PAN AFRICA CHRISTIAN UNIVERSITY

SCHOOL OF LEADERSHIP, BUSINESS AND TECHNOLOGY

END OF SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF COMMERCE

DECEMBER 2018 EXAMINATIONS

CAMPUS: ROYSAMBU

DEPARTMENT: BUSINESS STUDIES

COURSE CODE: BCM204

COURSE TITLE: BUSINESS STATISTICS II

EXAM DATE: TUESDAY 11TH DECEMBER 2018

DURATION: 3 HOURS

TIME: 2:00PM-5.00PM

INSTRUCTIONS

- Read the instructions and questions carefully before you write the answers.
- Write your **STUDENT NUMBER** in the Answer Booklet given
- **Answer question 1 and any other FOUR questions**
- *Write clearly and legibly.*
- Show your working clearly
- *ALL PAC University's examination rules and regulations apply*

QUESTION ONE: COMPULSORY [40MKS]

(a) Explain three methods of assigning probabilities. [6mks]

(b) You are given the following results of a national survey of 200 executives who were asked to identify the geographic location of their company and their company's industry type

Geographic Location

Industry Type	North East D	South East E	Midwest F	West G	
Finance A	24	10	8	14	**56**
Manufacturing B	30	6	22	12	**70**
Communication C	28	18	12	16	**74**
	82	**34**	**42**	**42**	**200**

(i) Use the data to construct probability matrix. [5mks]

Suppose a respondent is selected randomly

(ii) Find the probability that the respondent is from the Midwest (F) [3mks]

(iii) Calculate the probability that the respondent is from the communications industry (C) or from the Northeast (D) [3mks]

(iv) Find the probability that the respondent is from the Southeast (E) or from the finance industry (A) [3mks]

(c) A photographer has noticed that a freshly mixed batch of chemicals will develop photographs faster than an old batch of chemicals. The photographer keeps records of the time needed to develop a print and the chemicals:

Age of Chemicals (weeks)	Time to develop (hrs)
1	35
4	38
6	40
9	44
12	49
14	52

Assuming a linear regression equation of the form

$$\hat{y} = b_0 + b_1 x$$

Determine:

(i) The slope of the regression equation. [5mks]

(ii) The intercept of the regression equation. [5mks]

(iii) Predict how long it should take to develop a print if the chemicals are 10 days old.

[2mks]

(iv) Calculate the standard error of the estimate. [4mks]

(v) Calculate the coefficient of determination r^2 and interpret your results. [4mks]

QUESTION TWO [15MKS]

(a) Explain three probability sampling methods. [6mks]

(b) Discuss three reasons why it is important for a business researcher to work with a sample instead of whole population. [6mks]

(c) The human resources department at company ABC has 42 workers. In order to find out some information about the group as a whole, the company decides to take a sample of 7 of those workers to interview. Assuming the workers have been ordered from 1 through 42, use systematic sampling method to determine which workers would be included in the sample starting with worker number 3. [3mks]

QUESTION THREE [15MKS]

(a) Suppose 20% of the people in Nairobi prefer Pepsi-Cola as their soft drink of choice. If a random sample of six people is chosen, the number of Pepsi drinkers could range from zero to six. Shown here are the possible numbers of Pepsi drinkers in a sample of six people and the probability of that number of Pepsi drinkers occurring in the sample.

No of Pepsi Drinkers	0	1	2	3	4	5	6
Probability	0.003	0.375	0.243	0.082	0.015	0.02	0.262

Compute:

(i) The expected value of the number of Pepsi drinkers. [3mks]

(ii) The variance. [3mks]

(iii) The standard deviation. [3mks]

(b) The time that passengers at Syokimau railway station have to wait to buy tickets during the rush hour follow a skewed distribution with a mean of 2 minutes 46 seconds and a standard deviation of 1 minute 20 seconds. Calculate the probability that a random sample of 100 passengers will, on average have to wait more than 3 minutes. [6mks]

QUESTION FOUR [15MKS]

(a) Differentiate between type I error and type II error in statistical analysis. [3mks]

(b) A small business has 37 employees. Because of the uncertain demand for its product, the company usually pays overtime on any given week. The company assumed that about 50 total hours of overtime per week is required and that the variance on this figure is about 25. Company officials want to know whether the variance of overtime hours has changed. Given here is a sample of 16 weeks of overtime data (in hours per week). Assume hours of overtime are normally distributed.

Overtime in hours per week

57	56	52	44
46	53	44	44
48	51	55	48
63	53	51	50

Use the data to test the null hypothesis that the variance of overtime data is 25. Use $\alpha = 0.10$. [12mks]

QUESTION FIVE [15MKS]

Taifa Dynamic Ventures Ltd imports electrical equipment for sale across its branches in Kenya. The following data show shipments (in Millions of Kenya Shillings) for electrical lighting and wiring equipment imported over a 10-month period.

Period (Month)	**Value**	**Period (Month)**	**Value**
January	27	June	66
February	31	July	71
March	58	August	86
April	63	September	101
May	59	October	97

(a) Compute forecasts for periods 5 through 10 using 4-month moving averages. [5mks]

(b) Determine the errors of the forecasts. [5mks]

(c) Calculate the

(i) Mean Absolute Deviation (MAD) [2mks]

(ii) Mean Square Error (MSE). [3mks]

QUESTION SIX [15MKS]

(a) Differentiate between point estimation and interval estimation. [4mks]

(b) A study is conducted in a company that employs 800 engineers. A random sample of 50 engineers reveals that the average sample age is 34.3 years. Historically, the population standard deviation of the age of the company's engineers is approximately 8 years. Construct a 98% confidence interval to estimate the average age of all the engineers in this company. [5mks]

(c) Explain properties of a good estimator. [6mks]