Assessment I – April 2, 2025
Model Answers

Consider a **Real-Time System** in which there are three tasks. Their period and execution time are as follows:

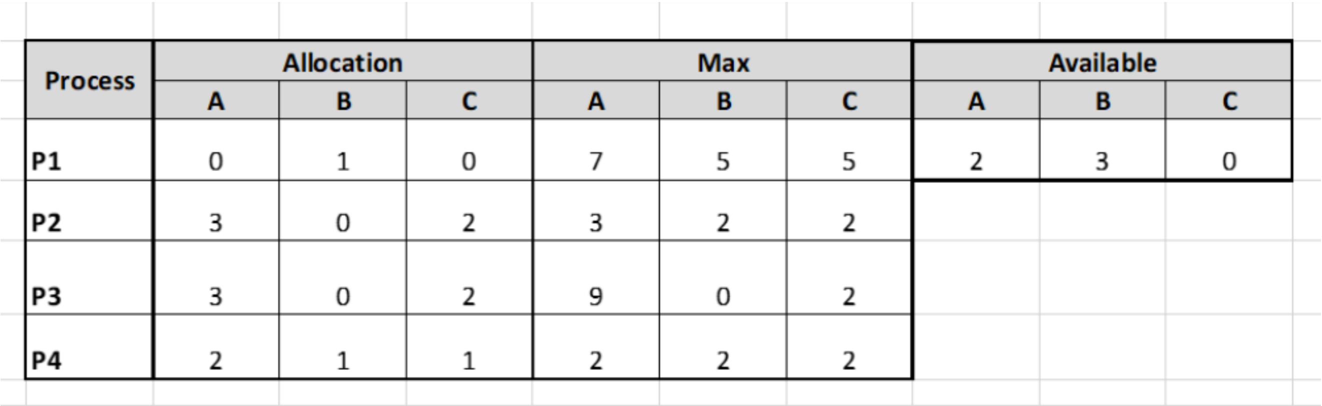
Processes	Execution time, e	Period, p
P1	35	100
P2	10	50
P3	30	150

The **total utilization of processor** is ___________ **%**.

Solution

35/100+10/50+30/150 = 0.35+0.2+ 0.2 = 0.75 = 75%

Assume that there are 4 processes, P1 through P4, and 3 resource types: A, B and C.
At time T0, let consider the following snapshot of the system:



Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P1	0	1	0	7	5	5	2	3	0
P2	3	0	2	3	2	2			
P3	3	0	2	9	0	2			
P4	2	1	1	2	2	2			

The system is currently in a safe state.
What is the execution order of the processes so that the system remains in a safe state?

a. P2 P4 P3 P1
b. P2 P1 P3 P4
c. P1 P2 P3 P4

d. P1 P3 P2 P4
e. P3 P1 P4 P2
f. P4 P1 P2 P3
g. P3 P1 P2 P4
h. P4 P3 P1 P2

Solution

Available resource (A B C) = (2 3 0)

Process	**Need**		
	A	**B**	**C**
P1	7	4	5
P2	0	2	0
P3	6	0	0
P4	0	1	1

P2: (2 3 0) + (3 0 2) = (5 3 2)
P4: (2 1 1) + (5 3 2) = (7 4 3)
P3: (3 0 2) + (7 4 3) = (10 4 5)
P1: (0 1 0) + (10 4 5) = (10 5 5)

Calculate the predicted burst time using exponential averaging for the **fifth** process if the predicted burst time for the first process is **10** units and actual burst time of the first four processes is **2, 4, 6** and **8** units respectively, given **α = 0.5**.

Solution

Predicted burst time for **1st process** = **10 units**
Actual burst time of the first four processes = 2, 4, 6, 8 α = 0.5

Predicted burst time for **2nd process** = α x Actual burst time of 1st process + (1-α) x Predicted burst time for 1st process

= 0.5 x 2 + 0.5 x 10 = 1 + 5 = 6 units

Predicted burst time for **3rd process** = α x Actual burst time of 2nd process + (1-α) x Predicted burst time for 2nd process

= 0.5 x 4 + 0.5 x 6 = 2 + 3 = 5 units

Predicted burst time for **4th process** = α x Actual burst time of 3rd process + (1-α) x Predicted burst time for 3rd process

= 0.5 x 6 + 0.5 x 5 = 3 + 2.5 = 5.5 units

Predicted burst time for **5th process** = α x Actual burst time of 4th process + (1-α) x Predicted burst time for 4th process

= 0.5 x 8 + 0.5 x 5.5 = 4 + 2.75 = **6.75 units**

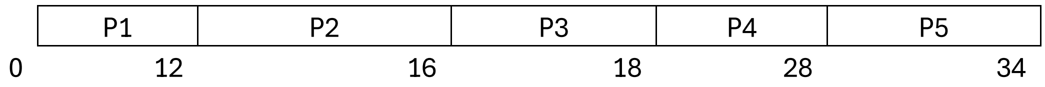
Consider the following scenario of processes and the **First-Come First-Served** (FCFS) scheduling algorithm.
Calculate **the average waiting time** of the system.

Process ID	Arrival time (ms)	Burst time (ms)
P1	0	12
P2	2	4
P3	5	2
P4	8	10
P5	10	6

Answer:

The average waiting time of the system is

The Gant chart



The waiting time of P1 = 0
The waiting time of P2 = 12-2=10
The waiting time of P3 = 16-5=11
The waiting time of P4 = 18-8=10
The waiting time of P5 =28-10=18
The average waiting time = (0 + 10 + 11 + 10 + 18) /5 = 49/5 = 9.8

A number is said to be a **palindrome** number if it reads the same forward and backward i.e., on reversing the digits of the number we get the same number.
Write a C program that starts by reading the number and then the program should display whether a given number is palindrome or not.

Test Case 1:
Input:
121

Output:
121 is a palindrome number.

Test Case 2:

Input:
342

Output:

342 is not a palindrome number.

Solution

```
#include <stdio.h>

int main() {
    int number, original, reversed = 0, remainder;

    scanf("%d", &number);

    original = number;

    while (number != 0) {
        remainder = number % 10;
        reversed = reversed * 10 + remainder;
        number /= 10;
    }

    if (original == reversed) {
        printf("%d is a palindrome number.\n", original);
    } else {
        printf("%d is not a palindrome number.\n", original);
    }

    return 0;
}
```