Total No. of printed pages = 3

CSE 181403

Roll No. of candidate | | | | | | | | | | |

2023

B.Tech. 4th Semester End-Term Examination

Computer Science and Engineering

OPERATING SYSTEM

New Regulation (w.e.f. 2017-18) & New Syllabus (w.e.f. 2018-19)

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. Multiple Choice Questions : (Choose the correct one) : (10 × 1 = 10)

(i) A page table must be updated as soon as the ———— address of a page changes

(a) Frame (b) Virtual

(c) Logical (d) None

(ii) The base and limit registers are updated for every process in ———— mode

(a) User (b) Both user and kernel

(c) Kernel (d) None

(iii) Whenever there is a need to switch between the threads of the same process, the context of a thread will be saved and restored in the form of

(a) Code, data and stack

(b) Code, CPU registers and stack

(c) PC, CPU registers and stack

(d) None

[Turn over

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

(a) Partition sector (b) Boot record

(c) Basic sector (d) Master boot record

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

(a) Assignment edge (b) Claim edge

(c) Request edge (d) None

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

(a) System programs (b) OS

(c) Users (d) None

(vii) ———————— is a process synchronization tool that protects any resource such as global shared memory that needs to be accessed and updated by many processes

(a) Message passing system (b) Semaphore

(c) Signal (d) none

(viii) ———————— scheduler is invoked when there is a need to swap out some blocked process

(a) Long-term (b) Medium-term

(c) Short-tem (d) None

(ix) The semaphore that takes value greater than one is known as

(a) Binary semaphore (b) Mutex

(c) Counting semaphore (d) None

(x) If a process is not allowed to execute to its completion and is interrupted in between, such that it has neither voluntarily released the processor nor has it exited, it is known as

(a) Dispatching

(b) Scheduling

(c) Non-pre-emptive scheduling

(d) Pre-emptive scheduling

2. (a) Differentiate between short term and medium term scheduling. 3

(b) Define turnaround time and response time. 2

(c) Write banker's algorithm and illustrate when the system is in a safe state by demonstrating an example. 5+5=10

3. (a) Consider the following scenario of processes in a system: 4+6=10

Process	Arrival time (ms)	Exeecution time (ms)
P1	0	5
P2	2	4
P3	3	6
P4	6	7

Draw a Gantt chart for the execution of the processes, showing their start time and end time using SRTF algorithm. Calculate turnaround time, waiting time for each process and average turnaround time, average waiting time for the system.

(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

4. (a) What is page fault? Consider the following reference string. 2+4+4=10

7 2 3 1 2 5 3 4 6 3 3 1 0 5 4 6 2 3 0 1

For a memory with three (03) frames how many page Faults will occur for LRU and FIFO page replacement algorithms.

(b) Explain Belady's anomaly. 5

5. (a) What is deadlock? Explain how deadlock can be prevented. 5+5=10

(b) What is a file system? What are the basic file operations that can be performed on files? 5

6. (a) Consider a disk queue with I/O requests on the following cylinders in their arriving order. 5+5=10

52, 95, 70, 128, 13, 44, 110, 34, 45

The disk head is assumed to be at Cylinder 23. Calculate and show with a diagram the total disk head movements using SSTF scheduling algorithm.

(b) Compare the memory allocation using first-fit, best-fit methods using internal fragmentation. 5

7. (a) Prove that all the CS protocol requirements are satisfied in Perterson's solutions for process synchronization. 9

(b) In a system, the following state of processes and resources is given: 6

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

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