


| Name: | |  | |
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| Enrolment No: | | | |
| UPES End Semester Examination, December 2023 | | | |
| Course: Statistical Methods in Analytical Chemistry, GLP, GMP | | Time : 03 hrs. | |
| Semester: V | | Max. Marks: 100 | |
| Program: Int. BSc+MSc Chem | | | |
| Course Code: CHEM3033 | | | |
| Instructions: | | | |
| SECTION A (5Qx4M=20Marks) | | | |
| S. No. | | Marks | CO |
| Q 1 | Mention the need to validate analytical results and discuss any one of the methods. | 4 | CO1 |
| 2 | What do you mean by “confidence level” and give formula to determine the confidence level? | 4 | CO1 |
| 3 | Calculate variance of the following data: 3, 7, 8, 10, 11, and 12. | 4 | CO2 |
| 4 | What do you mean by ANOVA and mention important features of it in validating analytical data? | 4 | CO3 |
| 5 | Differentiate between t-test and z-test of significance. | 4 | CO2 |
| SECTION B (4Qx10M= 40 Marks) | | | |
| Q 6 | How do you check the Quality Control of an organic industry? Mention a case study with appropriate illustrations. | 10 | CO3 |
| 7 | Differentiate between the following: (i) ANOVA & ANCOVA (ii) Range & Variance (iii) GLP & GMP (iv) Quality Control & Quality Assurance | 2+3+3+2 | CO3 |
| 8 | Discuss the importance of documentation in the pharmacy industry. Mention a few cases with appropriate justifications. | 10 | CO2 |
| 9 | Mention the significance of standard deviation in validating analytical results and determine the standard deviation for the following set of results obtained in a laboratory experiment to calculate the purity of a sample (%). 80, 95, 90, 92, 93, 89, 91 OR Classify “errors” based on the results obtained in an analytical method and suggest possible ways to reduce/minimize errors. | 10 | CO1 |

SECTION-C
(2Qx20M=40 Marks)

| 10 | <p>Determine Anova constant for the following data and give proper justification for the value obtained.</p> <table border="1"><thead><tr><th>Type of animal</th><th>No. of animals</th><th>Average domestic animal</th><th>Standard deviation</th></tr></thead><tbody><tr><td>Dog</td><td>5</td><td>12</td><td>2</td></tr><tr><td>Rat</td><td>5</td><td>16</td><td>1</td></tr><tr><td>Cat</td><td>5</td><td>20</td><td>4</td></tr></tbody></table> | Type of animal | No. of animals | Average domestic animal | Standard deviation | Dog | 5 | 12 | 2 | Rat | 5 | 16 | 1 | Cat | 5 | 20 | 4 | 20 | CO2 |
|----------------|--|-------------------------|--------------------|-------------------------|--------------------|-----|---|----|---|-----|---|----|---|-----|---|----|---|-----------|------------|
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| Cat | 5 | 20 | 4 | | | | | | | | | | | | | | | | |
| 11 | <p>Find the t-test value for the following two sets of variables: 9, 8, 7, 6 and 4, 3, 2, 1.</p> <p>OR</p> <p>What is the importance of sampling? Discuss salient features of a good statistical sampling plan and procedure in detail.</p> | 20 | CO2 | | | | | | | | | | | | | | | | |