PAN AFRICA CHRISTIAN UNIVERSITY

MASTER OF ARTS IN MARRIAGE AND FAMILY THERAPY

END OF TERM EXAMINATION

DEPARTMENT:

COURSE CODE:

COURSE TITLE: STATISTICS

EXAM DATE: APRIL 2019

TIME:

INSTRUCTIONS

- Read all questions carefully before attempting.
- Answer **QUESTION ONE AND ANY OTHER TWO**
- Write your **student number** on the answer booklet provided.

QUESTION ONE [COMPULSORY] – 40 MARKS

a) For each of the following questions, state the statistical measurement scale you would use to collect the data on the following questions **[5 marks]**

   i. What is your age?

   ii. How much money did you spend last semester?

   iii. What is your marital status?

   iv. How many shops did you enter at the Mall?

   v. How would you rate the quality of teaching received from your lecturer?

b) Differentiate between descriptive and inferential statistics **[4 marks]**

c) Describe the following statistical sampling techniques and cite an appropriate situation where each is applicable:

   i. Stratified sampling **[4 marks]**

   ii. Snow balling **[4 marks]**

   iii. Systematic sampling **[4 marks]**

d) By the help of a sketch diagram, explain the meaning of the terms Platykurtic and Leptokurtic in distribution of data **[6marks]**

e) Identify and briefly explain any three methods of statistical data collection **[9 marks]**

h) The following data represents the ages of 16 clients reporting for counselling sessions in a certain clinic: 40,75,66,52,47,37,31,42,68,52,42,67,44,16,25,72

   Determine the median age of the clients **[4 marks]**

<u>Answer any two question from this section</u>

QUESTION TWO

a) A firm categorized the employees according to their ages and computed the percentage of employees falling under each age class as below:

Age	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65
%	1.3	8.8	19	22.6	19.4	7.8	9.2	7.4	2.3	2.2

Compute and interpret:

   i. The mean age **[5marks]**

ii. The median age **[6marks]**

iii. The modal age **[6marks]**

b) Highlight three advantages of using mean as a measure of central tendency

[3marks]

c) Explain any five applications of statistics **[10 marks]**

QUESTION THREE

a) By use of an illustration, differentiate between positive and negative skeweness in distribution of data **[6marks]**

b) The data below represents the monthly expenditures (in thousands of shillings) of 1000 families sampled from a county:

Income (000)	100-120	120-140	140-160	160-180	180-200	200-220	220-240
Families	17	53	199	194	327	208	2

Determine and interpret:

i. The standard deviation of the expenditure **[8marks]**

ii. The Coefficient of variation **[4marks]**

iii. Interquartile range **[6marks]**

iv. The Karl Pearson Coefficient of Skewness **[6marks]**

QUESTION FOUR

a) Explain any three methods of determining correlation between statistical variables **[9marks]**

b) The data below shows the number of domestic violence cases registered in 12 counties and the unemployment rate (%) in each county in a certain year

County	1	2	3	4	5	6	7	8	9	10	11	12
Domestic violence cases	300	310	320	260	460	600	190	350	400	480	570	720
Unemployment rate (%)	30	14	30	23	32	26	20	21	23	30	35	26

i. Determine the Spearman Rank correlation coefficient between the two variables **[7marks]**

ii. Comment on your answer in (i) **[3 marks]**

c) A Counselling expert sampled 10 clients visiting her clinic in a particular year and recorded the number of visits made by these clients against the number of years that the client has been married. The result was as follows:

Client	1	2	3	4	5	6	7	8	9	10
Years of marriage	5	12	6	14	28	8	38	3	13	16
No. of visits	7	3	9	2	3	6	5	2	1	2

Determine and interpret for the Counsellor:

i. The Covariance between years of marriage and number of visits **[5marks]**

ii. Karl Pearson Correlation Coefficient between the two variables of concern

[6marks]

QUESTION FIVE

a) Distinguish between Bivariate and Multivariate regression analysis **[6 marks]**

b) Differentiate between dependent and independent variables as used in regression analysis **[4 marks]**

c) A MAFT student thinks that the number of divorce cases filed in Kenyan courts is dependent on the family income level. Based on this belief, she collected the following data over the 10 years period from 2009 to 2018 as follows.

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
Per-capita income(million $)	30,000	39,950	35,550	45,600	52,500	37,500	45,700	65,000	60,000	72,500
No. of divorce cases filed	2,500	3,500	1,650	6,600	8,200	3,000	7,050	3,300	7,300	8,400

Required:

i. Determine the regression equation that describes the relationship between the research variables **[8 marks]**

ii. Using the established regression equation, estimate the number of divorce cases expected to be filed if the per-capita income is $ 120 million. **[4 marks]**

d) In a research to establish the factors influencing family stability, the following regression equation was obtained:

$$Y_i = \beta_0 - \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where: Y_i is the Family stability index, X_1 is the family size, X_2 is the family income per annum, X_3 is the education level of the couple and X_4 is the number of years that a couple has been married.

i. Provide an interpretation of the parameters β_0, β_1, β_3 and e in the equation

[4 marks]

ii. Interpret the signs of the four explanatory variables included in the regression model **[4 marks]**