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B.Sc. Degree Examination, Harmattan Semester, 2005/2006

) 203: BIOMETRICS — Time allowed: 1¼ hours.

ruction: **Attempt all questions.**

ch question is followed by four options lettered A-D. Find the correct option for each question and shade/mark X on your swer sheet, the space which bears the same letter as the option you have chosen. Give only one answer to each question.

Matric No: AB Johnson Dept: Sciences Level: AB Sciences

Which of the following is not correct?

1. Pitfalls in experimentation include:
(a) Faulty experimental design (b) Inferior techniques (c) improper interpretation of experimental result (d) the formulation of the trial hypothesis.

2. The following are features of the scientific method except: (a) Reduction of the personal equation to the minimum (b) statistical analysis of the data (c) a careful and logical analysis of the hypothesis (d) bare observations.

3. The following are principles of experimental design except: (a) Replication (b) randomization (c) local control (d) maximisation

4. Experimental error is defined as:
(a) Error inherent in your readings (b) variability among experimental nets
(c) Objective basis for the evaluation of experimental results (d) lapses on the part of the experimenter.

5. Which of the following is not correct: Progress of knowledge by bare observation is (a) slow (b) certain (c) uncertain (d) irregular.

Questions 6-10. An experiment was conducted to find out the effect of the inclusion of different levels of palm oil in the diet of the catfish *Clarias gariepinus*. There were two replicates for each treatment. The data for the mean weight gained (g) by the fish is shown below:

Treatments	Replicates 1	2
et 1 (100% sardine oil)	1.2	0.7
2 (75% sardine oil +25% palm oil)	1.2	1.7
(50% sardine oil + 50% palm oil)	2.5	0.8
iet 4 (100% palm oil)	1.2	2.3

Using the Randomized Complete Block Design, answer the following questions:

6. Calculate the correction factor (a) 134.56 (b) 1.45 (c) 16.82 (d) 19.88.
7. Calculate the sum of squares of error (a) 3.06 (b) 0.76 (c) 0.05 (d) 2.25.
8. Calculate the value of F (a) 0.25 (b) 0.05 (c) 0.75 (d) 0.33.
9. What is the value of the degrees of freedom of the total (a) 3 (b) 1 (c) 7 (d) 4.
10. Calculate the mean of squares of replicates (a) 0.75 (b) 0.25 (c) 0.05 (d) 0.76. An experiment was conducted to find out the effects of three diets on the growth of Tilapia frys using a completely randomized design. Each treatment had three replicates. Below is the abridged data for the result of the growth rate (% day $^{-1}$):

Diets	Replicates 1	2	3
Diet 1	59.6	36.8	77.9
Diet 2	20.6	18.9	29.0
Diet 3	6.5	16.0	15.7

11. What is the degree of freedom of error (a) 2 (b) 5 (c) 8 (d) 6.
12. Compute the value for the mean squares of treatment (a) 160.79 (b) 1701.94 (c) 4368.67 (d) 3403.88
13. Compute the value for the f ratio (a) 9.21 (b) 6.34 (c) 10.58 (d) 15.26.
14. Calculate the sum of squares of treatment (a) 4368.67 (b) 943.79 (c) 3403.88 (d) 1701.94
15. What is the value of the degree of freedom of treatment (a) 2 (b) 3 (c) 6 (d) 5

Given the data below, the result of a student in O.O.U. What is the weighted mean of this result.

Course	Unit	Score	Grade
BIO 101	3	40	E1
CHM 101	4	60	B4
PHY 101	4	45	D2
PHY151	1	70	A5
MAT 101	3	48	D2

(a) 2.26 (b) 2.53 (c) 2.27 (d) 2.52

Use this data set for questions 17-20: 4, 3, 7, 8, 5, 11, and 13.

17. What is the geometric mean (a) 4852.40 (b) 4852.20 (c) 4852.17 (d) 4852.41.
18. Calculate the harmonic mean (a) 5.74 (b) [illegible]
19. Evaluate the mean deviation (a) [illegible]
20. The variance is (a) -0.00017 (b) 0.00015 (c) -0.00015 (d) 0.00017

Questions 21-23: Evaluate the following

21. $\binom{7}{4}\binom{6}{5}$ (a) 211 (b) 208 (c) 219 (d) 210.

22. $\binom{3}{2}\binom{7}{3}$ (a) 265 (b) 350 (c) 267 (d) 367.

23. The number of permutations of letters in the word *statistics* (a) 50450 (b) 50400 (c) 50540 (d) 50500. Among diabetics, the fasting blood glucose level X is normally distributed with mean 106/100ml and standard deviation 8mg/100ml.

Use this to answer questions 24-28.

