CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DEGREE OF DOCTOR OF PHILOSOPHY IN EDUCATION

EDUC 902: ADVANCED APPLICATIONS OF EDUCATIONAL STATISTICS

STREAMS: PHD (EDUC) **TIME: 3 HOURS**

DAY/DATE: WEDNESDAY 22/04/2020 **2.30 PM – 5.30 PM**

INSTRUCTIONS:

- **Answer Question One and any other Two Questions**
- **Do not write on the question paper**

1. Educational researcher wishes to predict the performance (y) of secondary schools in public examinations, using certain characteristics of the schools $(x_1, x_2, x_3, x_4, x_5)$ Data had been collected from a random sample of 15 schools and the data was present as follows:

Table 1: Performance of schools and certain characteristics

y	x_1	x_2	x_3	x_4	x_5
28	11	15	13	9	13
64	15	15	15	13	5
49	9	15	15	9	13
56	11	11	15	11	9
59	15	9	15	7	11
70	15	7	11	5	11
85	11	11	13	5	9
34	7	15	9	11	7
53	15	15	14	5	11
42	13	11	15	9	10
35	12	15	15	5	7
15	11	13	13	5	11
31	11	12	15	8	8
44	15	9	15	7	9
14	7	13	13	7	5

Y = % pass of official examination
X_1 = Number of teachers in the school
X_2 = Number of years of experience of the principal
X_3 = Average number of years of teaching experience of teachers
X_4 = Average number of text books in the school
X_5 = Discipline of the school rated in a point of scale

(a) Calculate the
(i) Mean
(ii) Median
(iii) Mode for Y_1, X_1 and X_2 [18 marks]

Table 2: correlation with Y

Variable	Correlation
x_1	0.513
x_2	-0.317
x_3	0.078
x_4	0.001
x_5	0.117

(b) Interpret the results from Table 2

Table 3: Model Summary

Model	R	R^2	Adjusted R^2	R charge	F charge
1	0.583	0.339	-0.028	0.339	0.925

PREDICTORS: x_1, x_2, x_3, x_4, x_5

(c) Interpret the results from Table 3

Table 4: Coefficients

Model	B	Standard Error	Beta	t	Sig
Constant	32.661	58.52	-	0.558	0.590
x_1	3.524	2.431	0.495	1.449	0.181
x_2	-1.738	2.363	-0.233	-0.736	0.481
x_3	-1.562	3.381	-0.140	-0.462	0.655
x_4	1.432	2.291	0.185	0.625	0.547
x_5	0.294	2.265	0.037	0.130	0.900

Independent Variables x_1, x_2, x_3, x_4, x_5

(d) (i) Write the regression model equation
(ii) Calculate the standard error
(iii) Test the null hypothesis at 0.05 level in a two tailed test about the relationship between performance and the independent variables. [12 marks]

2. (a) The number of primary school pupils in Embu county is estimated to be 110,000. As a researcher what sample would you take at
(i) 95% confidence limit with 80% of target population having characteristics of interest
(ii) 99% confidence limit with a maximum error of 0.05
(iii) 90% confidence limit

(b) A researcher needs to be familiar with measurement scaled before undertaking correlation analysis. Discuss the scales of measurements used in correlation analysis.

(c) There are about 500 teachers in Tharaka Nithi secondary schools. The ministry of education want to estimate the number of teachers who specialize in sciences. What will be your sample size at [15 marks]

(i) 95% confidence limit
(ii) 99% confidence limit
(iii) 90% confidence limit

3. (a) Explain the steps involved in hypothesis testing

(b) A sample of 162 measures were taken to test the hypothesis that the mean number of hours that students spend reading per month is less than 100 hours. If the sample mean was found to be 120 hours and a variance of 24, test the null hypothesis at $\propto = 0.05$ level of significance in a two tailed test.

(c) Calculate the:
(i) Range
(ii) Variance
(iii) Standard deviation
For the following distribution
44, 52, 68, 68, 52, 68, 60, 52, 72, 56, 200, 74, 102, 88, 110 [15 marks]

4. (a) The scores of mathematics and physics CAT were recorded as followed:

Mathematics	3	8	9	5	7	4	10	6	1	5
Physics	5	9	10	1	8	3	7	4	2	6

Compute Spearman Rank Correlation Coefficient and Interpret your results.

(b) (i) State the properties of correlation coefficient (r)
(ii) Describe the applications of correlation coefficient (r)
(iii) Describe the factors that influence correlation coefficient (r) [15 marks]
