UNIVERSITY EXAMINATIONS

2022/2023 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER

SPECIAL/SUPPLEMENTARY EXAMINATION

FOR THE DEGREE OF BACHELOR OF EDUCATION AND BACHELOR OF SCIENCE

(MATHEMATICS)

COURSE CODE: STA 106

COURSE TITLE: BASIC STATISTICS

DATE: 11/08/23   **TIME:** 11 AM -1 PM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

QUESTION ONE (30MARKS)

(a) Distinguish between statistics and probability. (3Mks)

(b) Highlight the distinct phases in statistical experiment. (6Mks)

(c) The mean of 200 items was calculated as 50. If two items were misread as 92 and 8 instead of 192 and 88, find the correct mean. (3Mks)

(d) Proof that $\sum_{i=1}^{N} f_i(x_i - \bar{x}) = 0$ (3Mks)

(e) What do you understand the term quartile deviation. (1Mk)

(f) Find the quartile deviation of the daily wages in (£) of 7 persons given as in 12, 7, 15, 10, 19, 17, and 25. (3Mks)

(g) The following contents of data were recorded from each of the 30 packets of washers considered under a study: 28, 31, 29, 27, 30, 29, 29, 26, 30, 28, 28, 29, 27, 26, 32, 28, 32, 31, 25, 30, 27, 30, 29, 30, 28, 29, 31, 27, 28, and 28. Construct the frequency distribution table and obtain

   (i)   Mean (2Mks)

   (ii)   Mode (2Mks)

   (iii) Median (2Mks)

   (iv) Standard deviation (2Mks)

(h) The average weight of the following distribution is 58.5kg. Find the value of x. (3Mks)

Weight (kg)	50	55	60	$x+12.5$	70	Total
No. of men	1	4	2	2	1	10

QUESTION TWO (20 MARKS)

(a) What do you understand by the term mutually exclusive events? (1Mk)

(b) Two soldiers A and B are aiming at a target, the probability that A will hit the target is $\frac{3}{4}$, and the probability that B will hit the target is $\frac{2}{3}$. If the two soldiers are firing independently, what is the probability that:

   (i) Both of them will hit the target (2Mks)

   (ii) Either A or B will hit the target (2Mks)

   (iii) Neither A nor B will hit the target (2Mks)

(c) A class has 10 boys and 5 girls. Three students are selected at random from the class without replacement. What is the probability that

    (i) All three are girls (2Mks)

    (ii) The first two students chosen are boys and the third is a girl (2Mks)

    (iii) The first and the third are of the same sex while the second is of the opposite sex (2Mks)

(d) In five consecutive innings, a cricketer passes the following scores: 24, 7, 184, 77 and 38. Obtain the geometric mean. (3Mks)

(e) If 2 balls are drawn one after the other from a bag containing 3 white and 5 black balls, what is the probability that;

    (i) The first ball is white and the second is black (2Mks)

    (ii) One ball is white and the other is black (2Mks)

QUESTION THREE (20 MARKS)

(a) If A_1, A_2 and A_3 are mutually exclusive events whose union is the sample space S of an experiment and B is an arbitrary event of S, such that $P(B) \neq 0$. Show that

$$P(A_1|B) = \frac{P(B|A_1)P(A_1)}{\sum_{r=1}^{3} P(B|A_r)P(A_r)}$$ (4Mks)

(b) A student answers a multiple choice examination question that has 5 possible answers. Suppose that the probability that the student knows the answer is 0.85 and the probability that student guesses the answer is 0.15. Assume that if the student guesses, the probability of selecting the correct answer is 0.20. If the student correctly answers a question, find the probability that a student really knows the correct answer. (7Mks)

(c) From a committee of 10 people, how many ways can one choose a chairman, vice-chairman and a secretary? Assuming one person can't hold more than 1 position. (2Mks)

(d) If A and B are events connected with a random experiment such that $P(A) = \frac{1}{2}$,

    $P(B) = \frac{1}{3}$ and $(A \cap B) = \frac{1}{4}$, find

    (i) $P(A \cup B)$ (1Mk)

    (ii) $P(A|B)$ (2Mk)

    (iii) $P(A^c \cap B^c)$ (2Mk)

    (iv) $P(A^c \cup B^c)$ (2Mks)

QUESTION FOUR (20 MARKS)

(a) For a given set of observations 6, 10, 25, 19, 15, 4, 20, 4, 7, 13 and 9, determine
    (i) The first and third quartile   (6Mks)
    (ii) The second moments about the actual mean   (6Mks)

(b) The table below gives the marks obtained in statistics by 60 students.

Class interval	0-10	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	5	8	11	15	13	6	2

Draw a cumulative frequency curve (Ogive) and determine the median mark, the sixth decile marks (D_6), the first quartile mark (Q_1) and the thirtieth percentage mark (P_{30})   (8Mks)

QUESTION FIVE (20 MARKS)

The table below shows the distribution of masses of 100 college students.

Mass (Kg)	60-62	63-65	66-68	69-71	72-74
No. of students	5	18	42	27	8

Calculate;

    (i) The pearson's first coefficient of skewness   (10Mks)
    (ii) The percentile coefficient of kurtosi   (10Mks)