

## MATHEMATICS DEPARTMENT

### SECOND SEMESTER EXAMINATION 2013/2014

#### STA 1201: BASIC STATISTICAL METHODS TIME: 3 HOURS

#### INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS.

**Read the questions carefully and answer the questions asked. Only duly registered students should take the examination. No mobile phone is allowed, any form of exams malpractice will be punished accordingly. Any scientific calculator & statistical table are allowed.**

#### QUESTION ONE

- a) Define Statistics and explain how it can be of use to you in your profession.
- b) Prepare (i) One-way (ii) Two-way hypothetical blank table observing the basic rules of tabulation
- c) The following table represents the number of accidents in selected Local Government Area of Cross River State between 2008 to 2010. Complete the table and draw a percentage component bar chart of the data.

L.G.A	2008	2009	2010	TOTAL
AKAMKPA	27			
AKPABUYO		10	10	38
BIASE	15		18	54
BOKI		5	13	36
TOTAL		54	63	195

#### QUESTION TWO

- a) What do you understand by the following terms:
  - i) 1th Moment about the mean
  - ii) Skewness of a distribution
  - iii) Kurtosis of a distribution
- b) The following table shows the proportion in which Francisca spends her pocket money.

ITEMS: Food % Drinks Toiletries Clothing Transport Savings Hair

PROPORTION: 30%

- i) Present the above information using a pie chart.
- ii) If Francisca is entitled to N40,000.00 how much will she spend on Hair?

#### QUESTION THREE

- (a) Briefly explain the following terms:
  - i) Point Estimate
  - (ii) Statistical Hypothesis
- (b) You are supplied the following data about height of boys and girls studying in a college

	<u>BOYS</u>	<u>GIRLS</u>
Number	62	38
Coefficient of Variation	5%	4%
Standard deviation of distribution	3	2

You are required to find out:-

- i) The sex, boys or girls, in which there is greater variability in individual heights.
- ii) Common average height for both boys and girls.
- (c) The weights of five similar cement blocks are 9, 2.4, 3.0, 3.5 and 4.2kg. Find a 95% Confidence interval for the mean of all such blocks assuming an approximate normal distribution.

#### QUESTION FOUR

- a) Differentiate between control chart for the mean and control chart for proportion defective.
- b) The following are weights of cement bags which are nominally 10grams. Ten samples of 3 bags have been taken at weekly intervals from the manufacturing process for ten weeks:-

Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Week 9	Week 10						
10.1	10.0	10.1	9.8	9.9	10.0	10.0	9.7
9.9 10.0							
.0	9.8	9.9	10.2	9.9	10.0	10.1	9.9
9.8 10.2							
.8	10.0	10.1	9.9	10.0	10.1	10.2	9.8
9.8 10.0							

- i) Construct and plot an  $\bar{X}$  – quality control chart for the above process (HINT: Use the mean of the weekly ranges as an estimate of the process standard deviation.
- ii) Is the process under control?

#### QUESTION FIVE

- a) Draw a cader diagrams to illustrate
  - i) Positive correlation
  - ii) Karlect positive correlation
  - iii) Negative correlation
  - iv) .....correlation
  - v) Zero correlation
- b) A large company's Sales Manager has tabulated the price (K) ₦ (000) against Engine capacity (y) (000) for statistical model of cars as follows:

x	10	12	8	13	12	11	11
y	27	41	27	32	34	26	38

- i) Draw the scatter diagram and fit the least square regression line of Y on X.
- ii) Predict the Engine capacity of a car model costing ₦15,000.00.

#### QUESTION SIX

- a) Define the following:
- Index number
  - Price index
- b) Distinguish between Laspeyre's and Paasche's Price index formula.
- c) Table below shows the average retail prices and production of Roofing Sheets and Bags of Cement during the year respectively.

	2009	2010	2009	2010
Roofing Sheet	281	282	385	482
Bags of Cement	263	274	862	718

Calculate for the year 2010:

- Laspeyre's Price Index
- Phasche's Price Index

**CROSS RIVER UNIVRSITY OF TECHNOLOGY, CALABAR      MATHS/STATISTICS  
DEPARTMENT**

**SECOND SEMESTER EXAMINATION 2014/2015      STA 1201: BASIC STATISTICAL  
METHOD**

**INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS      TIME: 2 HOURS**

No mobile phone is allowed and any form of exams malpractice will be punished accordingly.

