UGANDA MARTYRS UNIVERSITY

FACULTY OF SCIENCE

DEPARTMENT OF NATURAL SCIENCES

SEMESTER II EXAMINATIONS

FIRST YEAR EXAMINATION FOR

BAEAM, BSc in Agriculture, BAM, BSc Acct & Finance

BUSINESS STATISTICS / INTRODUCTION TO STATISTICS

DATE: 5th June 2022

TIME: 9:00 – 12:00 pm

DURATION: 3 Hrs

INSTRUCTIONS

1. Carefully read through **ALL** the questions before attempting
2. Attempt any **FIVE** of the seven questions
3. Ensure that your **Reg number** is indicated on all pages of the examination answer booklet
4. Ensure your work is **clear** and **readable**. Untidy work shall be penalized
5. Any type of examination malpractice will lead to automatic disqualification
6. Calculators and mathematical tables may be used

1. (a) **[10 marks]** A statistics instructor tracks the calls and texts that he receives on his cell phone over a month. His results are as follows

	Contact Source				
Type of message	Family Member	Opinion Survey	Scam Artist	Wrong Number	Total
Phone call	7	10	13	6	36
Text	8	4	8	4	24
Total	15	14	21	10	60

Using this data, for a randomly selected message, what is the probability that

(i) it is came from a family member?

(ii) it is a phone call that is wrong number?

(iii) it is a text message or a scam artist?

(iv) it is a family member contacting him, given that he received a text message?

(v) Are the events "receives a text message" and "is contacted by a family member" independent? Why? (show your work to justify your answer)

(b) Given that A and B are mutually exclusive events, such that P(A) = 0.5, $P(A \cup B) =$ 0.9, find

(i) **[2 marks]** $P(\overline{A} \cup B)$

(ii) **[2 marks]** $P(\overline{A} \cup \overline{B})$

(c) **[6 marks]** If A and B are events and $P(B) = \frac{1}{6}$, P(A and B) $= \frac{1}{12}$, $P(B|A) = \frac{1}{3}$.

Calculate:

(i) **[2 marks]** P(A)

(ii) **[2 marks]** P(A|B)

(iii) **[2 marks]** P(A|B)

2. The table below shows the ages of employees in years who belong to a certain scheme.

Class	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Frequency	3	5	16	20	33	18	4	1

Determine

(a) **[4 marks]** The lower quartile, Q1

(b) **[4 marks]** The upper quartile, Q3

(c) **[2 marks]** The semi-inter quartile range

(d) **[4 marks]** Mean deviation

(e) **[6 marks]** Standard deviation

3. The number of bids submitted by Mukisa Construction Co. prior to winning a competitive government contract from the small-scale business administration in Uganda is given in the following distribution

X	1	2	3	4	5
P(X = x)	0.1	0.2	0.4	0.2	0.1

Compute

(i) [**4 marks**] The expected value of X

(ii) [**4 marks**] The variance of X

(iii)[**2 marks**] The standard deviation of X

(iv)[**3 marks**] E(2X – 1)

(v) [**3 marks**] Var(2X + 3)

(b) [**4 marks**] A certain university, 60% of the students are enrolled in a math course, 50% are enrolled in an English course, and 40 are in both. What percentage of the students are enrolled in an English course and/or a math courses.

4. (a) A discrete random variable X has a probability function

$$f(x)=\begin{cases}\frac{x}{k}, x=1,2,3,.....,n\\ 0,.elsewhere\end{cases}$$

where k is a constant. Given that the expectation of X is 3, find

(i) [**3 marks**] The value of n

(ii) [**3 marks**] The constant k

(iii)[**5 marks**] The variance and standard deviation of X

(b) Below is an oil well's daily production, in barrels.

214, 203, 226, 198, 243, 225, 207, 203, 208

Calculate

(i) [**2 marks**] Mean

(ii) [**1 mark**] Median

(iii) [**2 marks**] Inter-quartile range

(iv) [**4 marks**] Standard deviation

5. The "recovery time" of an aircraft which is the time that elapses between its arrival at an airport and its being ready to take off again is given below for several aircrafts.

Recovery time(min)	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44
No. of aircrafts	3	11	13	21	26	12	7	2

Calculate the

(a) [**4 marks**] Mean using 27 as the assumed mean

(b) [**4 marks**] Mode
(c) [**4 marks**] Median
(d) [**4 marks**] Geometric mean
(e) [**4 marks**] Harmonic mean

6. Data from a study on the number of absences and the final grades of seven randomly selected students from a statistics class is given in the following table.

Number of absences (X)	Final grade (Y)
0	82
2	86
15	43
9	74
12	58
5	90
8	78

Calculate
(a) [**4 marks**] Pearson's correlation coefficient, r
(b) [**4 marks**] Spearman's rank correlation
(c) [**4 marks**] Kendall's rank correlation
(d) [**4 marks**] Write the regression equation if Y on X
(e) [**4 marks**] Write the regression equation of X on Y.

7. (a) The weight of male reindeer of Rudolph is normally distributed with mean 102.4 kg and standard deviation 13.9 kg.
   (i) [**3 marks**] What proportion of these reindeer would weigh more than 118.0 kg.
   (ii) [**3 marks**] Rudolph is a fairly small reindeer. If exactly 10% of the reindeer weigh less than Rudolph, how much does Rudolph weigh?
   (iii) [**4 marks**] If 36 reindeer are randomly selected and their average weight calculated, what is the probability that the mean weight is less than 100.0kg

   (b) A certain firm sells maize flour in bags of mean weight 40 kg and standard deviation of 2 kg. Given that the weight is normally distributed, find:

   (i) [**4 marks**] The probability that the weight of nay bag taken at random will lie between 41.0 and 42,5 kg.

   (ii) [**3 marks**] The percentage of bags whose weight exceeds 43 kg

   (iii) [**3 marks**] The number of bags rejected out of a 500 bag purchase by a retailer whose consumers cannot accept a bad whose weight is below 38.5 kg.