24. Evaluate P [106≤X≤110] (a) 0.9599 (b) 0.1915 (c) 0.9899 (d) 0.9195

25. What percentage of diabetics have levels between 90 and 120mg/ml (a) 93.7% (b) 97.3% (c) 91.3% (d) 97.1%.

26. Evaluate P[X≥121mg/ml (a) 0.3011 (b) 0.0301 (c) 0.3101 (d) 0.3301.

27. Find P [X≤120 mg/100ml (a) 0.9599 (b) 0.4599 (c) 0.0401 (d) 0.5401

28. Find the point x_0 that has the property that 25% of all diabetics have a fasting glucose level X lower than x_0 (a) 90.64 (b) 19.36 (c) 100.64 (d) 116.44.

For questions 29-34 assume the probability of a male at birth is ½.

29. In a family of 4, what is the probability that there will be 3 boys (a) 0.25 (b) 0.75 (c) 0.15 (d) 0.50.

30. What is the probability that there will be at least one boy and one girl in the family described in question 29? (a) 0.125 (b) 0.875 (c) 0.625 (d) 0.500. Out of 400 families with 4 children each, how many would you expect to have?

31. At least one boy (a) 375 (b) 125 (c) 25 (d) 275

32. No girls (a) 125 (b) 25 (c) 375 (d) 275.

33. One or two girls (a) 240 (b) 265 (c) 260 (d) 250.

34. Two boys (a) 150 (b) 250 (c) 350 (d) 125. For a standard normal variate Z,

35. Find P [Z≥-1.29] (a) 0.0985 (b) 0.9015 (c) 0.9850 (d) .0901.

36. Find P [-1.72≤Z≤1.80] (a) 0.9641 (b) 0.0427 (c) 0.9214 (d) 0.9573.

Measurements were made on a sample of 30 individuals and recorded as follows: 12.8, 14.1, 12.3, 15.0, 13.7, 16.3, 11.2, 13.5, 12.8, 11.7, 15.9, 14.4, 13.2, 10.3, 16.1, 14.8, 13.7, 15.3, 13.2, 13.9, 14.6, 12.5, 15.3, 14.0, 13.2, 13.8, 16.6, 12.7, 13.4, 14.4. Vote 95% CL: 1.96.

Calculate

37. $\sum X$ (a) 413.7 (b) 414.9 (c) 414.7 (d) 413.9.

38. $\sum X^2$ (a) 5802.47 (b) 5602.45 (c) 5802.45 (d) 5602.47.

39. The mean $\bar{x}$ (a) 13.85 (b) 12.82 (c) 13.82 (d) 13.85.

40. The standard deviation (a) 2.23 (b) 2.22 (c) 2.24 (d) 2.21. The measurements (X_1) above are the results for Treatment 1 of an experiment. Treatment 2 yielded another 30 measurements with sum of X ($\sum_2$) =388.8 and the sum of squares of X ($\sum X_2^2$)

41.27.Calculate:

41. The mean (x_2) (a) 12.69 (b) 11.96 (c) 12.96 (d) 11.69

42. $\sum Z$ (a) 26.1 (b) 26.5 (c) 26.2 (d) 25.6.

43. Using the statistic d, examine the differences between the two sample means x_1 and x_2 (a) 1.63 (b) 1.52 (c) 1.62 (d) 1.53. In investigation on the effect of eating on pulse rate, pulse rates of individuals were measured before and after eating. The following results were obtained in beat min^{-1}

Subject	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Before	100	79	79	103	97	74	73	82	78	86	77	76	79	104
After	104	87	86	109	100	82	80	90	90	93	81	81	90	110

Using this table, calculate the values of:

44. n (a) 28 (b) 15 (c) 16 (d) 14.

45. $\sum Z$ (a) 69 (b) 94 (c) 96 (d) 95

46. $\sum Z^2$ (a) 742 (b) 741 (c) 714 (d) 724.

47. Mean Z (z) (a) 6.68 (b) 6.87 (c) 6.78 (d) 6.86

A study to detect the effect of rainfall on maize yield produced this result. Use the table to answer questions 48-50.

Maize yield (kgha^{-1}) Y	50	65	70	75	85	90	95	100	105	125
Annual rainfall X	30	33	40	43	50	55	60	70	73	76

48. Calculate $\sum XY$ (a) 48735 (b) 44325 (c) 42975 (d) 46835

49. Find $\sum Y^2$ (a) 72580 (b) 75670 (c) 78250 (d) 75830

50. Calculate the regression co-efficient (a) 1.27 (b) 1.29 (c) 1.31 (d) 1.33

$$b = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sum x^2 - \frac{(\sum x)^2}{n}}$$