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**University Examinations 2015/2016**

FOURTH YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE

**HBC 2240: ADVANCED BUSINESS STATISTICS**

**DATE: November, 2015 TIME:** $2$**HOURS**

**INSTRUCTIONS:** *Answer questions* ***one Compulsory*** *and any other* ***two*** *questions*

**QUESTION ONE - (30 MARKS)**

1. Distinguish between:
2. Sampling and census (2 Marks)
3. Random and non-random sampling methods (2 Marks)
4. Probability distribution and sampling distribution. (2 Marks)
5. Discuss each of the following sampling methods;
6. Systematic random sampling (3 Marks)
7. Stratified sampling (3 Marks)
8. Quota sampling (3 Marks)
9. Discuss the following aspects of statistical quality control (i) Acceptance sampling(2 Marks)

(ii) Process control (2 Marks)

(iii) Product control (2 Marks)

1. An organization has 750 employees divided into six stratas. A sample of 100 employees are to be selected for a study. State the number to be selected from each strata. (6 Marks)

Strata Job level No. of Employees

 1 top management 15

 2 Middle level management 30

 3 Lower level management 55

 4 Supervisors 105

 5 Clerks 510

 6 Secretaries 35

1. The management of ABC company is considering expanding its production. A payoff matrix (in Kshs) is worked out for the various states of nature and decision actions are tabulated as shown below. (3 Marks)

 Decision

 State of Nature Do not expand Expand by 200 units Expand by 400 units

 High Demand 30,000 35,000 38,000

 Medium demand 20,000 25,000 20,000

 Low demand 10,000 15,000 14,000

By using maximax criterion advice the management on the action / decision to take.

**QUESTION TWO (20 MARKS)**

1. Decision are made based on the data available about the occurrence of events as used as the decision situation (environment). Discuss any three types of decision making environments. (6 Marks)
2. In decision theory, what do the following terms mean;
3. State of nature
4. pay – off
5. The management of Matopeni Company is considering setting prices for its products. a payoff matrix (in kshs) is worked out for the various states of nature and decision actions are tabulated as shown below:

PRICE ALTERNATIVES

State of Nature Probability Kshs 40 Kshs 45 Kshs 50

High demand 0.2 632,000 660,000 680,000

Medium demand 0.5 504,000 505,000 506,000

Low demand 0.3 280,000 297,000 306,000

By using the following decision criterion, advice the management on which price to adopt.

1. The Expected monetary value (EMV) criterion (5 Marks)
2. The expected Opportunity loss (EOL) criterion (5 Marks)

**QUESTION THREE (20 MARKS)**

a (i) Differentiate between $\overbar{x}$ chart and R – chart. (2 Marks)

 (ii) Five different samples were taken from the production line of a certain product B and the weights of five product from each sample recorded as indicated in the table below;

 Sample N Weight

 1 200 150 100 110 140

 2 120 180 100 80 220

 3 210 190 170 100 130

 4 150 120 190 140 200

 5 200 190 260 120 230

Using statistical control tables, construct on $\overbar{x}$ chart and R-chart for the above data (12 Marks)

b) The number of weekly corruption complaints are monitored by the anti-corruption watch dog in a certain government ministry using a C-chart. Develop three sigma control limits using the data table below;

 week 1 2 3 4 5 6 7 8 9 10

 No. of

 Complains 3 2 3 1 3 3 2 1 3 1(6 Marks)

**QUESTION FOUR (20 MARKS)**

1. Explain each of the following:
2. Regression Analysis (2 Marks)
3. Correlation Analysis (2 Marks)
4. Autocorrelation Analysis (2 Marks)
5. Heteroscedasticity (2 Marks0
6. A sample survey of five families was taken and results were obtained with respect to their annual savings x, and income $x\_{2}$ in (shs 000) and family size $x\_{3}$

Family Annual Savings$x\_{1}$ Annual income$x\_{2}$ Family size $x\_{3}$

1 10 16 3

2 5 13 6

3 10 21 4

4 4 10 5

5 8 13 3

Find the least square regression equation of $x\_{1}$ on $x\_{2}$ and $x\_{3}$ (12 Marks)

**QUESTION FIVE (20 MARKS)**

1. (i) Given the function y = $ab^{x}$, obtain its linear regression form. (4 Marks)

(ii)A fire insurance company wants to relate the amount of fire damage (y) in major residential fires to the distance between the residence and the nearest fire station (x). The study is to be conducted in a large suburb of a major (city) a sample of 15 recent fires in this suburb is selected. The 15 values and the printout follow

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Observations | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| x | 3.4 | 1.8 | 4.6 | 2.3 | 3.1 | 5.5 | 0.7 | 3.0 | 2.6 | 4.3 | 2.1 | 1.1 | 6.1 | 4.8 | 3.8 |
| y | 26.2 | 17.8 | 31.3 | 23.1 | 27.5 | 36.0 | 14.1 | 22.3 | 19.6 | 31.3 | 24.0 | 17.3 | 43.2 | 36.4 | 26.1 |

If it established that the relationship between x and y is non-linear

**Required:**

1. Linearise the exponential relation and hence determine the non-linear regression equation in the form y = $ax^{b}$ (12 Marks)
2. Estimate the amount of damages if the distance between the residence and the fire station is 8 distance units. (4 Marks)