Beas.2108   **Statistical Methods and Numerical Analysis (1+1)**   **Marks: 50**
Time: 2 hours

I   **State True or False**   (10x1=10)
1. The degree of freedom for students t-test based on a random sample of size n is (n-1).
2. For a positively skewed distribution, mean < mode.
3. If $x_1, x_2, x_3, ..., x_n$ is a random sample of size n from a normal population with mean μ and variance σ^2, then the hypothesis $H_o: \mu = \mu_o$, $\sigma^2 = \sigma^2_0$ is a composite hypothesis.
4. The F-test is always a one-tailed test.
5. Binomial distribution tends to follow Normal distribution when n becomes large.
6. The range of standard deviation is - ∞ to ∞.
7. The probability of rejecting a null hypothesis when it is true is called Type-I error.
8. Z-test can be performed when the sample size (n) is small.
9. The correlation coefficient always lies between -1 to 1.
10. The significance of correlation and regression coefficients are tested based on a t-test.

II   **Write short notes on ANY FIVE of the following**   (5x2=10)
1. Differentiate between correlation and regression coefficient.
2. State the different kinds of approaches for interpolation.
3. What are the principles of experimental design?
4. What special terms are used for independent and dependent variate values concerning interpolation and extrapolation?
5. What are the different types of statistical models in experimental design?
6. Distinguish between symmetrical and asymmetrical factorial experiments.
7. What effects are measured in factorial experiments?

III   **Answer ANY FIVE of the following**   (5x4=20)
1. Define the symbolic operator Δ and ∇, and find a relation between them.
2. Distinguish between Simpson's 1/3 and Trapezoidal integration formula.
3. Discuss in brief the applicability of Newton's formula of advancing differences for interpolation.
4. What do you mean by levels of a factor? Explain it with an example.
5. Briefly mention the numerical differentiation and integration.
6. Which order of Runge-Kutta method is equivalent to Euler's method? What is the formula of the Runge-Kutta fourth order method? How many gradient evaluations are required for each iteration of a fourth-order Runge Kutta algorithm?
7. Write a short note on Response surface design.

IV   **Write an essay on ANY ONE of the following**   (1x10=10)
1. What is experimental design? Why randomized complete block design (RCBD) is superior to completely randomized design (CRD)?
2. Define contingency table. Explain the step-by-step procedure of performing chi-square test of independence.

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