)

Full Marks – 70 Time – Three hours

The figures in the margin indicate full marks for the questions.

Answer question No. 1 and any *four* from the rest.

1. Answer the following : (Choose the correct option) (10 × 1 = 10)

(i) System call is just a bridge between user programs and ——— for executing privileged operations.

(a) System programs (b) OS

(c) Users (d) None

(ii) The first physical sector on a basic disk contains a data structure known as the ———

(a) Partition sector (b) boot record

(c) Basic sector (d) master boot record

(iii) The CPU is a ——— resource.

(a) non-preemtive (b) preemptive

(c) consumable (d) none

(iv) The status of the resources and the execution of a process need to be stored somewhere in a data structure known as

(a) status block (b) PCB

(c) resource block (d) none

(v) What is the UNIX command for terminating a process abnormally?

(a) fork (b) suspend

(c) kill (d) none

[Turn over

(vi) When a running process is interrupted and the OS assigns another process to the running process and transfers control to it, it is known as

(a) context switching (b) interrupt handling

(c) PCB switching (d) process switching

(vii) The total time spent by a process in the system is called

(a) turnaround time (b) response time

(c) waiting time (d) none

(viii) When a process does not get access to the resource, it loops continually for the resource and wastes CPU cycles. It is known as

(a) deadlock (b) spin lock

(c) live lock (d) none

(ix) An edge from a process to a resource in RAG is known as

(a) assignment edge (b) claim edge

(c) request edge (d) none

(x) What is the minimum number of memory access needed in paging?

(a) Three (b) Four

(c) Two (d) Five

2. (a) What is race condition? Write a program that shows the data access synchronization problem. (5)

(b) Explain the concept of virtual memory in memory management. How is it implemented using paging? (10)

3. (a) Consider the following scenario of processes : (10)

Process	Arrival Time	Execution Time
P1	0	8
P2	1	4
P3	2	3
P4	3	5

Draw the Gantt Chart for the execution of the processes, showing their start time and end time, using Shortest Remaining Time Next scheduling. Calculate turnaround time, waiting time for each process and average waiting time for the system.

(b) Calculate the number of page faults for the following reference string using Optimal algorithm with frame size 3. (5)

5, 0, 2, 1, 0, 3, 0, 2, 4, 3, 0, 3, 2, 1, 3, 0, 1, 5

4. (a) Define the critical section problem. What is semaphore? Explain its implementation. (10)

(b) How do you use deadlock detection algorithm with a single instance of resource type? (5)

5. (a) Differentiate between long term and short-term scheduler. (3)

(b) Consider the following snapshot of a system : (8 + 4)

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

Using Banker's algorithm, determine whether or not the following state is unsafe. If the state is unsafe illustrate the order in which the processes may complete.

(c) Illustrate why the state is unsafe. Consider that Available = (0, 4, 0, 3).

6. (a) Prove that all the CS protocol requirements are satisfied in Perterson's solution for process synchronization. (10)

(b) There is a system with 64 pages of 512 bytes page size and a physical memory of 32 frames. How many bits are required in the logical and physical address? (5)

7. (a) What is a file? Write its different attributes and file operations. (10)

(b) In a system, the following state of processes and resources is given : (5)

R2 → P1, P1 → R2, P2 → R3, R1 → P2, R3 → P3, P3 → R4, P4 → R3, R4 → P4, P4 → R1, R1 → P5

Draw a RAG and wait-for graph for the system, and check deadlock condition.
