OPERATING SYSTEM

Solutions

1. Consider the following set of processes that arrive at time ‘0’, with the length of CPU Burst-time given in millisec:

Process	Burst Time
P_1	1
P_2	7
P_3	3

What is the average waiting time when we use SJF and FCFS Scheduling algorithms?

(a) 1.67, 3
(b) 2.67, 3
(c) 1.76, 3.5
(d) 1.66, 2

Solution: Option (a)

2. Which of the following information is not part of Process Control Block?

(1) Process State
(2) Process Page table
(3) List of Open files
(4) Stack Pointer

(a) Only 3
(b) 3 & 4
(c) 2 and 4
(d) None

Solution: Option (d)

Explanation:

Page tables of processes are part of the memory management information, Stack pointers are part of CPU registers, and process state, list of open files are in PCB. So, all options are in PCB.

3. Consider ‘n’ processes sharing the CPU in a round robin fashion. Assume that the context switch takes ‘s’ seconds. What must be the quantum ‘q’ such that the overhead of context switching is minimized and at same time each process is getting guaranteed execution on the CPU atleast once in every ‘t’ seconds?

(a) $q \leq (t - ns)/(n-1)$
(b) $q \leq (t - ns)/(n+1)$
(c) $q \geq (t - ns)/(n-1)$
(d) $q \geq (t - ns)/(n+1)$

Solution: Option (a)

4. Which of the following are the static prediction techniques to calculate Burst time?

(1) Process Size
(2) Simple Average
(3) Process Type
(4) Exponential Averaging/ Aging

(a) Only (1)
(b) 1 and 3
(c) 1, 2 and 3
(d) 2 and 4

Solution: Option (b)

5. Given n-processes (P_1, P_2,…..P_n) and bti is the actual burst time of P_i and bt_1, bt_2,…., bt_n are the burst times of a processes P_1, P_2,…P_n. What is the predicted burst time for process P_i using Simple Average?

(a) $T_{n+1} = \frac{1}{n} \sum_{i=1}^{n+1} bt_i$

(b) $T_{n+1} = \frac{1}{n} + n \sum_{i=1}^{n} bt_i$

(c) $T_{n+1} = \frac{1}{n} \sum_{i=1}^{n} bt_i$

(d) $T_{n+1} = \frac{1}{2n} \sum_{i=1}^{n} bt_i$

Solution: Option(c)

6. Consider the actual BT of the processes are 2, 5, 3, 9, 6 respectively. What is the predicted Burst time of the next process using simple average?

(a) 25
(b) 5
(c) 10
(d) 15

Solution: Option (b)

7. What is the predicted burst time for process P_i where t_n is the actual burst of previous process and T_n is the predicted burst time of the previous process.

(a) $T_{n+1} = a\ T_n + (1-a)t_{n-1}\quad 0 \le a \le 1$

(b) $T_{n+1} = a\ t_n + (1-a)T_n\quad 0 \le a \le 1$

(c) $T_{n+1} = a\ t_n + (1-a)T_n\quad 0 < a < 1$

(d) None of the above

Solution: Option (b)

8. If α=0.4 and T_1=10. Consider the actual burst times of t_1, t_2, t_3 are 5, 7, 2 respectively. What is the predicted burst time of t_4 using Exponential Average method?

(a) 3.36
(b) 4.3
(c) 5.36
(d) 6.66

Solution: Option (c)

9. Consider the processes P_1, P_2, P_3, P_4 whose arrival times are 0, 1, 2, 3 and Burst times are 5, 2, 13, 7. If the Context Switching time is 1 unit (ms), what is the average waiting time if Shortest Job Next scheduling algorithm is used?

(a) 7.5
(b) 6.25
(c) 6.5
(d) None

Solution: Option (c)

10. Consider the processes P_1, P_2, P_3, P_4 whose arrival times are 1, 5, 9, 10 and burst times are 4, 3, 5, 2 respectively. If the processes follow FCFS, what is the CPU idle time?

(a) 14/16
(b) 12/16
(c) 1/4
(d) 1/8

Solution: Option (d)

11. Consider the processes P_1, P_2, P_3, P_4 whose arrival times are 0, 2, 3, 5 and burst times are 7, 4, 2, 4 respectively. What is the average TAT and average WT if they follow Shortest Remaining Time First scheduling algorithm?

(a) 8.5, 3.5
(b) 8, 3.75
(c) 6, 3
(d) None

Solution: Option (b)

12. CPU Efficiency is very less in case of:

(a) Batch OS
(b) Multi-Programming OS
(c) Multi-tasking OS
(d) Multi-Processing OS

Solution: Option (a)

13. In Multi-processing Operating Systems:

(a) Maximum utilization of CPU can be achieved
(b) Maximum throughput is achieved
(c) Maximum security can be achieved
(d) Not suitable for Real time Applications

Solution: Option (a)

14. Consider three processes, all arriving at time zero, with total execution time of 10, 20 and 30 units, respectively. Each process spends the first 20% of execution time doing I/O, the next 70% of time doing computation, and the last 10% of time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process get blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of time does the CPU remain idle?

(a) 0%
(b) 10.6%
(c) 30.0%
(d) 89.4%

Solution: Option (b)

15. In Multilevel queue scheduling the processes are classified into different level queues based on:

(a) Burst time
(b) Priority
(c) Arrival time
(d) None

Solution: Option (b)

16. When two or more processes trying to execute a set of instructions and if the output depends on the order of execution of the process, this is termed as:

(a) Critical section
(b) Race condition
(c) Synchronization
(d) None

Solution: Option (c)

17. Any Busy waiting solution will suffer from:

(a) Deadlock
(b) Bounded waiting
(c) Priority Inversion
(d) All of the above

Solution: Option (c)

18. Critical Section is the place where:

(a) instructions should be executed sequentially
(b) instructions are highly secured
(c) shared resources are accessed by processes
(d) all of the above

Solution: Option (d)

19. Mutual Exclusion can be defined as:

(a) Multiple processes sharing the shared resources
(b) No two processes can enter critical section at the same time
(c) Only high priority processes can enter the critical section
(d) None of the above

Solution: Option (b)

20. Progress can be explained as:

(a) Speed of the Execution of the processes
(b) Maximum utilization of CPU
(c) the process which is not interested to enter Critical Section should not stop the other processes to enter CS
(d) All of the above.

Solution: Option (c)