CS222 Mid 472

Q1- Choose the correct answer for the following questions: [6 marks]

1- Which of the following maintains information about a process?

a) Stack
b) Process Control Block (PCB)
c) Scheduler
d) Acconting

2- The amount of time required to execute a particular process is called:

a) Waiting Time
b) Response Time
c) Burst Time
d) Turnaround Time

3- In Round Robin (RR), each process gets a small unit of CPU time called:

a) Time Slice
b) Time Interval
c) Time Quantum
d) CPU Burst

4- The time required by the dispatcher to stop one process and start running another is called:

a) Context Switch
b) Dispatch Latency
c)Turnaround Time
d) Waiting Time

5- If the CPU generated a logical address = 250 and the value of the relocation register = 1400, the physical address will be:

a) 1650
b) 1150
c) 1900
d) 2000

6- The role of the process scheduler in an operating system is:

a) Manages disk storage
b) Handles system calls
c) selects among available processes for next execution on CPU
d) Allocates resources to I/O devices

Q2- True or False: [6 marks]

7- Program must be brought from disk into memory and placed within a process for it to be run.

a) True
b) False

8- In asymmetric multiprocessing, all processors are treated equally.

a) True
b) False

9- Main memory is the only large storage media that the CPU can access directly.

a) True
b) False

10- Direct memory access (DMA) allows data transfer directly from I/O devices to memory without CPU involvement.

a) True
b) False

11- Context switching is overhead,the system does no useful.

a) True
b) False

12- APIs do not provide useful functionality.

a) True
b) False

Q3- Fill in the Blanks [6 Marks]

1- To keep track of which users use how much and what kinds of computer resources, we use [ ] .

2- [ ] scheduler selects which process should be executed next and allocates CPU.

3- Semaphore's Solution is a solution to the [ ] problem.

4- [ ] any mechanism for controlling access of processes or users to resources defined by the OS.

5- [ ] scheduling associates an integer with each process to determine its execution order.

6- Entity containing file system is known as a [ ]. ملاحظة: السؤال محذوف

Q4- Short Answer [6 Marks]

1- In priority scheduling techniques low priority processes may never execute. What is this problem called and what is the solution to prevent such a problem?

2- Describe two general solutions to the Critical-Section Problem and explain how each works.

3- list two differences between Direct and Indirect Communication.

Q5- Consider the following table [6 Marks]

Assume all processes arrived at time 0. Use the Round Robin (RR) scheduling technique with q = 3, draw the Gantt Chart, and calculate the average waiting time.

Process	Duration (Burst time)
P1	9
P2	12
P3	3
P4	6

Answers are on the next page

Answers

Question 1 answer:

1	b	2	c ملاحظة: بعض الدكاترة قبلوا c & d
3	c	4	b
5	a	6	c
7	a	8	b
9	a	10	a
11	a	12	b

Question 3 answer:

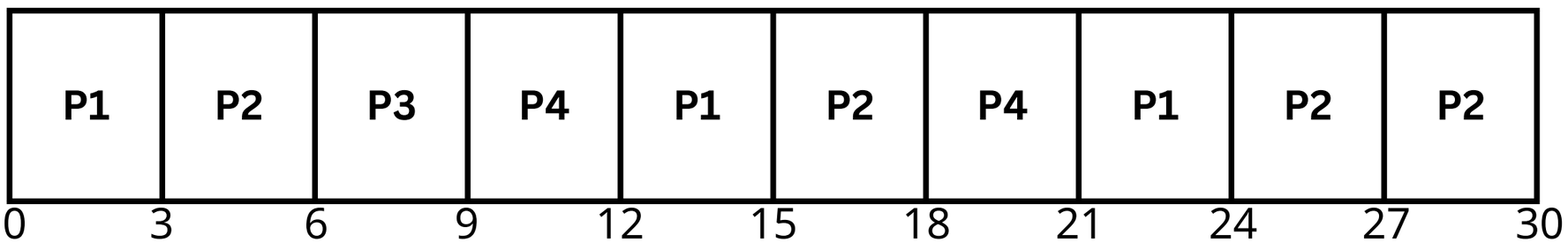
1	Acconting
2	short term
3	Critical section
4	protection
5	priority
6	volume

Question 4 answer:

1	**Problem = Starvation , Solution = aging increase priority of the process**
2	• **Mutual Exclusion** — if process Pi is executing in its critical section, then no other processes can be executing in their critical sections. • **Progress** — if no process is executing in its critical section and some processes wish to enter, the selection of which one enters next cannot be postponed indefinitely. **Another solution:** • **Peterson's Solution (software):** A classic two-process solution using two shared variables—turn and flag[2]. A process sets flag = true, sets turn to the other process, then waits while the other process's flag is true AND turn belongs to the other. Guarantees mutual exclusion, progress, and bounded waiting. • **Synchronization Hardware (TestAndSet / Swap):** Special atomic CPU instructions that test and modify a memory location in one uninterruptible step. A process loops on TestAndSet(lock) until it returns false, then enters the critical section and sets lock = false on exit. Prevents race conditions. ملاحظة: بعض الدكاترة قبلوا الحلين، لكن الأفضل تتأكدون من دكتوركم
3	• Direct communication: 1- Links are established automatically 2- A link is associated with exactly one pair of communicating processes • indirect communication 1- Link established only if processes share a common mailbox 2- A link may be associated with many processes

Question 5 answer:

Gantt Chart:



average waiting time:

P1 —> 24 - 9 = 15 : **P2 —>** 30 - 12 = 18 : **P3 —>** 9 - 3 = 6 : **P4 —>** 21 - 6 = 15

$$\frac{15 + 18 + 6 + 16}{4} = 13.5$$