**BITS PILANI, DUBAI CAMPUS**
**DUBAI INTERNATIONAL ACADEMIC CITY, DUBAI**

**FIRST SEMESTER 2025 – 2026**
**COURSE:** CSF213/ECOM213/MACF212 (Object Oriented Programming)
**COMPONENT:** Lab 12 **Week: 13**

**Aim:** Learn Java multithreading and understand how it improves performance.

**Objective:** To understand and apply **Java multithreading** for concurrent task execution to improve performance by performing multiple tasks simultaneously.

**Problem Descriptions:**

1. In an **online quiz competition**, there are **"n" candidates** participating.

   - The quiz consists of **5 questions**, and the **correct answers** are:

     Q.No: 1 2 3 4 5

     Answer: A B B A C

- **Marking scheme**:

  - Each correct answer carries **+2 marks**.
  - Each wrong answer gets a **–0.25 mark penalty** (25% of 1 mark).
  - Choosing option **X** means the question is unanswered, and **no marks are deducted**.

Each candidate answers the quiz by choosing one option for every question (**A, B, C, D, or X**).

**Task**

Write a **Java program using the thread concept** to simulate the evaluation process:

1. Each **candidate should be represented as a thread**, where the thread is responsible for evaluating the candidate's answers against the answer key and calculating the total score.
2. After all threads (candidates) finish execution, display:

   - Each candidate's name and their total score.
   - A **rank list of candidates**, sorted in descending order of marks.

**Sample Input and Output**

| Input | Output |
|---|---|
| Enter number of candidates: 4<br><br>Enter name of candidate 1: Ahmed<br>Enter answers (A/B/C/D/X) for 5 questions separated by spaces: A B B A C<br><br>Enter name of candidate 2: Priya<br>Enter answers (A/B/C/D/X) for 5 questions separated by spaces: A C B X C<br><br>Enter name of candidate 3: Salman<br>Enter answers (A/B/C/D/X) for 5 questions separated by spaces: B B C A D<br><br>Enter name of candidate 4: Neha<br>Enter answers (A/B/C/D/X) for 5 questions separated by spaces: A B X A C | Evaluation in progress...<br><br>Ahmed scored: 10.0 marks<br>Priya scored: 7.75 marks<br>Salman scored: 4.75 marks<br>Neha scored: 8.0 marks<br><br>---------- Rank List ----------<br>1. Ahmed → 10.0 marks<br>2. Neha → 8.0 marks<br>3. Priya → 7.75 marks<br>4. Salman → 4.75 marks<br>------------------------------ |

2. Write two thread classes **MorningThread** and **EveningThread**. The first thread will print "**Good Morning**" 5 times and sleep 1 second each time. The second thread will print "**Good Evening**" 5 times and sleep 1 second each time. Write the main thread that creates and starts one object of MorningThread and another of EveningThread.

**Output:**

Good Morning
Good Evening
Good Morning
Good Evening
Good Morning
Good Evening
Good Morning
Good Evening
Good Morning
Good Evening