**Practical 9: Alon-Matias-Szegedy Algorithm**

Codes:

import java.io.\*;

import java.util.\*;

class AMSA {

  public static int findCharCount(String stream, char XE, int random, int n) {

    int countoccurance = 0;

    for (int i = random; i < n; i++) {

      if (stream.charAt(i) == XE) {

        countoccurance++;

      }

    }

    return countoccurance;

  }

  public static int estimateValue(int XV1, int n) {

    int ExpValue;

    ExpValue = n \* (2 \* XV1 - 1);

    return ExpValue;

  }

  public static void main(String args[]) {

    int n = 15;

    String stream = "abcbdacdabdcaab";

    int random1 = 3, random2 = 8, random3 = 13;

    char XE1, XE2, XE3;

    int XV1, XV2, XV3;

    int ExpValuXE1, ExpValuXE2, ExpValuXE3;

    int apprSecondMomentValue;

    // Select three random characters from the stream

    XE1 = stream.charAt(random1 - 1);

    XE2 = stream.charAt(random2 - 1);

    XE3 = stream.charAt(random3 - 1);

    // Count the number of occurrences of each character in the stream

    XV1 = findCharCount(stream, XE1, random1 - 1, n);

    XV2 = findCharCount(stream, XE2, random2 - 1, n);

    XV3 = findCharCount(stream, XE3, random3 - 1, n);

    // Print the counts of the selected characters

    System.out.println(XE1 + "=" + XV1 + " " + XE2 + "=" + XV2 + " " + XE3 + "=" + XV3);

    // Estimate the expected value for each selected character

    ExpValuXE1 = estimateValue(XV1, n);

    ExpValuXE2 = estimateValue(XV2, n);

    ExpValuXE3 = estimateValue(XV3, n);

    // Print the expected values for each selected character

    System.out.println("Expected value for" + XE1 + " is::" + ExpValuXE1);

    System.out.println("Expected value for" + XE2 + " is::" + ExpValuXE2);

    System.out.println("Expected value for" + XE3 + " is::" + ExpValuXE3);

    // Compute the approximate second moment value using Alon-Matias-Szegedy algorithm

    apprSecondMomentValue = (ExpValuXE1 + ExpValuXE2 + ExpValuXE3) / 3;

    System.out.println("approximate second moment value using alon-matis-szegedy is::" + apprSecondMomentValue);

  }

}

**OUTPUT**

