STA 100

ALUPE UNIVERSITY COLLEGE

Bastion of Knowledge...

OFFICE OF THE DEPUTY PRINCIPAL
ACADEMICS, RESEARCH AND STUDENTS' AFFAIRS

UNIVERSITY EXAMINATIONS

2018 /2019 ACADEMIC YEAR

FISRT YEAR SECOND SEMESTER REGULAR EXAMINATION

FOR THE DEGREE OF BACHELOR OF EDUCATION

COURSE CODE: **STA 100**

COURSE TITLE: **PROBABILITY AND STATISTICS I**

DATE: 15TH APRIL, 2019   **TIME: 9.00 AM – 12.00 PM**

INSTRUCTION TO CANDIDATES

- **SEE INSIDE**

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RUGULAR –MAIN EXAM

STA 100: PROBABILITY AND STATISTICS I

STREAM: **BED SCI/ARTS**   **TIME: 2 HRS**

EXAMINATION SESSION: APRIL   **YEAR:** 2019

Instructions

    (i)   **Answer question ONE and TWO (Compulsory)**
    (ii)   **Answer any other THREE questions**
    (iii)   **Answers should be comprehensive, informative and neat.**

Question One (16 Marks)

Electric fuses nominally rated 30 amperes (30A) are tested by passing current through them and recording the current, x amperes at which they blow, the results is recorded in the table below.

Current (xA)	$25 \leq x < 28$	$28 \leq x < 29$	$29 \leq x < 30$	$30 \leq x < 31$	$31 \leq x < 32$	$32 \leq x < 33$
No of fuses	6	12	27	30	18	14
Current (xA)	$33 \leq x < 34$	$34 \leq x < 35$	$35 \leq x < 40$			
No of fuses	9	4	5			

    a) Find the mean and standard deviation of this data.   **(4 Marks)**

    b) Plot the histogram.   **(2 Marks)**

    c) Show these results on cumulative frequency curve.   **(2 Marks)**

    d) Using your graph estimate lower quartile, median, upper quartile and inter-quartile range.   **(4 Marks)**

    e) Comment on the skewness of the data.   **(2 Marks)**

    f) Estimate the mode of the distribution.   **(2 Marks)**

Question Two (15 Marks)

    a) The weather forecast in a certain radio station announces that the probability of rain tomorrow is 60%. Find the odds that it will not rain tomorrow.   **(3 Marks)**

b) A pair of dice is thrown. Find the probability that the numbers match, and given that their sum is greater than five. **(4 Marks)**

c) What is the median for the following five numbers? 223, 264, 216, 218, 229 **(2 Marks)**

d) Suppose a group of 30 scientists from different countries contains 10 who speak English and 6 who speak Russian.

    i. What is the probability of meeting a scientist who speaks English? **(2 Marks)**

    ii. What is the probability of meeting a scientist who can speak both Russian and English? **(2 Marks)**

    iii. What is the probability of meeting a scientist who speaks neither language? **(2 Marks)**

Question Three (13 Marks)

a) If $\sum_{i=1}^{6} x_i = -4,$ and $\sum_{i=1}^{6}(x_i)^2 = 10$ calculate:-

(i) $\sum_{i=1}^{6}(2x_i + 3)$ **(2 Marks)**

(ii) $\sum_{i=1}^{6} x_i(x_i - 1)$ **(2 Marks)**

(iii) $\sum_{i=1}^{6}(x_i - 5)$ **(2 Marks)**

b) The marks obtained by 25 students in statistics are given below. Find the geometric and the harmonic means. **(7 Marks)**

Marks (x)	11	12	13	14	15
No of students (f)	3	7	8	5	3

Question Four (13 Marks)

a) Two variables X and Y assume the values $x_1 = 2, x_2 = -5, x_3 = 4, x_4 = -8$ and $y_1 = -3, y_2 = -8, y_3 = 10, y_4 = 6$. Calculate $(\sum X)(\sum Y)$ **(3 Marks)**

b) The mean weight in grams of one day old chicks was recorded by a farmer as shown in the table below.

Weight (g)	60-80	80-100	100-120	120-140	140-160	160-180	180-200
No. of chicks	5	14	17	10	2	0	2

i. Using an assumed mean of 130g, calculate the mean weight of the chicks. (**7 Marks**)

ii. Calculate the median weight of the chicks (**3 Marks**)

Question Five (13 Marks)

a) Using the data 12 13 54 56 25, determine the type of kurtosis present. (**3marks**)

b) Show that variance is independent of change of origin and dependent on change of scale (**4 Marks**)

c) Find sample Mean and Sample Standard Deviation for the following data set: 5, 10, 15, 20 (**4 Marks**)

d) Two cards are drawn at random from a standard deck of 52 cards. What is the probability that both are hearts? (**2 Marks**)

Question Six (13 Marks)

a) In a group of 200 people, 40 like fish, 50 like meat and 20 like eggs. Find the probable number of people who like

   i. Fish and meat (**2 Marks**)

   ii. Meat and eggs (**2 Marks**)

   iii. Fish, meat and eggs (**2 Marks**)

b) For the following data

57	23	35	18	21
26	51	47	29	21
46	43	29	23	39
50	41	19	36	28
31	42	52	29	18
28	46	33	28	20

   i. Construct a frequency distribution with six classes. (**3 marks**)

   ii. Superimpose the histogram and the frequency polygon (**4 marks**)

Question Seven (13 Marks)

a) The table below contains data from a sample of 200 people regarding opinion about the

latest congressional plan to eliminate anti-trust exemptions for professional baseball (broken down by gender).

	OPINION ABOUT THE PLAN			
	For	Neutral	Against	Totals
Female	38	54	12	104
Male	12	36	48	96
Totals	50	90	60	200

i) What is the probability that a person selected at random is for the plan **(2 Marks)**

ii) If we know that the person is a female, what is the probability that the person is for the plan **(2 Marks)**

iii) What is the probability that the person is male *and* against the plan **(2 Marks)**

iv) What is the probability that the person is male *or* is neutral about the plan **(2 Marks)**

v) Is opinion about the plan related to gender, or are opinion and gender independent **(2 Marks)**

b) Show that $Skew(x) = \dfrac{E(X^3) - 3\mu E(X^2) + 2\mu^3}{\delta^3}$ **(3 Marks)**

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