Use any type of Scientific Calculator & Statistical table.

- (i) Define Statistics and state at least five (5) uses of Statistics.
- Briefly explain the difference Point Estimate and Statistical Hypothesis.

Consider the weekly wages (~~N~~) of workers in Factory A and Factory B as shown below:

FACTORY A	18,	19,	17,	10,	11,	14,	13,	17,	12,
	20,	14.							
FACTORY B	209,	221,	218,	228,	220,	227,	223,	224,	192.

- Calculate the Coefficient of variation:
  - Which Factory is the better pay-getter?
  - Which Factory is more consistent in terms of the payment pattern of workers?
  - Find the common mean weekly wages of workers in both Factories A and B.
- a) Draw diagrams to illustrate the following:
- Positive skewness
  - Negative skewness
  - Zero skewness

iv) Mesokurtic distribution (v) Platykurtic distribution (vi) Leptokurtic distribution

b) The following data are the diameters in centimeters of a sample of 50 computer equipments manufactured by a certain Company;

64	47	47	44	38	47	45	45	44	38
57	39	44	58	59	61	38	42	46	37
56	54	51	60	37	32	49	35	32	31
33	63	62	31	37	41	42	47	40	48
50	69	67	57	48	36	29	61	35	28

i) Construct a frequency distribution table of the diameters using class interval of 10 with 25 as the least lower class limit.

ii) Calculate the Pearson's Second Coefficient of skewness.

a) Define the following:

- i) Bias in sampling theory
- ii) Decision space in estimation theory
- iii) Type 1 error
- iv) Type 11 error

b) A research team studying the relationship between blood type and severity of a certain condition in a population collected data on 1000 people and the obtained data is displayed below:-

CONDITION	A	B	AB	O
ABSENT	80	40	20	160
MILD	200	170	30	100
SEVERE	60	100	10	30

- i) Calculate the expected frequency to show the relationship between blood type and severity.
- ii) Is there sufficient reason to believe that severity of condition and blood group are independent at 0.05 level of significant?

c) Differentiate between:

- i) Assignable and Random causes of variation in Statistical process control.
- ii)  $\bar{X}$  -bar and R charts.
- iii) P - charts and process capability.

A quality control inspector at the Coke soft drinks Company has taken ten samples with five observation of the volume of bottles filled as shown below:

TIME

SAMPLE	1	2	3	4	5
1	5.02	5.01	4.94	4.99	4.96
2	5.01	5.03	5.07	4.95	4.96
3	4.99	5.00	4.93	4.92	4.99
4	5.03	4.91	5.01	4.98	4.89
5	4.95	4.92	5.03	5.05	5.01

6	4.97	5.06	5.06	4.96	5.03
7	5.05	5.01	5.10	4.96	4.99
8	5.09	5.10	5.00	4.99	5.08
9	5.14	5.10	4.99	5.08	5.09
10	5.01	4.98	5.08	5.07	4.99

- Considering these data, what is an estimate of the mean, when the process is in control?
- Assuming that the process standard deviation is 0.05 ounces, construct the  $\bar{X}$  - bar chart and with limit of 3... sigma limits for sample limits for sample means. HINT:  $D_4 = 2.11$ ,  $D_3 = 0$ .
- Does it appear that the process was in control when the samples were collected?

a) Draw scatter diagrams to illustrate the following:

- Positive correlation
- Perfect positive correlation
- Negative correlation
- Perfect negative correlation
- Zero correlation

5. Given that: \*  $N = 11$ ,  $\sum XY = 453.75$ ,  $\sum Y^2 = 137.00$ ,  $\sum X^2 = 2810.94$ ,  $\sum Y = 170.5$ ,  $\sum X = 924$

\* Where Y is the average weight of some blocks over 11 months and X is the average quantity of cement used in moulding a block each month.

