Branch : CSE & IT Batch : Hinglish

Operating Systems

Process Synchronization/Coordination

DPP 10

[MSQ]

1. Consider the following concurrent program:

```
begin
    S1;
    S2;
     Parbegin
       S3;
       S4;
       S5;
     Parend;
  S6;
end;
```

Which of the following statement is correct about above program?

(a) S_1, S_2, S_3, S_4, S_5 run sequentially.
(b) S_3, S_4, S_5 run concurrently.
(c) S_1, S_2, S_6 run concurrently.
(d) S_1, S_2, S_6 run sequentially.

[NAT]

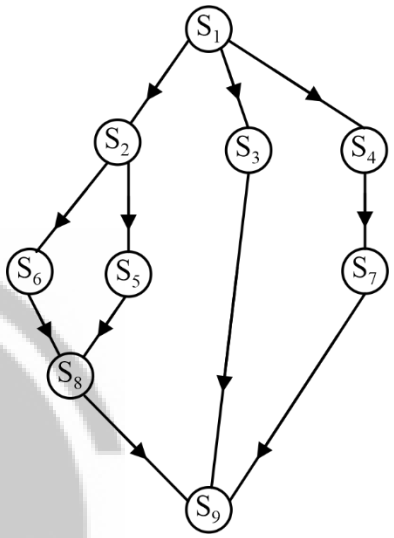
2. Consider the following concurrent program

```
S1;
Parbegin
    begin
        S2;
        S3;
        S4;
    end;
    S5;
    S6;
    begin
        S7;
        S8;
        S9;
    end;
    S10;
Parend;
S11;
```

After S_1 how many statements will start concurrently?

[MSQ]

3. Consider the given precedence graph:



Which of the following represent correct concurrent program of above precedence graph?

(a)
```
S1;
Parbegin;
  S3;
  begin
    S7;
    S4;
     Parbegin
      S2;
        Parbegin
          S6;
          S5;
        Parend;
      S8;
      Parend;
  end;
Parend;
S9;
```

(b)
```
S1;
Parbegin
    begin
      S2;
      Parbegin
        S6;
        S5;
      Parend;
    end;
      S8;
        begin
          S4;
          S7;
        end;
    S3;
Parend;
S9;
```

(c)
```
S1;
Parbegin
    begin
      S2;
       Parbegin
         S6;
         S5;
       Parend;
       S8;
    end;
    S3;
    begin;
      S4;
      S7;
    end;
Parend;
S9;
```

(d)
```
S1;
Parbegin
        begin
          S4;
          S7;
        S2;
          Parbegin
            S6;
            S5;
          Parend;
        S8;
        S3;
Parend;
S9;
```

[MSQ]

4. Consider the following program

```
main()
    {
      Parbegin
            P();
            Q();
            R();
      Parend;
    }
```

```
void P(void)
{
  Parbegin
        1();
        2();
        3();
  Parend;
}
```

```
void Q(void)
{
  Parbegin
        4();
        5();
        6();
  Parend;
}
```

```
void R(void)
{
  Parbegin
        7();
        8();
        9();
  Parend;
}
```

Which of the following output sequences are possible after the successful completion of P( ) and Q( )?

(a) 1 2 3 4 5 6 7 8 9 (b) 4 1 2 5 3 6 7 9 8

(c) 4 1 5 6 2 4 7 8 9 (d) 9 7 6 1 2 5 6 2 3

[MCQ]

5. Deadlock is _____

(a) Starvation

(b) Blocking a process for defined time

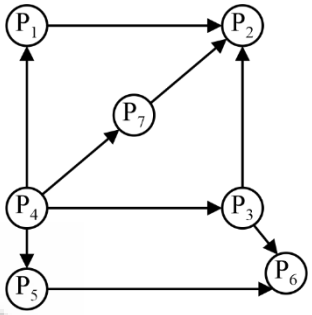
(c) Infinite waiting

(d) Utilization of CPU

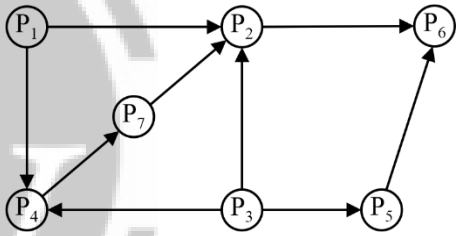
[MCQ]

