CS & IT ENGINEERING

Operating System

Process Synchronization

DPP 01 Discussion Notes

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[MCQ]

#Q. Consider a process scenario in which each process executes first in CPU then goes for IO operation, then once again process needs a CPU burst and then terminates. Following is given a process scenario in which for CPU execution system uses preemptive SJF algorithm. Consider system has enough number of resources to carry out IO operations for all processes in parallel at a time.

Process	Arrival Time	CPU Burst Time	IO Burst Time	CPU Burst Time
P1	0	6, 5, 4, 0	7 0	2
P2	1	4 3 0	2 0	1 0
P3	2	1 0	4 0	3 2 0

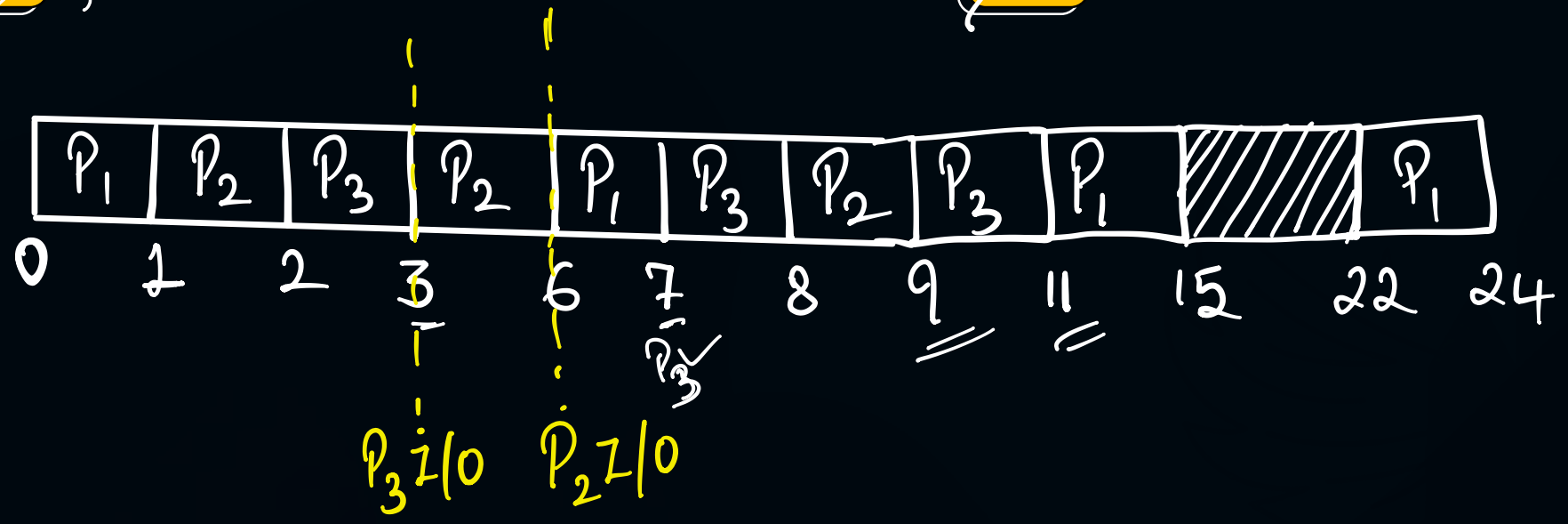
The completion times for the processes P1, P2 and P3 are respectively?

A 24, 11, 9

B 24, 9, 11

C 17, 11, 9

D 17, 9, 10



[NAT]

#Q. The following two functions P1 and P2 that share a variable D with an initial value of 4 execute concurrently.

```
P1() {
   I: X = D – 2;
   II: D = X * 2;
}
```

```
P2() {
   III: Y = D * 3;
   IV: D = Y – 2;
}
```

X = 2

D = 4

Y = 12

D = 10

The number of distinct possible values of D after a successful execution of P1 and P2 are 3 ?

Case 1: $P_1() \rightarrow P_2()$ **D = 10** ✓

I, II, III, IV

Case 2: $P_2() \rightarrow P_1()$ **D = 16**

III, IV, I, II

Case 3: $P_1()$ $P_2()$ (Let us suppose $P_1()$ writes final value)

↓

I, III, IV, II **D = 4**

Case 4: $P_1()$ $P_2()$ (P_2 writes the final value of D)

