

THE OPEN UNIVERSITY OF SRI LANKA  
FACULTY OF HEALTH SCIENCES  
DEPARTMENT OF BASIC SCIENCES  
ACADEMIC YEAR 2020/2021 – SEMESTER 01



BACHELOR OF SCIENCE HONOURS IN NURSING  
BSU5335 – HEALTH STATISTICS - LEVEL 5  
CONTINUOUS ASSESSMENT II (NBT II)  
DURATION: 1  $\frac{1}{2}$  HOUR

DATE: 4<sup>th</sup> JANUARY 2022

TIME: 2.00 PM – 3.30 PM

REGISTRATION NO: .....

**IMPORTANT INSTRUCTIONS/ INFORMATIONS TO CANDIDATES**

- This question paper consists of **12 pages** with **two Parts/Sections**:
  - **Part A / Section 1: Multiple Choice Questions - MCQs (20 marks)**: There are 10 MCQs. Indicate answers for **all** questions in the answer sheet provided by placing a cross (X) in **INK** in the relevant cage (answers in pencil will **NOT** be marked).
  - **Part B / Section 2: Structured Essay Questions – SEQs (80 marks)**: There are 2 SEQs. Write answers for **all** within the space provided in the question paper.
- Answer **ALL** questions
- Write your **Registration Number** in the space provided.
- Statistical tables are given in page 11.
- Do **NOT** bring in on person or have in possession unauthorized materials, including mobile phones and other electronic devices, and do not violate any other examination rules.
- Do **NOT** take page/part of this question paper out of the examination hall.
- **Non-programmable calculators are allowed.**
- **Please fill the address sheet. (See last page).**

**BACHELOR OF SCIENCE HONOURS IN NURSING  
BSU5335 – HEALTH STATISTICS – LEVEL 5  
CONTINUOUS ASSESSMENT II (NBT II)**

**REGISTRATION NO:** .....

**ANSWER SHEET FOR PART A**

<b>Q. No.</b>	<b>(a)</b>	<b>(b)</b>	<b>(c)</b>	<b>(d)</b>
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				

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**Part A – Multiple Choice Questions**

**(10\*2 = 20 marks)**

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**Choose the most suitable/best answer and indicate with a 'X' in the answer sheet.**

1. Which one of the following is a qualitative research method?
  - a. Cross-sectional surveys
  - b. Cohort Studies
  - c. In-depth Interviews
  - d. Experimental studies
  
2. The average resting pulse rate and the sample standard deviation of a random sample of 9 women were 76 and 5, respectively. The standard error of the sample mean is
  - a. 8.44
  - b. 1.80
  - c. 1.67
  - d. 0.57
  
3. A range of values within which the value of a population parameter is expected to lie is called;
  - a. Confidence limits
  - b. Significance level
  - c. Confidence interval
  - d. Margin of error
  
4. Which one of the following does not affect the width of the confidence interval?
  - a. Sample size
  - b. Sample variance
  - c. Confidence level
  - d. Sample mean
  
5. Suppose that a random sample of 25 bottles of cough medicine is selected by a medical student. He measured the alcohol content of each bottle and found that the sample mean of alcohol content is 8.6 ml with the sample standard deviation of 2.88 ml. What is the 95% confidence interval for the true mean alcohol content for the population of all bottles?  
**(Hint: At 5% significance level z-value is 1.96 and t value 2.06)**
  - a. (7.413, 9.787)
  - b. (7.470, 9.730)
  - c. (8.363, 8.837)
  - d. (8.374, 8.826)

6. The null and alternative hypotheses statements are based on:
- sample parameters
  - sample statistics
  - population parameters
  - both sample statistics and population parameters
7. Paired-sample t-test is used in which one of the following cases?
- When comparing the performances before and after training
  - When comparing two separate groups
  - When comparing the association between two groups
  - When comparing more than two groups
8. The degree of the chi-square test for cross-tabulation with  $r$  number of rows and  $c$  number of columns is
- $(r-1)(c-1)$
  - $r*c$
  - $(r+1)(c+1)$
  - $(r-2)(c-2)$
9. Which one of the following tests is used to compare three or more population means?
- Z- test
  - ANOVA
  - Paired t-test
  - Chi-square test
10. When the Pearson correlation coefficient  $(r) = 1$ , there is
- a perfect negative relationship between the variables
  - a perfect positive relationship between the variables
  - a strong positive relationship between the variables
  - no relationship between the variables

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**Part B –Structured Essay Questions**  
(40\*2 = 80 marks)

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Write answers in the space provided.

