OPERATING SYSTEM

Solutions

1. Semaphore is used for:

(a) Synchronization   (b) Deadlock Avoidance
(c) Bounded Waiting   (d) None

Solution: Option (a)

2. Assume that 'C' is a Counting Semaphore initialized to value '10'. Consider the following program segment:

P(C); V(C); P(C); P(C); P(C); V(C); V(C)
V(C); V(C); V(C); P(C); V(C); V(C); P(C)

What is the value of C?
(a) 6   (b) 12
(c) 8   (d) 10

Solution: Option (b)

3. Which of the following is not a valid deadlock prevention scheme?

(a) Release all resources before requesting a new resource
(b) Number the resources uniquely and never request a
    resource with a lower number than last requested
(c) Never request a resource after releasing any resource
(d) Request all required resources before execution

Solution: Option (c)

4. Suppose we want to synchronize two concurrent processes P and Q using binary semaphores S, T and U:

Process P:	Process Q:
P(S)	W:
P(T)	X:

P(U)	Y:
Print 'a'	Print 'a';
Print 'b'	Print 'b';
V(S)	A:
V(T)	B:
V(U)	C:

What should be written at W to avoid deadlock?

(a) P(T)   (b) P(U)

(c) P(S)   (d) Not possible to avoid deadlock

Solution: Option (a)

5. What should be written at X and Y for the above problem?

(a) P(S), P(T)   (b) P(T), P(U)

(c) P(S), P(U)   (d) None

Solution: Option (b)

6. The arrival time, priority and durations of the CPU and I/O bursts for each of the three processes P_1, P_2 and P_3 are given in the table below. Each process has a CPU burst followed by an I/O burst followed by another CPU burst. Assume that each process has its own I/O resource.

Process	AT	Priority	Burst duration CPU, I/O, CPU
P_1	0	2	1, 5, 3
P_2	2	3 (lowest)	3, 3, 1
P_3	3	1 (highest)	2, 3, 1

If the Preemptive priority scheduling is used, what is the finish times of the processes?

(a) 11, 15, 9   (b) 10, 15, 9

(c) 11, 16, 10   (d) 12, 17, 11

Solution: Option (c)

7. The following code with two threads can run in parallel. S and Q are binary semaphores equipped with P & V operations.

2

$$S= 1 \ \& \ Q= 0;$$

Producer:	Consumer:
while (true) do	while (true) do
P(S);	P(Q);
x= Produce( );	Consume(x);
V(Q)	V(S)
done	done.

Which of the following is true?
(a) The process can deadlock
(b) One of the threads can starve
(c) Some items produced may be lost
(d) None of the above

Solution: Option (d)

8. Readers-Writers problem can be solved using:

(a) Semaphores   (b) Monitors
(c) Both (a) & (b)   (d) None

Solution: Option (c)

9. Consider the following pseudo code fragment:

Printf ("Hello");
if(!fork( ))
Printf("World");

Which of the following is the output of the code fragment?
(a) Hello Hello World World   (b) Hello World World
(c) Hello World   (d) Hello World Hello World

Solution: Option (c)

10. Which of the following is initiated by process itself?

(a) Running   (b) Ready
(c) Suspend   (d) Block

Solution: Option (d)

11. Consider the following program:

```
main( )
{
intpid
pid= fork( );
printf("%d", pid);
}
```

What is the output by parent and child processes?
(a) child= 0, parent= 0   (b) child= 0, parent= process_id of child
(c) child= 1, parent= 0   (d) none

Solution: Option (b)

12. A CPU generally handles an interrupt by executing an interrupt service routine:

(a) as soon as an interrupt is raised
(b) by checking the interrupt register at the end of fetch cycle
(c) by checking the interrupt register after finishing the execution of the current instruction
(d) none of the above

Solution: Option (c)

13. A scheduling algorithm assigns priority proportional to the waiting time of a process. Every process starts with priority zero (the lowest). The scheduler re-valuates the process priorities every T time units and decides the next process to schedule. Which one of the following is true if the processes have no I/O operations and all arrive at time zero?

(a) This algorithm is equivalent to FCFS
(b) This algorithm is equivalent to Round Robbin
(c) This algorithm is equivalent to SJF
(d) This algorithm is equivalent to Shortest Remaining Time First

Solution: Option (b)

14. The highest response ratio next Scheduling policy favors 'X' jobs, but is also limits the waiting time of 'Y' jobs. What are X and Y?

(a) Shorter Jobs, Low Priority Jobs   (b) Longer Jobs, High Priority Jobs

(c) Longer Jobs, Shorter Jobs   (d) Shorter Jobs, Longer Jobs

Solution: Option (d)

15. Which of the following instructions should be allowed only in Kernel Mode?

(a) Disable all interrupts   (b) Read the time-of-day clock

(c) Set the time-of-day clock   (d) Change the Memory Map

Solution: Option (a)

16. Consider the below code fragment:

```
if(fork k( ) = = 0)
{
   a= a+5; printf("%d, %d \n", a, &a);
 }
else
 {
   a= a – 5;
printf("%d %d \n", 0, &a);
  }
```

Let u, v be the values printed by parent process and x, y be the values printed by child process. Which one of the following is true?

(a) u= x + 10 and v = y   (b) u= x + 10 and v≠ y

(c) u + 10= x and v = y   (d) u + 10= x and v ≠ y

Solution: Option (a)

17. Which of the following regarding semaphores are true?

(a) Semaphores always guarantee Mutual Exclusion but fail to guarantee progress

(b) Under certain situations may fail to guarantee Mutual exclusion

(c) Improper usage of semaphore operations may lead to deadlock

(d) Both (a) & (c) are true

5

Solution: Option (d)

18. Two concurrent processes P_1 and P_2use four shared resources R_1, R_2, R_3 and R_4 as shown below:

	P_1: Compute;	P_2: Compute;
	Use R_1;	Use R_1;
	Use R_2;	Use R_2;
	Use R_3;	Use R_3;
	Use R_4;	Use R_4;

Both processes are started at the same time, and each resource can be accessed by only one process at a time. The following scheduling constraints exist between the accesses of resources by the processes:

P_2 must complete use of R_1 before P_1 gets access to R_1
P_1 must complete use of R_2 before P_2 gets access to R_2
P_2 must complete use of R_3 before P_1 gets access to R_3
P_1 must complete use of R_4 before P_2 gets access to R_4

There are no other scheduling constraints between the processes above scheduling constraints, what is the minimum no. of binary semaphores needed?
(a) 1   (b) 2
(c) 3   (d) 4

Solution: Option (d)

19. Consider the program segment:

```
x= 0; y=0;
Cobegin
begin
        x= 1;
        y= y + x;
end
begin
        y= 2;
        x= x + 3;
end
Coend;
```

6

Which of the following indicates possible values for the variables when the segment finishes execution?

(1) x= 1, y= 2
(2) x= 1, y= 3
(3) x= 4, y= 6

(a) 1 only
(b) 1 & 2 only
(c) 1 & 3 only
(d) 2 & 3 only
(e) 1, 2, 3

Solution: Option (d)

20. Which of the following is not a necessary condition for a deadlock among processes?

(a) Shared Resources
(b) No Preemption
(c) Acyclic condition among processes
(d) None of the above

Solution: Option (d)