**EXERCISE - 1**

**Homogeneity study data**

|  |  |  |
| --- | --- | --- |
| **S.No of PT item** | **Result 1** | **Result 2** |
| **1** | **40.1** | **40.0** |
| **2** | **39.8** | **39.6** |
| **3** | **39.5** | **39.4** |
| **4** | **39.8** | **39.2** |
| **5** | **39.7** | **39.6** |
| **6** | **39.3** | **39.2** |
| **7** | **39.3** | **39.5** |
| **8** | **39.8** | **39.7** |
| **9** | **39.6** | **39.8** |
| **10** | **39.6** | **39.5** |

**SDPA = 0.25**

**Calculate Between sample SD, Ss for the above data. Ss=**

**Stability study data**

|  |  |  |
| --- | --- | --- |
| **S.No of PT item** | **Result 1** | **Result 2** |
| **1** | **38.3** | **38.5** |
| **2** | **38.8** | **38.7** |
| **3** | **38.6** | **38.8** |

**Calculate the difference between homogeneity & stability average =**

**Determine whether the PT items or homogeneous and stable . If not what action will be taken?**

**EXERCISE - 2**

**ASSIGNMENT OF VALUE USING A CRM IN THE PT PROGRAM**

**CRM Value from Reference Material Certificate =21.62**

**EU from Reference Material Certificate = 0.52**

**Coverage factor reported in Reference Material Certificate =2**

**Data on characterizing each of the 20 PT items twice using the CRM are as under:**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No** | **RM1** | **RM2** | **CRM1** | **CRM2** |
| 1 | **20.5** | **20.5** | **19.0** | **18.0** |
| 2 | **21.1** | **20.7** | **19.8** | **19.9** |
| 3 | **21.5** | **21.5** | **21.0** | **21.0** |
| 4 | **22.3** | **21.7** | **21.0** | **20.8** |
| 5 | **22.7** | **22.3** | **20.5** | **21.0** |
| 6 | **23.6** | **22.4** | **20.3** | **20.3** |
| 7 | **20.9** | **21.2** | **21.5** | **21.8** |
| 8 | **21.4** | **21.5** | **21.9** | **21.7** |
| 9 | **23.5** | **23.5** | **21.0** | **21.0** |
| 10 | **22.3** | **22.9** | **22.0** | **21.3** |
| 11 | **23.5** | **24.1** | **20.8** | **20.6** |
| 12 | **22.5** | **23.5** | **21.0** | **22.0** |
| 13 | **22.5** | **23.5** | **21.0** | **21.0** |
| 14 | **23.4** | **22.7** | **22.0** | **22.0** |
| 15 | **24.0** | **24.2** | **22.1** | **21.5** |
| 16 | **24.5** | **24.4** | **22.3** | **22.5** |
| 17 | **24.8** | **24.7** | **22.0** | **21.9** |
| 18 | **24.7** | **25.1** | **21.9** | **21.9** |
| 19 | **24.9** | **24.4** | **22.4** | **22.6** |
| 20 | **27.2** | **27.0** | **24.5** | **23.7** |

**Calculate assigned value and standard uncertainty in assigned value of the RM prepared by PTP.**

**Assigned Value =**

**Standard uncertainty in assigned value =**

**EXERCISE - 3**

**Determination of Assigned value and SDPA using ALGORITHM A**

**Data received from the participants are as under:**

|  |  |
| --- | --- |
| **1** | **1.69** |
| **2** | **0.74** |
| **6** | **2.05** |
| **8** | **1.14** |
| **9** | **2.19** |
| **12** | **1.39** |
| **13** | **1.52** |
| **14** | **1.5** |
| **19** | **1.58** |
| **20** | **0.8** |
| **22** | **1.21** |
| **25** | **1.63** |

**Determine the following using Algorithm A:**

**Assigned Value =**

**SDPA =**

**Standard Uncertainty of Assigned Value =**

**Also calculate Z score or Z prime score of the participants**

**EXERCISE - 4**

**Determination of Assigned value and SDPA using nIQR method**

**Data received from the participants are as under:**

|  |  |
| --- | --- |
| **S.No.** | **Value** |
| **1** | **47.0** |
| **2** | **41.0** |
| **3** | **54.0** |
| **4** | **43.0** |
| **5** | **65.0** |
| **6** | **43.0** |
| **7** | **47.0** |
| **8** | **48.0** |
| **9** | **42.0** |
| **10** | **51.0** |
| **11** | **49.0** |
| **12** | **56.0** |
| **13** | **43.0** |
| **14** | **45.0** |
| **15** | **42.0** |

**Determine the following using nIQR method:**

**Assigned Value =**

**nIQR =**

**Also calculate Z score of the participants**

**EXERCISE – 5 (a) @ 95% CL**

**Identification of Blunders using Grubbs’ test**

**Data received from the participants are as under:**

|  |  |
| --- | --- |
| **S.No** | **Value** |
| **1** | **59.5** |
| **2** | **62.4** |
| **3** | **67.0** |
| **4** | **67.5** |
| **5** | **67.5** |
| **6** | **68.5** |
| **7** | **69.1** |
| **8** | **69.5** |
| **9** | **69.6** |
| **10** | **70.0** |
| **11** | **70.2** |
| **12** | **70.2** |
| **13** | **70.3** |
| **14** | **70.4** |
| **15** | **70.9** |

**Use Grubbs test and identify the blunders and list them below**

**EXERCISE – 5 (b) @ 99% CL**

**Identification of Blunders using Grubbs’ test**

**Data received from the participants are as under:**

|  |  |
| --- | --- |
| **S.No** | **Value** |
| **LAB\_01** | **54.10** |
| **LAB\_04** | **59.53** |
| **LAB\_07** | **57.37** |
| **LAB\_10** | **61.85** |
| **LAB\_12** | **51.07** |
| **LAB\_16** | **62.44** |
| **LAB\_19** | **16.56** |
| **LAB\_23** | **49.52** |
| **LAB\_26** | **55.80** |
| **LAB\_29** | **48.24** |