01.

a) Write down the short answers for the following questions.

i. Use of z distribution and t distribution in interval estimation.

ii. What is a hypothesis?

iii. What are the main steps that should follow in hypothesis testing?

iv. When you use paired t-test in analyzing a data set?

**(12 Marks)**

- b) A doctor wants to determine whether there is a significant gender difference of contacting with COVID-19. PCR test records of a random sample of 50 persons were obtained and data are given below.

Gender	PCR Test Result		Total
	Positive	Negative	
Male	19	6	25
Female	10	15	25
Total	29	21	50

Chi-squared test is used to check the doctor's claim.

Observed value ( <i>O</i> )	Expected value ( <i>E</i> )	$\frac{(O - E)^2}{E}$
19	A	W
6	B	X
10	C	Y
15	D	Z

- i. State the null and alternative hypothesis to check the doctor's claim.

(4 Marks)

- ii. Calculate the Expected frequencies. (Find the values for the letters of A-D given in the above table).

(8 Marks)

iii. Find the values for the letters of **W-Z** given in the above table

**(8 Marks)**

iv. Calculate the chi-square test statistics by using the following equation.

$$\chi^2 = \sum_{i=1}^n \frac{(O - E)^2}{E}$$

**(2 Marks)**

v. What is the degree of freedom for this chi-squared test?

**(2Marks)**

vi. Test the null hypothesis at 5% level and Clearly state your conclusions. .

**(4 Marks)**

02.

- a) A study was conducted by a researcher to check the relationship between stress and life satisfaction. Measurements from 10 persons were obtained. The participants completed a measure on how stressful they were (on a 1 to 30 scale) and a measure on how satisfied they were about their life (measured on a 1 to 10 scale). The recorded data were as follows. Using this data, answer the following questions.

Stress score (X)	Life Satisfaction (Y)
11	7
25	1
19	4
7	9
23	2
6	8
11	8
22	3
25	3
10	6

- i) Complete the following table

$X$	$X^2$	$Y$	$Y^2$	$X \times Y$
11		7		
25		1		
19		4		
7		9		
23		2		
6		8		
11		8		
22		3		
25		3		
10		6		

(15 Marks)

- ii) Calculate following measures.

a.  $\sum_{i=1}^{10} X =$

b.  $\sum_{i=1}^{10} Y =$

c.  $\sum_{i=1}^{10} X^2 =$

d.  $\sum_{i=1}^{10} Y^2 =$

e.  $\sum_{i=1}^{10} XY =$

(5 Marks)



iii) Calculate the correlation coefficient ( $r$ ).

$$r = \frac{n \sum_{i=1}^n xy - [\sum_{i=1}^n x] [\sum_{i=1}^n y]}{\sqrt{n (\sum_{i=1}^n x_i^2) - (\sum_{i=1}^n x_i)^2} \sqrt{n (\sum_{i=1}^n y_i^2) - (\sum_{i=1}^n y_i)^2}}$$

**(3 Marks)**

iv) Interpret your result obtained in part (iii).

**(2 marks)**

b) A research study was conducted to examine the efficacy of a new antidepressant. There are three (3) groups (a placebo group, a group that received a low dose of the drug, and a group that received a moderate dose of the drug). Four (4) patients were randomly assigned into each group, totaling 12 patients. Beck Depression Inventory records of patients were checked after one month of treatment, and the following summary measurements were obtained.

MST (Mean square due to treatment) = 742.5

MSE (Mean square due to error) = 65.9

i) State the null and alternative hypothesis of the study.

**(4 marks)**

ii) Calculate the F-test statistics.

**(2 marks)**

iii) What are the degrees of freedoms for the numerator and for the denominator?

**(4 marks)**

iv) Find the F-critical value from F-table at 5% significant level.

**(2 marks)**

v) State your conclusions.

