UNIVERSITY OF SWATINI

FACULTY OF EDUCATION

DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND MANAGEMENT

FOR

INSTITUTE OF POST GRADUATE STUDIES

NOVEMBER, 2018 FINAL EXAMINATION PAPER

MASTER OF EDUCATION (M.Ed)

COURSE CODE	:	EFM 601
TITLE OF PAPER	:	QUANTITATIVE METHODS OF RESEARCH
TIME ALLOWED	:	THREE HOURS
INSTRUCTIONS	:	1. THIS PAPER IS DIVIDED INTO **TWO SECTIONS** (**A** AND **B**). ANSWER **ANY TWO** QUESTIONS FROM EACH SECTION **2.** UTILISE THE ATTACHED STATISTICAL FORMULAS AND TABLES WHERE NECESSARY.
TOTAL MARKS	:	100

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION TO DO SO HAS BEEN GRANTED BY THE INVIGILATOR.

SECTION A

1. How justifiable is the assertion that the quantitative research methodology is not as applicable to educational research as the qualitative research methodology.
Total: 25 Marks.

2. Examine the view that the research hypotheses are as critical as the research questions / objectives in an educational research ***Total: 25 Marks.***

3. Discuss the assertion that in an educational study, a questionnaire is a better data collection instrument than an interview. ***Total: 25 Marks.***

SECTION B

Question 4

Agroup of ten(10) Bed students wrote a Developmental Psychology test and got marks shown in set A. The same group of students wrote a Research Methods and Statistics test and got marks shown in set B.

Table 1:Marks obtained in Developmental Psychology and Research Methods and Statistics test

Student	1	2	3	4	5	6	7	8	9	10
Set A	50	70	50	65	30	80	40	45	75	55
Set B	70	90	60	60	20	60	60	80	40	90

a) Using information in Table 1 above, find the correlation coefficient using Spearman's rank order and comment on it. **(15 marks)**
b) Plot a scatter gram using the same information in Table 1. **(10 marks)**

Question 5

Ten (10) pupils wrote a Physics and Maths test and obtain the following results shown in the table below.

Table 2:Marks obtained in Physics and Maths tests.

Pupil	A	B	C	D	E	F	G	H	I	J	Mean	Standard deviation
Physics	30	80	50	50	90	10	30	70	60	80	55	24.6
Maths	90	10	60	70	90	50	50	60	60	40	56	22.3

a) In which set of marks did pupil E perform better and why? **(12 marks)**

b) Compute the variance for Physics marks. **(7 marks)**
c) Determine the Standard Deviationfor Physics marks. **(2 marks)**
d) State two advantages of the mean. **(4 marks)**

Question 6

A clinical Psychologist is interested in finding out the prevalence of depression and anxiety in four sections in her locality. She is convinced that the occurrence of depression varies with the level of poverty one has. She collected data presented in Table 3 below.

Table 3: Prevalence of poverty

Section	A	B	C	D
Prevalence rate	22	31	45	48
Level of poverty	14	8	10	12

a) Which test statistic is most applicable to test this data? **(2 marks)**
b) Test at 5% significance level whether there is an association between prevalence of depression and level of poverty. **(23 marks)**

T Test

TABLE II Critical Values of t: Student t-test

	Level of significance for a directional (one-tailed) test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for a non-directional (two-tailed) test					
df	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

Find the row corresponding to the indicated degrees of freedom, find the column corresponding to the chosen level of significance, taking into account the type of H_1 (directional or non-directional). The critical value t_{crit} is at the intersection of that row and that column. If $t_{obs} \geq t_{crit}$ then H_0 is rejected.

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STATISTICAL FORMULAE

Sample Variance: $S^2 = \frac{\sum(x-\bar{x})^2}{n-1}$

Sample Standard Deviation: $s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$

Product moment correlation coefficient:

$$r_{xy} = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Spearman's rank order correlation coefficient: $rho = 1 - \frac{6\sum d^2}{n(n^2-1)}$

Chi-squared Test Statistic: $x^2 = \sum \frac{(0-E)^2}{E}$

Z-score: $z = \frac{x-\bar{x}}{s}$

Standardisation: $z = \frac{u-\mu}{\sigma}$ **Where Z ~N(0,1)**

T-score: $T = 50 + 10\left(\frac{x-\bar{x}}{s}\right)$

Student t-test: $t = \frac{\sqrt{(n-1)}\sum d}{\sqrt{n\sum d^2 - (\sum d)^2}}$

ANALYSIS OF VARIANCE (ANOVA)

1. $SS\,(\text{TOTAL}) = \sum x^2 - \frac{(\sum x)^2}{n}$

2. $SST = SS(\text{Treatment}) = SS(Btwn\ Grps) = \sum \frac{T_i^2}{n_i} - \frac{(\sum x)^2}{n} = \frac{T_1^2}{n_1} + \frac{r_2^2}{n_2} + \cdots + \frac{T_p^2}{n_p} - \frac{(\sum x)^2}{n}$

3. $SSE = SS\ (TOTAL) - SST$

   [N.B. $SSE = SS\ (\text{Error}) = SS\ (\text{Within Groups}) = SS\ (\text{Residual})$]

4. $MST = \frac{SST}{p-1}$

5. $MSE = \frac{SSE}{n-p}$

6. $F_{calc} = \frac{MST}{MSE}$

ONE-WAY ANOVA TABLE

Source of variation	**Sum of squares**	**Degrees of Freedom (df)**	**Mean Square**	F_{calc}
Between Groups (Treatments)	SST	$p-1$	$MST = \frac{SST}{p-1}$	$F_{calc} = \frac{MST}{MSE}$
Within Groups (Error or Residual)	SSE	$n-p$	$MSE = \frac{SSE}{n-p}$	
Total	$SS(\text{TOTAL})$	$n-1$		

n = total number of observations

p = number of treatments (number of samples or groups)

p-1 = numerator degrees of freedom

n-p = denominator degrees of freedom

T_i= total for group i(i = 1, 2, 3, …, p)

n_i= number of observations in group i(i = 1, 2, 3, …, p)