**Use Grubbs test and identify the blunders and list them below**

**EXERCISE – 6**

**Identify the blunders and calculate the performance of all participants**

|  |  |
| --- | --- |
| **Code** | **Result** |
| **2** | **314.7** |
| **5** | **317.0** |
| **9** | **327.8** |
| **10** | **313.8** |
| **17** | **335.7** |
| **19** | **330.5** |
| **21** | **328.8** |
| **24** | **302.9** |
| **27** | **385.1** |
| **28** | **339.6** |
| **30** | **342.1** |
| **32** | **320.0** |
| **33** | **322.0** |
| **37** | **338.4** |
| **39** | **248.9** |

**Take MPE between as 6%**

|  |  |
| --- | --- |
| **Code nos. of blunders identified finally:** |  |

|  |  |
| --- | --- |
| **Assigned value after removal of blunders** |  |
| **SDPA after removal of blunders** |  |
| **SU after removal of blunders** |  |

**EXERCISE – 7 – VALIDATION OF ASSIGNED VALUE**

|  |
| --- |
| **Example -1 Pesticide residue in Milk (mg/L)** |
| **Assigned Value=** | **445.3** |
| **EU of Assigned value=** | **17.26** |
| **Robust average of 43 participants=** | **421.58** |
| **Robust SD of 43 participants=**  | **21.47** |

|  |
| --- |
| **Example - 2 Aflatoxin content in ground nut (mg/kg)** |
| **Assigned Value=** | **425.7** |
| **EU of Assigned value=** | **17.28** |
| **Robust average of 19 participants=** | **431.2** |
| **Robust SD of 19 participants=** | **14.16** |

|  |
| --- |
| **Example - 3 Polyester content in textiles (%)** |
| **Assigned Value from 19 participants =** | **67.30** |
| **SDPA=** | **1.22** |
| **Homogeneity average=** | **66.80** |
| **EU (max) of Homogeneity results=** | **1.34** |

|  |
| --- |
| **Example - 4 Mercury content in food (mg/kg)** |
| **Assigned Value from 17 participants =** | **152.5** |
| **SDPA=** | **6.48** |
| **Homogeneity average=** | **160.4** |
| **EU (max) of Homogeneity results=** | **5.24** |

**EXERCISE – 8 STATISTICS FOR SMALL NO. OF PARTICIPANTS**

**Case -1: Cement fineness (Assume MPE as 30%)**

|  |  |
| --- | --- |
| **Code** | **Value** |
| **LAB-08** | **240**  |
| **LAB-07** | **267**  |
| **LAB-11** | **269**  |
| **LAB-13** | **270**  |
| **LAB-09** | **272**  |
| **LAB-12** | **274**  |
| **LAB-14** | **295**  |
| **LAB-05** | **300**  |
| **LAB-04** | **314**  |
| **LAB-01** | **341**  |

**Case -2: PR in vegetables (Assume MPE as 30%)**

|  |  |
| --- | --- |
| **Code** | **Value** |
| **EO\_01** | **60.1** |
| **EO\_13** | **79.8** |
| **EO\_28** | **84.2** |
| **EO\_14** | **90.5** |

**Calculate the following in both cases (In case 2 take SDPA by perception @10% of Assigned Value):**

|  |  |
| --- | --- |
| **Assigned Value =** |  |
| **SDPA =** |  |
| **SU of Assigned Value =** |  |

**EXERCISE – 9 (a)**

**Performance evaluation in case of qualitative PT schemes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Assigned Value** | **Present** | **Present** | **Absent** |  |
|  |  |  |  |  |
| **Data received from the participants are as under:** |
| **Lab code** | **Vial A** | **Vial B** | **Vial C** | **Performance (Overall)** |
| **1** | **Present** | **Absent** | **Present** |  |
| **2** | **Present** | **Present** | **Absent** |  |
| **3** | **Present** | **Present** | **Absent** |  |
| **4** | **Present** | **Present** | **Absent** |  |
| **5** | **Absent** | **Absent** | **Absent** |  |
| **6** | **Present** | **Present** | **Absent** |  |
| **7** | **Present** | **Present** | **Absent** |  |
| **8** | **Present** | **Present** | **Absent** |  |
| **9** | **Present** | **Present** | **Present** |  |
| **10** | **Present** | **Absent** | **Present** |  |
| **11** | **Present** | **Present** | **Absent** |  |
| **12** | **Present** | **Present** | **Absent** |  |
| **13** | **Present** | **Present** | **Absent** |  |
| **14** | **Present** | **Present** | **Absent** |  |
| **15** | **Present** | **Present** | **Absent** |  |

**Give the overall performance of each of the participants in the above PT Scheme**

**EXERCISE – 9 (b)**

**Performance evaluation in case of semi quantitative PT schemes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| **Data received from the participants are as under:** |

|  |  |  |
| --- | --- | --- |
| **ID of Lab** | **Rating reported** | **Performance of the lab** |
| **1** | **2.5** |  |
| **2** | **3** |  |
| **3** | **2.5** |  |
| **4** | **2.5** |  |
| **5** | **1.5** |  |
| **6** | **3** |  |
| **7** | **3.5** |  |
| **8** | **3** |  |
| **9** | **3** |  |
| **10** | **2.5** |  |
| **11** | **3** |  |
| **12** | **3.5** |  |
| **13** | **3** |  |
| **14** | **3** |  |
| **15** | **2.5** |  |
| **16** | **2** |  |

**Determine Assigned value and evaluate the performance of all the labs**