Total No. of printed pages = 4

19/5th Sem/UCSE502

2021

OPERATING SYSTEM

Full Marks – 100

Time – Three hours

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

Answer any *five* questions.

1. (a) What is the kernel of an OS ? Explain with a diagram layered architecture of an operating system. 2+5=7

   (b) What is multi-programming, time sharing and multi-processor OS ? 3

   (c) What is the purpose of system calls, and how do system calls relate to the OS and to the concept of dual-mode (kernel-mode and user-mode) operation ? 5

[Turn over

(d) What is an Open source operating system ? Give example of any two open source operating systems. 3

(e) What is Virtual machine ? 2

2. (a) What is swapping and what is its purpose ? 5

(b) Explain Process state with a diagram. 10

(c) What is semaphore ? Explain its implementation as wait and signal for providing process synchronization. 5

3. (a) Explain the preemptive and non-preemptive versions of SJF and Round Robin (time slice = 2) scheduling algorithms with Gantt Chart for the four processes given. Compare their average turn around and waiting time. 12

Process	Arrival Time	Burst Time
P1	0	10
P2	1	06
P3	2	12
P4	3	15

(b) Consider the following page reference string 1, 2, 3, 4, 5, 3, 4, 1, 6, 7, 8, 7, 8, 9, 7, 8, 9, 5, 4, 4, 5, 3. How many page faults would occur for the LRU and FIFO page replacement algorithms ? Assume four frames and all frames are initially empty. 8

4. (a) With a neat sketch explain how logical address is translated into physical address using paging mechanism. 10

(b) Compare contiguous and non-contiguous memory allocation techniques. 5

(c) What is external and internal fragmentation ? 5

5. (a) Given free memory partitions of 100 K, 500 K, 200 K, 300 K, and 600 K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 212 K, 417 K, 112 K, and 426 K (in order) ? 8

(b) A disk drive has 200 cylinders, numbered 0 to 199. The drive is currently serving a request at cylinder 53. The queue of pending requests, in FIFO order, is 98, 183, 37, 122, 14, 124, 65, 67. Starting from the current

head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk-scheduling algorithms ? 12

(i) FCFS

(ii) SCAN

(iii) LOOK

(iv) C-SCAN

6. (a) Explain the bankers algorithm with a suitable example. 10

(b) How does deadlock avoidance differ from deadlock prevention ? 5

(c) What is the critical section ? What are the minimum requirements that should be satisfied by a solution to critical section problem ? 5

7. Write short notes on : 10×2=20

(a) Dining Philosopher's Problem.

(b) Evolution of Operating System.