OS EXPT 6

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BATCH: A1

CODE:

import matplotlib.pyplot as plt

# Process class

class Process:

    def \_\_init\_\_(self, pid, burst\_time):

        self.pid = pid

        self.burst\_time = burst\_time

        self.remaining\_time = burst\_time

        self.waiting\_time = 0

        self.turnaround\_time = 0

# Gantt chart drawing function

def draw\_gantt\_chart(gantt\_chart):

    plt.figure(figsize=(10, 2))

    for idx, (pid, start, end) in enumerate(gantt\_chart):

        plt.barh(0, end - start, left=start, edgecolor='black', color='lightblue')

        plt.text(start + (end - start) / 2, 0, f'P{pid}', va='center', ha='center', color='black')

    plt.xlabel('Time')

    plt.yticks([])

    plt.title('Gantt Chart')

    plt.show()

# Average time calculation

def calculate\_avg\_times(processes):

    total\_waiting\_time = sum([p.waiting\_time for p in processes])

    total\_turnaround\_time = sum([p.turnaround\_time for p in processes])

    avg\_waiting\_time = total\_waiting\_time / len(processes)

    avg\_turnaround\_time = total\_turnaround\_time / len(processes)

    return avg\_waiting\_time, avg\_turnaround\_time

def round\_robin(processes, quantum):

    time = 0

    gantt\_chart = []

    ready\_queue = processes[:]

    waiting\_queue = []

    while ready\_queue or waiting\_queue:

        if ready\_queue:

            current\_process = ready\_queue.pop(0)

            if current\_process.remaining\_time > quantum:

                gantt\_chart.append((current\_process.pid, time, time + quantum))

                time += quantum

                current\_process.remaining\_time -= quantum

                ready\_queue.append(current\_process)

            else:

                gantt\_chart.append((current\_process.pid, time, time + current\_process.remaining\_time))

                time += current\_process.remaining\_time

                current\_process.turnaround\_time = time

                current\_process.waiting\_time = current\_process.turnaround\_time - current\_process.burst\_time

        else:

            time += 1  # Idle CPU time if no processes in ready queue

    draw\_gantt\_chart(gantt\_chart)

    avg\_waiting\_time, avg\_turnaround\_time = calculate\_avg\_times(processes)

    return avg\_waiting\_time, avg\_turnaround\_time

def sjf(processes):

    time = 0

    gantt\_chart = []

    ready\_queue = sorted(processes, key=lambda p: p.burst\_time)

    while ready\_queue:

        current\_process = ready\_queue.pop(0)

        gantt\_chart.append((current\_process.pid, time, time + current\_process.burst\_time))

        time += current\_process.burst\_time

        current\_process.turnaround\_time = time

        current\_process.waiting\_time = current\_process.turnaround\_time - current\_process.burst\_time

    draw\_gantt\_chart(gantt\_chart)

    avg\_waiting\_time, avg\_turnaround\_time = calculate\_avg\_times(processes)

    return avg\_waiting\_time, avg\_turnaround\_time

def create\_processes():

    return [

        Process(pid=1, burst\_time=10),

        Process(pid=2, burst\_time=5),

        Process(pid=3, burst\_time=8),

        Process(pid=4, burst\_time=6),

    ]

if \_\_name\_\_ == "\_\_main\_\_":

    processes\_rr = create\_processes()

    quantum = 3

    print("Round Robin Scheduling:")

    avg\_waiting\_rr, avg\_turnaround\_rr = round\_robin(processes\_rr, quantum)

    print(f"Average Waiting Time (RR): {avg\_waiting\_rr:.2f}")

    print(f"Average Turnaround Time (RR): {avg\_turnaround\_rr:.2f}")

    processes\_sjf = create\_processes()

    print("\nShortest Job First Scheduling:")

    avg\_waiting\_sjf, avg\_turnaround\_sjf = sjf(processes\_sjf)

    print(f"Average Waiting Time (SJF): {avg\_waiting\_sjf:.2f}")

    print(f"Average Turnaround Time (SJF): {avg\_turnaround\_sjf:.2f}")

OUTPUT:

Round Robin Scheduling:

Average Waiting Time (RR): 17.00

Average Turnaround Time (RR): 24.25

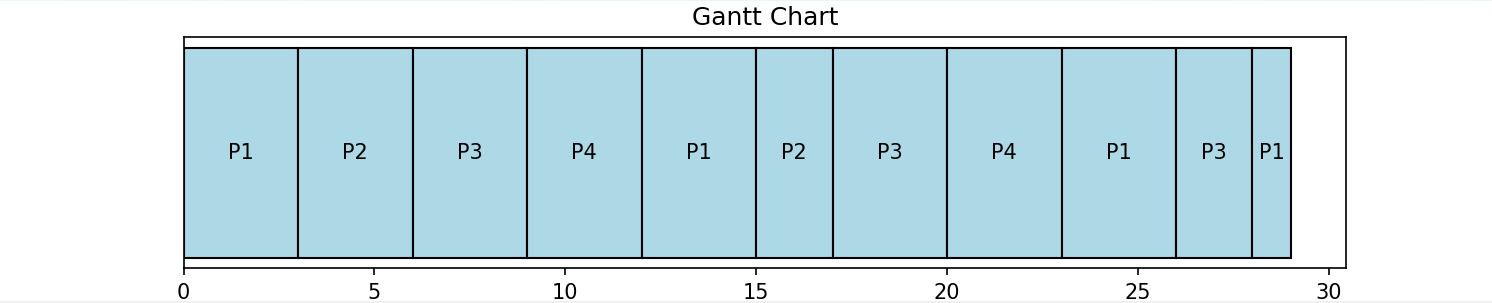
Shortest Job First Scheduling:

Average Waiting Time (SJF): 8.75

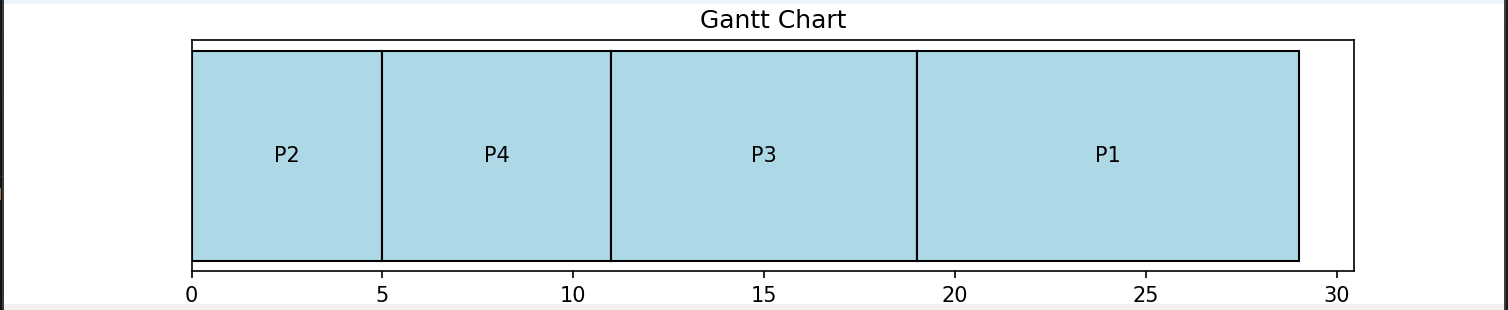
Average Turnaround Time (SJF): 16.00

GANTT CHARTS:

ROUND ROBIN:



SHORTEST JOB FIRST:



Outcomes: CO2: Demonstrate use of inter process communication

Questions: