JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF HUMANITIES AND SOCIAL SCIENCE

UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF ARTS IN DEVELOPMENT AND POLICY STUDIES

1ST YEAR 2ND SEMESTER 2017 APRIL EXAMS

MAIN CAMPUS (REGULAR)

COURSE CODE: ZDS 3125
COURSE TITLE: QUANTITATIVE METHODS I

EXAM VENUE: **STREAM: BA ARTS**

DATE: **EXAM SESSION:**

TIME: 2 HOURS

Instructions:

1. Answer Question ONE (COMPULSORY) and ANY other 2 questions

2. Candidates are advised not to write on the question paper.

3. Candidates must hand in their answer booklets to the invigilator while in the examination room.

QUESTION 1 ONE (30MARKS).

a) Differentiate the following terms as used in statistics: Descriptive Statistics and Inferential Statistics [2 marks]

b) Define the following terms as used in statistical inference: Type I error and Type II error [2 marks]

c) The distribution of weights (in Ounces) of Malignant Tumors Removed from the Abdomen of 40 patients are as shown below;

70 64 99 55 64 89 87 65 62 38 67 70 60 69 78 39 75 56 71 51 99 68 95 86 57 53 47 50 55 81 80 98 51 36 63 66 85 79 83 70

   i. Starting with the 1st class as 30 - 39 construct a grouped frequency distribution for the data [4 marks]
   ii. Use the frequency table above to estimate the Mean and 7th decile [4 marks]

d) The following table gives the demand for cartons of cough syrups from a Pharmaceutical company by different Pharmacies in the country;

No. of cartons	50-59	60-69	70-79	80-89	90-99	100-109	110-119	120-129	130-139
No. of shops	15	20	32	35	33	22	20	10	8

From the data above Calculate;

1.) Mean demand for the number of cartons of cough syrup [4 marks]
2.) Median demand for the number of cartons of cough syrup [4 marks]
3.) Variance and Standard deviation demand for the number of cartons of cough syrup [5 marks]

e) For a random sample of 30 airline passengers, each person's mass and height was recorded and summarized in the table below:

	Passenger mass	Passenger height
Average	78 kgs	166 cm
standard deviation	16.4 kgs	20.1 cm

   i. Calculate the coefficient of variation for each measure to compare the relative variability between passenger masses and passenger heights. [3 marks]
   ii. Which variable shows greater relative variability? [2 marks]

Question Two (20 Marks)

a) The contents of seven similar containers of sulfuric acid are;
9.8, 10.2, 10.4, 9.8, 10.0, 10.2, and 9.6 liters. Find a 95% confidence interval for the mean contents of all such containers, assuming an approximately normal distribution
[6 marks]

b) A manufacturer of a consumer electronics product expects 2% of units to fail during the warranty period. A sample of 500 independent units is tracked for warranty performance.

   i.   What is the probability that none fails during the warranty period?   [5 marks]
   ii.   What is the expected number of failures during the warranty period? [5 marks]
   iii.   What is the probability that more than two units fail during the warranty period?
[4 marks]

Question Three (20 Marks)

a) An automatic filling machine is used to fill 18 bottles with liquid detergent. If the variance of fill volume exceeds 0.5(fluid ounces2), an unacceptable proportion of bottles will be under filled or overfilled. On the basis of the sample data below is there evidence to suggest that the manufacturer has a problem with under filled or overfilled bottles? Use $\alpha= 0:05$, and assume that fill volume has a normal distribution.   [6 marks]

        18.57 18.10 18.61 18.32 18.33 18.46
        18.12 18.34 18.57 18.22 18.63 18.43
        18.37 18.64 18.58 18.34 18.43 18.63

b) A drug mixing machine is set to give 12 milligrams of aspirin for every 100mg sachet of Panadol. Ten 100mg sachets are examined. The percentages of aspirin are as follows;

     11, 14, 13, 12, 13, 12, 13, 14, 11, 12
Is there reason to believe that the machine is defective at $\alpha = 0.05$ level of significance.
[6 marks]

c) The time that it takes a randomly selected job applicant to perform a certain task is normally distributed with a mean value of 120 second, and a standard deviation of 20 seconds. Determine the probability that:

   i.   A randomly selected candidate will complete the task between 100 and 130 seconds
[2 marks]
   ii.   A randomly selected candidate will complete the task between 75 and 100 seconds.
[2 marks]

iii.   A randomly selected candidate will complete the task within 75 seconds.   [2 marks]
iv.   If the slowest 10% are to be given advanced training, what task times would qualify
individuals for such training?   [2 marks]

Question Four (20 Marks)

a) An economist believes that during periods of high economic growth, the U.S. dollar
appreciates with probability 0.70; in periods of moderate economic growth, the dollar
appreciates with probability 0.40; and during periods of low economic growth, the dollar
appreciates with probability 0.20. During any period of time, the probability of high
economic growth is 0.30, the probability of moderate growth is 0.50, and the probability
of low economic growth is 0.20. Suppose the dollar has been appreciating during the
present period. What is the probability we are experiencing a period of high economic
growth?   [8 marks]

b) From the following table, showing the wage distribution of workers, find;

Monthly Income($)	0-200	200-400	400-600	600-800	800-1000
No. of workers	150	100	80	50	20

i.   the range of incomes earned by middle 50% of the workers,   [4 marks]
ii.   the range of incomes earned by middle 80% of the workers,   [4 marks]
iii.   the percentage of workers earning between $550 and $880   [4 marks]

Question Five (20 Marks)

a) The price of a commodity went up by 5%, 8% and 77% respectively in the last three years.
The annual average rise of price is 26% and not 30%. Comment. [6 marks]

b) The following table gives the number of workers and total wages paid in three
departments of a manufacturing unit

Department	No.of workers	Total wages
A	105	168,000
B	304	425,600
C	424	508,800

c) If a bonus of $200 is given to each worker, what is the average percentage increase:

i.   in wages of the workers of each department?   [6 marks]
ii.   in wages of the total workers?   [2 marks]

d) The rate of sales tax as a percentage of sales, paid by 400 shopkeepers of a market during
     an assessment year ranged from 0 to 25%. The sales tax paid by 18% of them was not
     greater than 5%. The median rate of sales tax was 10% and 75th percentile rate of sales
     tax was 15%. If only 8% of the shopkeepers paid sales tax at a rate greater than 20% but
     not greater than 25%, summarize the information in the form of a frequency distribution
     taking intervals of 5%. Also find the modal rate of sales tax   [6 marks]