- Calculate the least squares regression estimate equation to show if an Estate Manager can estimate Y from X.
- Calculate the coefficient of correlation of Y and X and interpret your result.
- Is the association between Y and X significant at 5% level of significant?

6. (a) Distinguish between Laspeyre's and Paasche's index formula.

7. A building material industry recorded the quantity and prices (₦) of Cement, Roofing Sheets and Ceiling Boards they used in 2012, 2013 and 2014 as shown below:-

YEAR/ITEM	2012		2013		2014	
	Quantity	Price	Quantity	Price	Quantity	Price
CEMENT	400	100	600	150	400	150
ROOFING SHEETS	200	150	400	250	350	100
CEILING	800	200	1000	200	800	250

- Calculate the Fisher's Price Index for 2014 using 2013 as base year.
- Calculate the Fisher's Price Index for 2013 using 2012 as base year.

**CROSS RIVER UNIVERSITY OF TECHNOLOGY, CALABAR**  
**DEPARTMENT OF MATHEMATICS/STATISTICS**  
**SECOND SEMESTER EXAMINATION, 2017/2018 SESSION**

**STA 1201 – INTRODUCTION TO STATISTICS  
HOURS**

**TIME: 2**

1. (a) Differentiate between
  - i) Deductive and inductive statistics
  - ii) Sample and population
  - iii) Parameter and statistic
  - iv) Raw data and array
  - v) Primary and secondary data(b) List and explain at least four sources of data collection
2. (a) With appropriate curves, list and explain the types of correlation.  
(b) Give two practical examples where regression can be applied in your field of study  
(c) Given the following data in the table below

X	40	23	40	47	42	34	36	20	22
Y	44	26	46	49	46	36	38	36	24

- i) Obtain the spearman's rank correlation coefficient.
  - ii) Obtain the least squares regression line of Y on X.
  - iii) Predict the value of Y for X = 37 and 50 in (ii) above
3. (a) Explain the word statistics as a course of study.  
(ii) Distinguish between deductive and inductive statistics.  
(b) Nurses at a certain hospital believe they need more staff at night. To eliminate the night workload, a random sample of 35 nights was selected. For each night, the total number of room calls to nurses "station" in the hospital was recorded as follows:  

68	60	69	70	83	58	90	86	71	71	92
95	70	74	46	18	84	82	75	63	101	77
102	80	86	85	73	86	62	100	90	37	88
70	87									

  - i) Using five classes, obtain the class width.
  - ii) Make a frequency table showing the class limits, class boundaries, midpoint, frequencies, relative frequencies and cumulative frequencies.
  - iii) Draw a Histogram for the data.
  - iv) Draw a relative frequency polygon.
  - v) Draw an ogive.
4. From the table below

CLASS INTERVAL	FREQUENCY
2.0-2.4	0
2.4-2.9	4
2.9-3.4	20
3.4-3.9	38
3.9-4.4	28
4.4-4.9	9
4.9-5.4	1

- (i) Compute Q1, Q3.
  - (ii) Interquartile Range
  - (iii) Semi-interquartile
  - (iv) P15
  - (v) D5
5. (a) (i) What is index number and its uses
- (ii) Distinguish between Laspeyre's, Passche's and Kelly's index numbers.
- (b) The table below shows the quantities and unit prices of five different items for 2000 and 2002. Using 2000 as the base period obtain.
- (i) Drobish and Bowl index
  - (ii) Marshall and Edgeworth index
  - (iii) Walsch index
  - (iv) Kelly's index with 38 as the quantity

	<b>2000</b>		<b>2002</b>	
Item	Price	Quantity	Price	Quantity
A	17	50	16	60
B	19	40	22	45
C	15	15	5	20
D	19	60	11	80
E	12	70	3	80

6. (a) Consider the data on the selling price (in thousands of dollars) of 60 new vehicles sold last month at Jid Car Ltd.

Price	71-80	81-90	91-100	101-110	111-120
Frequency	3	7	18	20	12

- Compute (i) the range (ii) Mean deviation (iii) Variance and standard deviation (v) Coefficient of variation (vi) Interquartile range
- (b) Determine whether the distribution is symmetrical.