KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2015/2016

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION

EPS 400: EDUCATIONAL STATISTICS AND EVALUATION

DATE: WEDNESDAY 30TH MARCH 2016 TIME: 8.00 A.M. - 10.00 A.M.

INSTRUCTIONS

1. **This paper is divided into two sections, a and B.**
2. **Answer ALL questions in BOTH sections.**
3. **Relevant formulae are attached at the end of this question paper**
4. **Scientific calculators may be used in this examination, but use of MOBILE PHONES IS STRICTLY PROHIBITED**

A (40 MARKS)

1. Explain **three** reasons why teacher trainees should study educational statistics and evaluation. (3 marks)

2. Complete the following table by indicating whether the given variable is quantitative/ qualitative, discrete or continuous, and the scale of measurement. (3 marks)

Variable	Qualitative / Quantitative	Discrete/ continuous	Scale of Measurement
a. The Type of shoes are wearing now			
b. The time you take to answer this question			

3. Distinguish between the following and give a suitable example of each: (4 marks)
   a) Descriptive statistics and inferential statistics
   b) Maximum performance and typical performance test.

4. a) State **three** roles of educational measurement objectives. (3 marks)

b) 75 students sat for a Physics test that was scored out of 70. The following distribution represents the students' scores in the test:

Scores (X)	30-34	35- 39	40- 44	45 - 49	50- 54	55 - 59	60 - 64	65 - 69
Frequency (f)	5	15	22	17	8	5	2	1

Using the frequency distribution data, calculate the following:

i) Mode (1 mark)

ii) Mean (2 marks)

iii) Median (3 marks)

iv) Standard deviation (5 marks)

c) Using the measures of central tendency found in (B) above, describe:

i) The shape of the distribution of scores (include a sketch) (2 marks)

ii) The performance of students on the Physics test (2 marks)

iii) The best measure of central tendency for describing the students' scores in the Physics test. (1 mark)

5. 100 students sat for a Kiswahili test. The mean score was 48 and the standard deviation was 5. If the students' scores were normally distributed.

a) How many students scored between 43 and 55? (2 marks)

b) If only the top one percent of the class was to be given a prize in Kiswahili, what would be the minimum score a student would have to get to qualify for the award? (2 marks)

6. a) Highlight **two** uses of a table of specifications (2 marks)

b) Highlight **two** ways of enhancing the reliability of a test (2 marks)

c) What **three** guidelines would you have in mind as you write comments in the report cards of your students? (3 marks)

SECTION B (30 MARKS)

7. With the aid of scatter diagrams, explain the difference between positive and negative correlation. (2 marks)

8. The following were the scores obtained when a group of ten (10) form 1 students were tested in Biology and Agriculture.

Student	A	B	C	D	E	F	G	H	I	J
Biology	12	14	16	17	18	18	10	21	22	23
Agriculture	13	15	15	17	16	17	17	18	18	19

i) Compute and interpret the Pearson's correlation coefficient (r_{xy}) for the two sets of scores. (6 marks)

ii) State **one** assumption of the r_{xy} (1 mark)

iii) Compute and interpret the Spearman's Rank order correlation coefficient (rho) for the score. (4 marks)

9. a) Give **one** consideration that a teacher should make when selecting item format in test construction (1 mark)

b) State **two** functions of item analysis in test construction (2 marks)

c) A group of 150 examinees responded as sown below in two multiple choice items.

Item								
1	**OPTIONS**	**A***	**B**	**C**	**D**	**E**	**OMIT**	**TOTAL**
	UPPER GROUP	5	65	2	3	0	0	75
	LOWER GROUP	35	25	7	3	5	0	75
2	**OPTIONS**	**A**	**B**	**C***	**D**	**E**	**OMIT**	**TOTAL**
	UPPER GROUP	5	13	50	2	5	0	75
	LOWER GROUP	5	19	39	5	3	4	75

Key: * The correct option

i) Calculate the difficulty index and discrimination index of each item. (8 marks)

ii) Based on the item analysis data obtained in (I) above, comment on the quality of each of the items. (2 marks)

iii) Evaluate all the distracters in each of the two items and identify the effective and non-effective distracters. Give a reason for each answer. (4 marks)

