MERU UNIVERSITY COLLEGE OF SCIENCE & TECHNOLOGY

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University Examinations 2012/2013

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR MASTER OF SCIENCE IN ENTREPRENUERSHIP

HR 3107: STATISTICS

DATE: DECEMBER 2012   **TIME: 3 HOURS**

INSTRUCTIONS: *Answer questions **one** and any other **two** questions*

QUESTION ONE - (30 MARKS)

a) The table below shows the distribution of marks obtained by some students in a statistics examinations.

Marks (x)	10-14	15-19	20-24	25-29	30-34	35-39	40-44
Frequency (f)	4	5	8	13	11	6	3

  i.   Draw a histogram and frequency polygon using the same axis.   (3 Marks)
  ii.   Draw an ogive curve.   (3 Marks)
  iii. Calculate the mean   (2 Marks)
  iv.   Calculate mode and median   (4 Marks)
  v.   Calculate the standard deviation   (2 Marks)

b) If the mean value of the height of 50 people is 165cm and the standard deviation is 5cm. How many people have the height.
  i.   Between 166 and 172cm.   (2 Marks)
  ii.   Between 155 and 170   (2 Marks)
  iii. Less than 158.   (1 Mark)
  iv.   More than 169   (1 Mark)

c) The following data present prices for food stuffs between a green grocery shop and an open air market

Open air market	22	26	17	20	28	31	23	13	19	25	28	24	27	18	20	14	24	15	19	18	27
Green grocery shop	21	29	15	20	26	32	25	14	19	27	27	24	27	20	23	16	26	20	20	17	29

On the basis of these results use the sign test to investigate if the open air market is cheaper than green grocery shop at 5% level of significance. (4 Marks)

d) The number of births in hundreds of a particular town for 2001 to 2010 were as follows.

Year	2001	02	03	04	05	06	07	08	09	2010
Births	32	24	27	41	34	25	27	26	24	25

Obtain a smoothened value using a five point moving average. (3 Marks)

e) The following data refer to two variables promotional expenses Ksh(10,000) and sales in 1000 units, collected in promotional exercise.

Promotional Expenses in 10000	Sales in 1000 units
7	12
10	14
9	13
4	5
11	15
5	7
3	4

Calculate the correlation coefficient and comment on your answer. (4 Marks)

QUESTION TWO – (20 MARKS)

a) Suppose that speeds on a highway are normally distributed with mean $\mu = 83.2 Km/hr$ and standard deviation $\sigma = 9.6 Km/hr$. If the police will stop and charge anyone driving in the fastest 1%; what is the fastest speed someone can drive without being stopped?
(6 Marks)

b) The average travel time taken based on a random sample of 10 people working in MUCST to reach the office the office is 40 minutes with a standard deviation of 10 minutes. Establish the 95% confidence interval for the mean travel time for everyone in MUCST. (6 Marks)

c) A student magazine at MUCST is conducting a study on the sleeping habits of the students. They collected data for 45 male students and 46 female students and found that male average sleeping hours $\bar{x}_m = 6.81$ and female average sleeping hours $\bar{x}_m = 7.37$ with standard deviations $S_m = 1.22$ and $S_F = 1.02$. Based on the results, is there any

difference in the mean number of hours that students sleep each night at 5% level of significance? (7 Marks)

QUESTION THREE – (20 MARKS)

a) In a market survey conducted to examine whether choice of a brand is related to the income strata of the consumers, a random sample of 600 consumers revealed the following,

Income per month	Brand 1	Brand 2	Brand 3	total
Less than Ksh10,000	132	128	50	310
Ksh10,000 – 15,000	62	60	28	150
Ksh15,000 – 20,000	30	30	26	86
Above Ksh20,000	16	22	16	54
Total	240	240	120	600

Using the x^2 statistic, test at 5% level of significance whether the brand preference is associated with the income strata. (6 Marks)

b) A consumer marketing group desired to examine whether supermarket chains operating in Meru Town differed in their 'out of stock' levels for advertised specials. The group identified the relevant response variable as the percentage of items advertised not in stock. The following data was collected from three supermarket chains in the town.

Chain 1	Chain 2	Chain 3
15	10	17
14	14	12
20	9	14
15	10	15
16	11	12

Using ANOVA at 5% level of significance test whether there are significant differences among the three chains and analyze this situation. (6 Marks)

c) A shopping mall with a chain of outlets is concerned about its service quality reputation perceived by its customers. The data below shows the perceived service quality with regard to politeness of the staff. The number in each cell of the table is the percentage of people who have said that the staff is polite. Perform the two way ANOVA at 8% level of significance and draw your inferences about the population means of politeness corresponding to the days as well as the outlets.

Day/outlet	A	B	C	D	E
Monday	79	81	74	77	66
Tuesday	78	86	89	97	86
Wednesday	81	87	84	94	82

Thursday	80	83	81	88	83
Friday	70	74	77	89	68

(7 Marks)

QUESTION FOUR – (20 MARKS)

a) The data below shows the value for interest rates of Central bank commodities future indexes for a sample of 12 days

Day	Interest rate	Future index
1	7.43	221
2	7.48	222
3	8.0	226
4	7.75	225
5	7.60	224
6	7.63	223
7	7.68	223
8	7.67	226
9	7.59	226
10	8.07	235
11	8.03	233
12	8.00	241

Calculate the correlation coefficient and comment about the relationship of the two variables. (6 Marks)

b) A specialist in a government hospital state that the number of full-time employees FTE in a hospital can be estimated by counting the number of beds in the hospital. A survey was carried on 12 hospitals and the following data was obtained;

Number of Beds	23	29	29	35	42	46	50	54	64	66	76	78
FTE	69	95	102	118	126	125	138	178	156	184	176	225

Develop a linear regression model and estimate the number of FTE given 88 number of beds. (5 Marks)

c) Suppose the following data set is obtained from prices for the same 15 items at two competing supermarkets A and B

A	B
319	339
159	149
209	239
149	145
99	99
245	259
199	189
129	139
149	155
89	99
69	75
112	109
159	175
179	189
53	59

Based on this data can we conclude that supermarket A is usually cheaper than supermarket B at 5% level of significance using the sign test method?   (5 Marks)

d) A commuter has a choice of driving to work either by a highway (which is often clogged with traffic during morning rush hour) or by back roads which normally are longer. Over the course of several weeks, he tries both routes and times his trip to work. He collected the following data.

A(Using highway	34	28	46	42	56	85	48	25	37	49
B (back roads)	43	49	41	55	39	45	65	50	47	51

Test using the Rank-sum test if there is any difference in the average time to commute to work at 5% level of significance.   (5 Marks)

QUESTION FIVE – (20 MARKS)

a) The data below shows air pollution by carbon monoxide and nitrogen oxide over a 16 year period.

Year	1985	86	87	88	89	90	91	92	93	94	95	96	97	98	99	2000
Carbon monoxide	176.84	173.67	172.97	174.42	160.52	154.19	147.13	140.9	135.90	133.56	126.78	128.86	117.91	115.39	114.54	114.47
Nitrogen oxides	25,76	25.42	25.58	26.67	25.38	25.53	25.18	25.26	25.36	25.35	24.96	24.79	24.71	24.35	22.84	22.60

      i.   Calculate 5-point moving average.   (6 Marks)

      ii.   Plot a time plot and the 5-point moving average on the same axis.   (8 Marks)

b) Differentiate between parametric and non-parametric statistic tests.   (2 Marks)

c) State and explain the components of a time series.   (4 Marks)