**(3 marks)**

Percentage Points of the Chi-Square Distribution

Degrees of Freedom	Probability of a larger value of $\chi^2$								
	0.99	0.95	0.90	0.75	0.50	0.25	0.10	0.05	0.01
1	0.000	0.004	0.016	0.102	0.455	1.32	2.71	3.84	6.63
2	0.070	0.103	0.211	0.575	1.386	2.77	4.61	5.99	9.21
3	0.115	0.352	0.584	1.212	2.366	4.11	6.25	7.81	11.34
4	0.297	0.711	1.064	1.923	3.357	5.39	7.78	9.49	13.28
5	0.554	1.145	1.610	2.675	4.351	6.63	9.24	11.07	15.09
6	0.872	1.635	2.204	3.455	5.348	7.84	10.64	12.59	16.81
7	1.239	2.167	2.833	4.255	6.346	9.04	12.02	14.07	18.48
8	1.647	2.733	3.490	5.071	7.344	10.22	13.36	15.51	20.09
9	2.088	3.325	4.168	5.899	8.343	11.39	14.68	16.92	21.67
10	2.558	3.940	4.865	6.737	9.342	12.55	15.99	18.31	23.21
11	3.053	4.575	5.578	7.564	10.341	13.70	17.28	19.68	24.72
12	3.571	5.226	6.304	8.438	11.340	14.85	18.55	21.03	26.22
13	4.107	5.892	7.042	9.299	12.340	15.98	19.81	22.36	27.69
14	4.660	6.571	7.790	10.165	13.339	17.12	21.06	23.68	29.14
15	5.229	7.261	8.547	11.037	14.339	18.25	22.31	25.00	30.58
16	5.812	7.962	9.312	11.912	15.338	19.37	23.54	26.30	32.00
17	6.408	8.672	10.085	12.792	16.338	20.49	24.77	27.59	33.41
18	7.015	9.390	10.865	13.675	17.338	21.60	25.99	28.87	34.80
19	7.633	10.117	11.651	14.562	18.338	22.72	27.20	30.14	36.19
20	8.260	10.851	12.443	15.452	19.337	23.83	28.41	31.41	37.57
22	9.542	12.338	14.041	17.240	21.337	26.04	30.81	33.92	40.29
24	10.856	13.848	15.659	19.037	23.337	28.24	33.20	36.42	42.98
26	12.198	15.379	17.292	20.843	25.336	30.43	35.56	38.89	45.64
28	13.565	16.928	18.939	22.657	27.336	32.62	37.92	41.34	48.28
30	14.953	18.493	20.599	24.478	29.336	34.80	40.26	43.77	50.89
40	22.164	26.509	29.051	33.660	39.335	45.62	51.80	55.76	63.69
50	27.707	34.764	37.689	42.942	49.335	56.33	63.17	67.50	76.15
60	37.485	43.198	46.459	52.294	59.335	66.98	74.40	79.08	88.38

CRITICAL VALUES for the "F" Distribution, ALPHA = .05.

Denominator DF	Numerator DF									
	1	2	3	4	5	6	7	8	9	10
1	161.448	199.500	215.707	224.583	230.162	233.986	236.768	238.883	240.543	241.882
2	18.513	19.000	19.164	19.247	19.296	19.330	19.353	19.371	19.385	19.396
3	10.128	9.552	9.277	9.117	9.013	8.941	8.887	8.845	8.812	8.786
4	7.709	6.944	6.591	6.388	6.256	6.163	6.094	6.041	5.999	5.964
5	6.608	5.786	5.409	5.192	5.050	4.950	4.876	4.818	4.772	4.735
6	5.987	5.143	4.757	4.534	4.387	4.284	4.207	4.147	4.099	4.060
7	5.591	4.737	4.347	4.120	3.972	3.866	3.787	3.726	3.677	3.637
8	5.318	4.459	4.066	3.838	3.687	3.581	3.500	3.438	3.388	3.347
9	5.117	4.256	3.863	3.633	3.482	3.374	3.293	3.230	3.179	3.137
10	4.965	4.103	3.708	3.478	3.326	3.217	3.135	3.072	3.020	2.978
11	4.844	3.982	3.587	3.357	3.204	3.095	3.012	2.948	2.896	2.854
12	4.747	3.885	3.490	3.259	3.106	2.996	2.913	2.849	2.796	2.753
13	4.667	3.806	3.411	3.179	3.025	2.915	2.832	2.767	2.714	2.671
14	4.600	3.739	3.344	3.112	2.958	2.848	2.764	2.699	2.646	2.602
15	4.543	3.682	3.287	3.056	2.901	2.790	2.707	2.641	2.588	2.544
16	4.494	3.634	3.239	3.007	2.852	2.741	2.657	2.591	2.538	2.494
17	4.451	3.592	3.197	2.965	2.810	2.699	2.614	2.548	2.494	2.450
18	4.414	3.555	3.160	2.928	2.773	2.661	2.577	2.510	2.456	2.412
19	4.381	3.522	3.127	2.895	2.740	2.628	2.544	2.477	2.423	2.378
20	4.351	3.493	3.098	2.866	2.711	2.599	2.514	2.447	2.393	2.348

**Reg. No:**.....

**Name:**.....

**Address:**.....

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