Statistical Expressions

1. $$\frac{N\Sigma XY - \Sigma X\Sigma Y}{\sqrt{\left[N\Sigma X^2 - (\Sigma X)^2\right]\left[N\Sigma Y^2 - (\Sigma Y)^2\right]}}$$

$$\frac{\Sigma XY - \dfrac{\Sigma X\Sigma Y}{N}}{\sqrt{\left[\Sigma X^2 - \dfrac{(\Sigma X)^2}{N}\right]\left[\Sigma Y^2 - \dfrac{(\Sigma Y)^2}{N}\right]}}$$

2. $$\frac{\Sigma xy}{N S_x S_y} \text{ or } \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\sqrt{\left(\Sigma(x-\bar{x})^2\right)\left(\Sigma(y-\bar{y})^2\right)}} = \frac{\Sigma xy}{\sqrt{\Sigma x^2\,\Sigma y^2}}$$

3. $$\frac{M_{x_1} - M_{x_1}}{s_x}\left(\sqrt{pg}\right)$$

4. $$1 = \frac{6\Sigma D^2}{N(N^2-1)}$$

5. $$\frac{K}{K-1}\left(\frac{1-\Sigma pq}{S^2}\right)$$

6. $$\frac{s\ r_{N_1}}{r_{n+1}} \rightarrow \frac{2r_{\frac{1}{2}\frac{1}{2}}}{r_{\frac{1}{1}\frac{1}{1}}+1}$$

7. $$\frac{(cf_B + f_w/_2)}{N}$$

8. $$D = \frac{R_u - R_L}{n},\ P = \frac{(R_u + R_L)}{(n_u + N_L)} X\,100$$

9. $$\frac{\Sigma fx^2 - \dfrac{(\Sigma fx)^2}{\Sigma f}}{\Sigma f} \text{ or } \frac{\Sigma fx^2}{\Sigma f}\left(\frac{\Sigma fx}{\Sigma f}\right)^2 \text{ where } \Sigma f = N$$

10. $$S_R = S_X\sqrt{1 - r_{xx}}$$

11. $$\frac{nas_a^2 + nbs_b^2 + na(\dot{x}_a - \bar{x})^2 + n_b(\bar{x}b - \bar{x})^2}{na + n_b + \ldots}$$

12. $$\frac{Kr}{1 + (K-1)r}$$

13. $$L + \left(\frac{\frac{N}{2} - cfh}{fw}\right)ci$$

Statistical Expressions

1. $$\frac{N\Sigma XY - \Sigma X \Sigma Y}{\sqrt{[N\Sigma X^2 - (\Sigma X)^2][N\Sigma Y^2 - (\Sigma Y)^2]}}$$ or

$$\frac{\Sigma XY - \frac{\Sigma X \Sigma Y}{N}}{\sqrt{\left[\Sigma X^2 - \frac{(\Sigma X)^2}{N}\right]\left[\Sigma Y^2 - \frac{(\Sigma Y)^2}{N}\right]}}$$

2. $$\frac{\Sigma xy}{N S_x S_y}$$ or $$\frac{\Sigma (x-\bar{x})(y-\bar{y})}{\sqrt{(\Sigma (x-\bar{x})^2)(\Sigma (y-\bar{y})^2)}} = \frac{\Sigma xy}{\sqrt{\Sigma x^2 \Sigma y^2}}$$

3. $$\frac{M_x - M_y}{S_x} \left(\sqrt{pq}\right)$$

4. $$1 - \frac{6\Sigma D^2}{N(N^2-1)}$$

5. $$\frac{K}{K-1}\left(1 - \frac{\Sigma pq}{S^2}\right)$$

6. $$\frac{2 r_{hh}}{1 + r_{hh}} \longrightarrow \frac{2 V_x V_y}{V_x V_x + V_y V_y}$$

7. $$\frac{(F_R + F_W)a}{N}$$

8. $$D = \frac{R_H - R_L}{n}, \quad P = \frac{(R_H + R_L)}{2n} \times 100.$$

$$D = \frac{R_H}{n_H} - \frac{R_L}{n_L}, \quad P = \frac{(R_H + R_L)}{(n_H + n_L)} \times 100.$$

The Standard Normal Distribution

z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4545
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990

Note: Use 0.4999 for z values above 3.09.

Source: Frederick Mosteller and Robert E. K. Rourke, *Sturdy Statistics*, Table A–1 (Reading, Mass.: Addison-Wesley, 1973). Reprinted with permission of the copyright owners.