

Bachelor of Computer Science & Engg. Examination, 2022
(3rd year, 1st semester)

OPERATING SYSTEM

Time: 3 hours

[And 0.5 hours for downloading of question paper and 1 hour for scanning of handwritten answerscript and uploading of scanned answerscript.]

Instructions for submission of answerscript:

1. Please scan your handwritten answerscript.
2. Mail the scanned answerscript to: sarmisthasn1010@gmail.com
3. Please put your file name as follows: OS_<your full roll no.>
4. Please put the subject line as: BCSE III OS SemI 2022 < your full roll no.>

Section-1: CO1: 04 marks [Each question carries 1 mark.]

1. Some of the important functions of OS are:

- a) Scheduling
- b) Deadlock detection
- c) Security
- d) All of the above

2. What is GUI?

- a) User interface
- b) Initialisation program of OS
- c) Interface between OS processes
- d) None of the above

3. Bootstrap program

- a) is a type of user interface
- b) initializes OS
- c) is an interface between OS processes
- d) None of the above

4. Kernel may be

- a) Monolithic
- b) Micro
- c) Nano
- d) all of the above

Section-2: CO2: 20 marks [Each question carries 2 marks.]

5. If all processes are I/O bound, there may be _____ jobs in ready queue, and the Short term Scheduler will have _____ to do.

- a) less, less
- b) many, less
- c) many, much
- d) less, much

6. Throughput is low when

- a) processes are large
- b) processes are small
- c) processes have short execution times
- d) processes have long execution times

7. Consider the following set of processes, the length of the CPU burst time is given in milliseconds (ms). Assume that all processes arrive sequentially as shown.

Process	Burst time	Arrival time
P1	6	0
P2	8	4
P3	7	5
P4	3	8

Assuming the above processes being scheduled with the First Come First Served (FCFS) scheduling algorithm.

- a) The waiting time of process P2 is 2ms and that of P4 is 13ms.
- b) The waiting time of process P2 is 4ms and that of P4 is 21ms.
- c) The waiting time of process P2 is 6ms and that of P4 is 13ms.
- d) None of the above is correct with respect to waiting times of P2 and P4.

8. Consider the following set of processes, the length of the CPU burst time is given in milliseconds (ms). Assume that all processes arrive sequentially as shown.

Process	Burst time	Arrival time
P1	6	0
P2	8	4
P3	7	5
P4	3	8

Assuming the above processes being scheduled with the First Come First Served (FCFS) scheduling algorithm.

- a) The waiting time of process P3 is 9ms and that of P4 is 13ms.
- b) The waiting time of process P3 is 7ms and that of P4 is 21ms.
- c) The waiting time of process P3 is 5ms and that of P4 is 13ms.
- d) None of the above is correct with respect to waiting times of P3 and P4.

9. Consider the following set of processes, the length of the CPU burst time is given in milliseconds (ms). Assume that all processes arrive sequentially as shown. CPU time quantum: 4ms

Process	Burst time	Arrival time
P1	6	0
P2	8	4
P3	7	5
P4	3	8

Assuming the above processes being scheduled with Round Robin (RR) scheduling algorithm.

- a) Process P4 has the highest waiting time.
- b) Process P3 has the highest waiting time.
- c) Process P2 has the highest waiting time.
- d) None of the above is correct with respect to waiting times of processes.

10. Consider the following set of processes, the length of the CPU burst time given in milliseconds (ms). Assume that all processes arrive sequentially as shown. CPU time quantum: 4ms

Process	Burst time	Arrival time
P1	6	0
P2	8	4
P3	7	5
P4	3	8

Assuming the above process being scheduled with the Round Robin (RR) scheduling algorithm.

- a) Process P3 has the least waiting time.
- b) Process P2 has the least waiting time.
- c) Process P1 has the least waiting time.
- d) None of the above is correct with respect to waiting times of processes.

11. Consider the following set of processes, the length of the CPU burst time is given in milliseconds (ms). Assume that all processes arrive sequentially as shown. CPU time quantum: 4ms

Process	Burst time	Arrival time
P1	6	0
P2	8	4
P3	7	5
P4	3	8

Assuming the above processes being scheduled with Round Robin (RR) scheduling algorithm.

- a) The waiting time of process P3 is 10ms and that of P4 is 4ms.
- b) The waiting time of process P3 is 9ms and that of P4 is 9ms.
- c) The waiting time of process P3 is 5ms and that of P4 is 13ms.
- d) None of the above is correct with respect to waiting times of P3 and P4.

12. Consider the following set of processes, the length of the CPU burst time is given in milliseconds (ms). Assume that all processes arrive sequentially as shown. CPU time quantum: 4ms

Process	Burst time	Arrival time
P1	6	0
P2	8	4
P3	7	5
P4	3	8

Assuming the above processes being scheduled with Round Robin (RR) scheduling algorithm.

- a) The waiting time of process P1 is 0ms and that of P4 is 4ms.
- b) The waiting time of process P1 is 8ms and that of P4 is 9ms.
- c) The waiting time of process P1 is 5ms and that of P4 is 0ms.
- d) None of the above is correct with respect to waiting times of P1 and P4.