6. Which of the following graph represents deadlock?

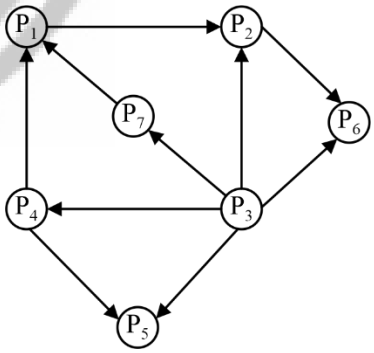
(a)



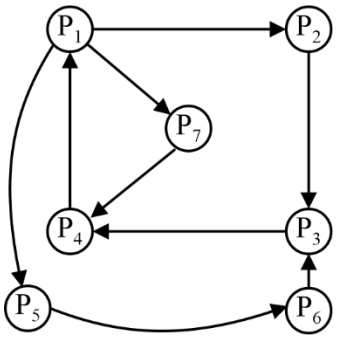
(b)



(c)



(d)



[MSQ]

7. Which of the following statement is/are correct?

(a) Deadlock is indefinite waiting.

(b) Deadlock is infinite waiting.

(c) Starvation is infinite waiting.

(d) Starvation is indefinite waiting.

[MCQ]

8. A problem encountered when a process is perpetually denied for indefinite time from necessary resources because that resource is currently used by another process. Such problem is known as _____

(a) Deadlock (b) Ageing

(c) Infinite blocking (d) Starvation

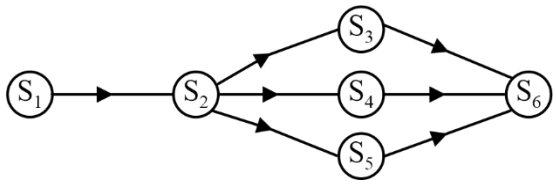
Answer Key

1. **(b, d)**
2. **(5)**
3. **(c)**
4. **(a, b)**
5. **(c)**
6. **(d)**
7. **(b, d)**
8. **(d)**

Hints & Solutions

1. (b, d)

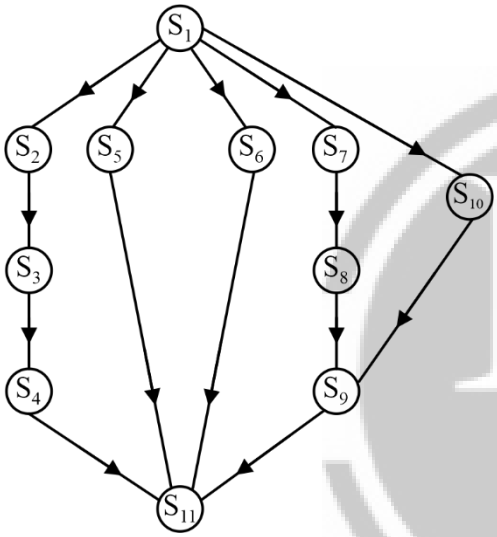
Precedence graph of above program is as follows



So, option b and d are correct.

2. (5)

Precedence graph for above program is as follows:



So, S_2, S_5, S_6, S_7, S_{10} will execute concurrently after S_1.

3. (c)

The concurrent program for given precedence graph is

S_1;
Parbegin
  begin
    S_2;
    Parbegin
      S_6;
      S_5;
    Parend;
    S_8;
  end;
  S_3;
  begin;
    S_4;
    S_7;
  end;
Parend;
S_9;

Therefore, option c is correct answer.

4. (a, b)

By using Parbegin and Parend all processes can run concurrently. So, every sequence is possible.

But in option 'c' and 'd' 4 and 2 are repeated twice respectively. Hence it is not possible.

5. (c)

Two more processes are said to be in deadlock if they wait for the happening of an event, which will never happen.

It is called infinite blocking or waiting.

6. (d)

In option d, P_1 is waiting for P_2, P_2 is waiting for P_3, P_3 is waiting for P_4, P_4 is waiting for P_1 and hence they all are waiting infinitely for each other.

Similarly, P_1, P_7, P_4 are in deadlock and P_1, P_5, P_6, P_3, P_4, P_1 are also in deadlock. Therefore, option d represents deadlock.

7. (b, d)

Deadlock is infinite waiting whereas starvation is indefinite blocking/waiting.

8. (d)

When a process is constantly denied for indefinite time from necessary resources is known as starvation.