↓

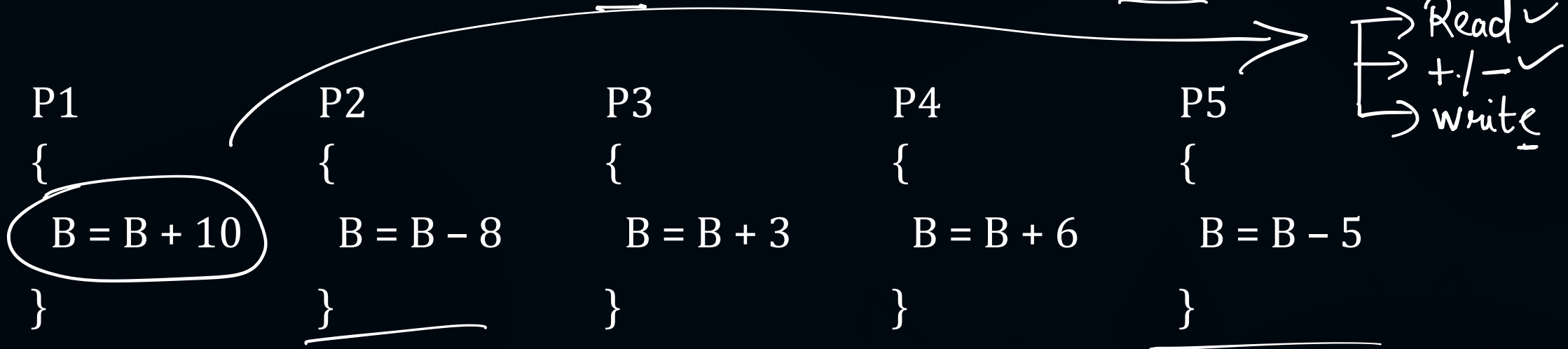
I, III, II, IV

3 distinct values of D

(4, 10, 16).

[NAT]

#Q. Consider 5 concurrent processes P1, P2, P3, P4 and P5 as shown below, which access a shared variable B. Variable B is initialized to 35.



The processes are executed on single CPU in time-shared environment. The minimum possible value of B after all 5 processes completed is M and maximum possible value of B after all 5 processes completed is N then the value of M – N is _____?

B = 35

M (minimum)

N (maximum) M - N. = ?

Case 1: Minimum (M) ⇒ 35 - 8 (P_2) ⇒ 27

27 - 5 (P_5) ⇒ 22.

M = 22

Case 2: Maximum (N) ⇒ 35 + 10 + 3 + 6 = 54 = N

M - N ⇒ 22 - 54 ⇒ - 32.

[MSQ]

#Q. Consider the following solution for synchronization of 2 processes P1 and P2. Consider here the variable lock is Boolean type and is shared between both the processes.

P1()	P2()

while(true)
{
while(lock!=True);
//critical section;
lock = False;
}
	while(true)
	{
	while(lock!=False);
	//critical section;
	lock = True;
	}

Which of the following is correct if lock variable is initialized to False?

lock = ~~false~~ True

A. Mutual exclusion is satisfied

B. Progress is satisfied

C. Bounded waiting is satisfied

D. There is starvation

[NAT]

#Q. A shared variable x, initialized to 3, is operated on by four concurrent processes *W*, *X*, *Y*, *Z* as follows. Each of the process *W* and *X* reads x from memory, increments by 2, stores it to memory and then terminates. Each of the processes *Y* and *Z* reads x from memory , decrements by 3, stores it to memory and then terminates. Each processes before reading x invokes the *P* operation (i.e., wait) on a counting semaphore *S* and invokes the *V* operation (i.e., signal) on the semaphore *S* after storing x to memory. Semaphore *S* is initialized to two. The minimum and maximum possible values of x after all processes complete execution are A and B respectively, then value of B – A is _____?

x = 3

W, X, Y, Z

+2 +2 -3 -3

S = 2

Minimum (A) y, z

$x - 3 - 3 \Rightarrow 3 - 3 - 3 = -3$ (A)

Maximum (B) w, x

$3 + 2 + 2 \Rightarrow 7$ (B)

$B - A \Rightarrow 7 - (-3) \Rightarrow \underline{10}$.

[MSQ]

#Q. Which of the following statements is/are not incorrect for semaphores?

A. Synchronization solutions using semaphore can have busy waiting (wait function)

B. Synchronization solutions using semaphore may have deadlock

C. Synchronization solutions using semaphore may suffer from priority inversion

D. Synchronization solutions using semaphore may not have mutual exclusion

[NAT]

#Q. A non-negative counting semaphore S is initiated with value x. After performing 13 P() and 4 V() functions values of semaphore S becomes 27. Values of x is _____?

$S \rightarrow x$

$x - 13 + 4 = 27$

$x - 9 = 27$

$\boxed{x = 36}$

THANK - YOU