8. Consider two normal populations $N(\mu_1, \sigma_1^2)$ and $N(\mu_2, \sigma_2^2)$ where the means μ_1 and μ_2 and variances σ_1^2, σ_2^2 are unspecified. Test the hypothesis :

H_0 : $\sigma_1^2 = \sigma_2^2 = \sigma^2$ (unspecified) with μ_1 and μ_2 (unspecified) against the alternative hypothesis :

H_1 : $\sigma_1^2 \neq \sigma_2^2$; μ_1 and μ_2 (unspecified).

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Dual Degree B. Sc. (Hons.) Mathematics-M.Sc. Mathematics EXAMINATION, Dec. 2017

(Ninth Semester)

(Main & Re-appear)

MAT-615-H

STATISTICAL METHODS

Time : 3 *Hours*]   [*Maximum Marks :* 75

Before answering the question-paper candidates should ensure that they have been supplied to correct and complete question-paper. No complaint, in this regard, will be entertained after the examination.

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks.

Unit I

1. (a) Let X and Y be two independent continuous random variables then find p.d.f. of U = X − Y.

(b) If X and Y are two independent variables such that :

$$f(x) = e^{-x}, \ x \geq 0$$

and $g(y) = 3e^{-3y}, \ y \geq 0,$

find the probability distribution of X/Y.

2. If $(X, Y) \sim B \vee N(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$, prove that the marginal p.d.f.s of X and Y are normal but converse is not true.

Unit II

3. Distinguish between partial and multiple correlation.

Prove that :

$$R_{1.23}^2 = \frac{r_{12}^2 + r_{13}^2 - 2r_{12}r_{13}r_{23}}{1 - r_{23}^2}$$

Also give important properties of multiple correlation coefficient.

4. (a) Derive the equation of the plane of regression of X_1 on X_2 and X_3.

(b) In a trivariate distribution :

$\sigma_1 = 2, \ \sigma_2 = \sigma_3 = 3, \ r_{12} = 0.7, \ r_{23} = r_{31}$ = 0.5. Find $b_{12.3}$ and $\sigma_{1.23}$.

Unit III

5. Write notes on the following :

(a) Median test

(b) Mann-Whitney U-test.

6. (a) What do you mean by non-parametric tests ? How do they differ from parametric tests ? Also, give important assumptions made for applying non-parametric tests.

(b) Define order statistics and give their distributions.

Unit IV

7. Obtain the critical region of the LR test for testing the mean of a normal population.