13. Processes share a semaphore variable **semex**, initialized to 1.

Suppose a process executes in the following manner.

```
signal(semex);
```

```
.....
```

```
critical section
```

```
.....
```

```
wait(semex);
```

What may happen in this situation:

- a) A deadlock will definitely occur
- b) Entering critical section will take infinite time
- c) More than one processes maybe executing in their critical section
- d) None of the above will happen.

14. Processes share a semaphore variable **semex**, initialized to 1.

Suppose a process executes in the following manner.

```
wait(semex);
```

```
.....
```

```
critical section
```

```
.....
```

```
wait(semex);
```

What may happen in this situation:

- a) A deadlock may occur
- b) No starvation happens for entering critical section
- c) More than one processes maybe executing in their critical section
- d) None of the above will happen.

Section-3: CO3: 20 marks[Each question carries 2 marks.]

15. A solution to the problem of external fragmentation is _____

- a) compaction
- b) smaller memory space
- c) both (a) and (b)
- d) none of the mentioned

16. Internal fragmentation occurs in _____

- a) Segmentation
- b) Paging
- c) OS kernel
- d) None of the above

17. Consider the following page references during a given time interval for a memory consisting of 5 frames : 25,46,17,38,39,25,46,17,11,22,25,46. What is the number of page hits using First In First Out (FIFO) page replacement strategy?

- a) 10
- b) 5
- c) 3
- d) 0

18. Consider the following page references during a given time interval for a memory consisting of 5 frames : 25,46,17,38,39,25,46,17,11,22,25,46. What is the number of page hits using Least Recently Used (LRU) page replacement strategy?

- a) 10
- b) 5
- c) 3
- d) 0

19. Consider the following page references during a given time interval for a memory consisting of 4 frames : 25,46,17,38,39,25,46,17,11,22,25,46. What is the number of page hits using First In First Out (FIFO) page replacement strategy?

- a) 10
- b) 5
- c) 3
- d) 0

20. Consider the following page references during a given time interval for a memory consisting of 4 frames : 25,46,17,38,39,25,46,17,11,22,25,46. What is the number of page hits using Least Recently Used (LRU) page replacement strategy?

- a) 10
- b) 5
- c) 3
- d) 0

21. Which one will be beneficial: demand paged segmentation or demand paging? Justify your answer.

22. Differentiate between temporal locality and spatial locality.

23. Does implementation of Inverted page table help? Justify your answer.

24. What type of fragmentation does buddy memory allocation lead to and how?

Section-4: CO4: 16 marks [Each question carries 2 marks.]

For question nos. 25, 26, 27, 28:

Consider a storage disk with 8 platters (numbered as 0...7), 150 cylinders (numbered as 0...149), and 256 sectors per track (numbered as 0, 1, ... 255). Disk requests come in the form [sector number, cylinder number, platter number].

25. The following disk requests are received by the disk controller at the same time:

[150, 72, 0], [120, 134, 4], [160, 20, 1], [202, 86, 3], [236, 116, 5], [138, 16, 2]

Currently head is positioned at sector number 100 of cylinder 80, and is moving towards higher cylinder numbers. The average power dissipation in moving the head over 100 cylinders is 20 milliwatts and for reversing the direction of the head movement once is 15 milliwatts. Considering Shortest Seek Time First (SSTF), what is the dissipated power?

- a) 45
- b) 80
- c) 85
- d) None of these

26. The following disk requests are received by the disk controller at the same time:

[150, 4, 0], [120, 34, 4], [160, 10, 1], [202, 7, 3], [236, 19, 5], [138, 73, 2], [152, 2, 0], [120, 15, 4], [160, 6, 1], [202, 20, 3]

Currently head is positioned at sector number 100 of cylinder 50. Using shortest seek time first (SSTF), find out the time required to service all requests if time taken to move from one cylinder to another is 1 ms.

- a) 119 ms
- b) 98 ms
- c) 121 ms
- d) none of the above

27. The following disk requests are received by the disk controller at the same time:

[150, 98, 0], [120, 37, 4], [160, 14, 1], [202, 124, 3], [236, 65, 5], [138, 67, 2]

Currently head is positioned at sector number 100 of cylinder 32. Using First Come First Served (FCFS), find out the no. of disk head moves and the no. of times the direction of the move changes.

- a) 319, 5
- b) 298, 6
- c) 321, 4
- d) none of the above

28. The following disk requests are received by the disk controller at the same time:

[150, 98, 0], [120, 37, 4], [160, 14, 1], [202, 124, 3], [236, 65, 5], [138, 67, 2]

Currently head is positioned at sector number 100 of cylinder 32, and is moving towards higher cylinder numbers. Using SCAN, find out the no. of disk head moves and the no. of times the direction of the move changes.

- a) 202, 1
- b) 212, 2
- c) 221, 4
- d) none of the above

29. Compare and contrast between grouping technique and counting technique.
30. What is seek time? What is rotational latency?
31. How does Linked disk space allocation technique work?
32. What are the disadvantages of Indexed file allocation technique?

Section-5: CO5: 6 marks [Each question carries 2 marks.]

33. What are the characteristics of Capability List?
34. How does an implementation combination of access list and capability list help a system?
35. How does a switch between domains occur?

Section-6: CO6: 4 marks [Each question carries 2 marks.]

36. What is inode?
37. What is the difference between context switch and mode switch?

==. ==. ==. ==. == == ==. ==. ==. ==. ==. ==. == == == ==. ==. ==. ==. ==. ==. ==. ==