



**NATIONAL OPEN UNIVERSITY OF NIGERIA**  
**FACULTY OF SOCIAL SCIENCES**  
**DEPARTMENT OF ECONOMICS**  
**2021\_1 EXAMINATION**

**COURSE TITLE: APPLIED STATISTICS**

**COURSE CODE: ECO 452**

**UNITS: 2**

**TIME ALLOWED: 2 HOURS**

**INSTRUCTION: ANSWER ANY THREE QUESTIONS**

**1. (a) What is Two-Way Analysis of Variance? 2 Marks**

(b) Table 1 gives the outputs of an experimental farm that used each of four fertilizers and three pesticides such that each plot of land had an equal probability of receiving each fertilizer-pesticide combination (completely randomized design).

**Table 1: Output with 4 Fertilizers and 3 Pesticides**

	Fertilizer 1	Fertilizer 2	Fertilizer 3	Fertilizer 4
Pesticide 1	21	12	9	6
Pesticide 2	13	10	8	5
Pesticide 3	8	8	7	1

(i) Find the average output for each fertilizer  $\bar{X}_j$  for each pesticide  $\bar{X}_i$  and for the sample as a whole  $\bar{X}$ . **(2 Marks)**

(ii) Find the total sum of squares, SST, the sum of squares for fertilizer or factor A, SSC, for pesticides or factor B, SSR, and for the error or unexplained residual, SSE. **3 Marks**

(iii) Find the degrees of freedom for SSC, SSR, SSE, and SST. **3 Marks**

(iv) Find MSC, MSR, MSE, MSC/MSE, and MSR/MSE. **3 Marks**

(v) From the results, construct an ANOVA Table. **4 Marks (for correctly filled Table)**

(vi) Test at the 1% level of significance the hypothesis that the means for factor A populations (fertilizers) are identical. **3 Marks**

(vii) Test at the 1% level of significance the hypothesis that the means for factor B populations (pesticides) are identical. **3 Marks**

**23.3 Marks**

**2a. Define hypothesis testing and highlight the procedures for hypothesis testing. 9 Marks**

**2b. Highlight five Significances of Statistics in Social Sciences. 5 Marks**

**2c.** The breaking strengths of cables produced by a manufacturer have a mean of 1800 pounds and a standard deviation of 100 pounds. By a new technique in the manufacturing process, it is claimed that the breaking strength can be increased. To test this claim, a sample of 50 cables is tested and it is found that the mean breaking strength is 1850 pounds. Can we support the claim at the 0.01 significance level? Note: Z-tabulated at 0.01 is 2.33. **9.3Marks**

### **23.3 Marks**

**3.a** What do you understand by multiple regression analysis? **3Marks**

**3b.** Highlight the assumptions of multiple regression you know. **9Marks**

**3c.** Table 2 contains observations on the quantity demanded (Y) of a certain commodity, its price (X1) and consumers' income (X2). Compute the fitted linear regression (that is, estimate the values for the parameters) **11.3Marks**

**Table 2: Quantity demanded, price and income**

<b>n</b>	<b>Y (quantity demanded)</b>	<b>X1 (price)</b>	<b>X2 (Income)</b>
1	100	5	1000
2	75	7	600
3	80	6	1200
4	70	6	500
5	50	8	300
6	65	7	400
7	90	5	1300
8	100	4	1100
9	110	3	1300
10	60	9	300

### **23.3 Marks**

**4.a** Define Time series. **3.3 Marks**

**4b.** Itemize and discuss the Components of Time Series you know: **20Marks (with detailed explanations)**