00204

THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF BASIC SCIENCES
ACADEMIC YEAR 2018/2019 – SEMESTER I

BACHELOR OF PHARMACY HONOURS – LEVEL 4
BACHELOR OF MEDICAL LABORATORY SCIENCES HONOURS – LEVEL 4
BSU4230 – BASIC STATISTICS
FINAL EXAMINATION **DURATION: TWO HOURS**

DATE: 15th MARCH 2019 TIME: 2.00 pm – 4.00 pm

INDEX NUMBER: .....

IMPORTANT INSTRUCTIONS/ INFORMATIONS TO CANDIDATES

- This question paper consists of 07 pages with **04 Essay Questions.**
- Write your **Index Number** in the space provided.
- Answer ALL questions.
- **All the questions should be answered** in the booklet provided.
- Necessary Formulae/ Z table are given in the pages 6-7.
- Mobile phones and any other electronic equipment are **NOT** permitted.
- **Non-programmable calculators are allowed to use.**

BSU 4230-BASIC STATISTICS
FINAL EXAMINATION

Essay Questions
(100% marks)

1. A researcher has carried out a small study in a hospital. There were 135 patients in the male ward and 45 patients in the female ward. The gender, height, weight and number of days stayed in the hospital were recorded for each patient.

a)

i. Classify the variables as either quantitative or qualitative.
ii. Classify the quantitative variables as either discrete or continuous.
iii. Suggest 2(two) central tendency measures and 2(two) dispersion measures to explore the height of the patients.
iv. Suppose the mean weight of male patients was 58 kg with a standard deviation of 2.5 kg and the mean weight of female patients was 47 kg with a standard deviation of 2.3 kg. Calculate the coefficient of variation of male and female patients separately.
v. Comment on the variability of weight in male and female patients.

(30 marks)

b) Sketch the following diagrams.

i. Pie chart for gender of the patients.
ii. From the records of the last year, the researcher had recorded number of males and females in the hospital from September to December. Sketch a compound bar chart for the data given below.

Gender	September	October	November	December
Male	56	58	50	55
Female	44	45	34	30

(20 marks)

2.

a) One hundred (100) persons were selected to test a new test kit for blood glucose. All 100 persons were tested using the kit and a standard test. According to the results of the tests, the patients were labeled as either diabetes (D+) or non-diabetes (D-). . Results are given below.

	Standard Test		Total
	D +	D -	
New kit D+	20	15	35
New kit D-	25	40	65
Total	45	55	100

i. Calculate sensitivity, specificity, Positive Predictive Value (PPV) and Negative Predictive Value (NPV) of the new test kit. .

ii. Calculate the probability that a randomly selected person has a positive test results from the new test kit.

iii. Calculate the probability that a randomly selected person has a negative test results from the new test kit.

iv. Calculate the probability that a randomly selected person has a positive test result or negative result from the new test kit.

v. If 3 (three) people are randomly selected, find the probability that all of them will have diabetes according to the standard test.

(30 marks)

b) Suppose the height of adult females are normally distributed with mean of 160 cm and standard deviation of 8 cm.

i. Find the probability that a randomly selected adult female has a height greater than 180 cm using the Z table.

ii. Any adult female whose height is greater than h cm is defined as tall. If 40% of adult females are found to be tall, find the value of h using the Z table.

(20 marks)

3.

a) The Head of the Department of Basic Sciences of the Open University is interested to identify the students' opinion on the Day schools of Health Statistics course. He wishes to get feedback from 50 students who have got more than 70% attendance for Day schools. Suppose that he wants to record gender, age and usefulness (Very useful, Somewhat useful, Not useful) of the Day schools of each selected student.

i. Define the Population, Sample and Sampling units of this study.
ii. Write the scales of measurements of the variables that the researcher is going to investigate?
iii. Suggest a suitable sampling method for this study. Justify your answer.
iv. Suggest 2 (two) methods that he can use to collect data.
v. List 2 (two) non-sampling errors that can occur during the study.
vi. Describe how would you advice the researcher to get the sample of 50 individuals from 275 students by using Random Number Table. Clearly show how to select first 5(five) individuals who might be selected to the sample using the given random number table. Start selecting numbers row wise from 19428 in the 2nd row.

Table of Random Numbers

05542	29705	83775	21564	81639	27973	62413	85652
19428	88048	08747	20092	12615	35046	67753	69630
97402	27569	90184	02338	39318	54936	34641	95525
51472	65358	23701	75230	47200	78176	85248	90589
98729	76703	16224	97661	79907	06611	26501	93389
61345	88857	53204	86721	59613	67494	17292	94457
93129	40386	51731	44254	66685	72835	01270	42523
59208	95266	33970	70958	60017	39723	00606	17956
96997	55340	80312	78839	09815	16887	22228	06206

(30 marks)

b) Explain the differences between the following terms.

i. Probability sampling and Non-probability sampling.
ii. Strata and Clusters.
iii. Census and Sampling
iv. Experimental study and Observational study.
v. Retrospective study and Prospective study

(20 marks)

4.

a) Resting pulse rate (beats per minute) of randomly selected 9 women are given below.

74, 71, 69, 74, 72, 81 80, 76, 78

i. Calculate the mean pulse rate of women.
ii. Calculate the standard deviation of pulse rates.
iii. Calculate the standard error of the mean.

(30 marks)

b) An investigator followed up a group of 7400 individuals to evaluate the risk of exposure to asbestos fiber in the development of lung cancer. In this group, 2900 had been exposed to asbestos fiber and among them 54 individuals have developed lung cancer. Five (5) of those who were not exposed to asbestos fiber also have developed lung cancer.

i. What is the type of study described here?
ii. Briefly describe the differences between a Cohort study and a Case-control study?
iii. Compute the relative risk (RR).
iv. Interpret the computed relative risk (RR) value.

(20 marks)

Necessary Formulae

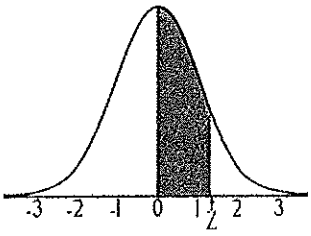
The following equations are given in the usual/ standard notation.

$$V = \frac{\sum(x - \bar{x})^2}{n - 1}$$

$$CV = \frac{S}{\bar{x}} \times 100\%$$

$$SE_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$$

$$SE_p = \sqrt{\frac{pq}{n}}$$



STANDARD NORMAL TABLE (Z)

Entries in the table give the area under the curve between the mean and z standard deviations above the mean. For example, for $z = 1.25$ the area under the curve between the mean (0) and z is 0.3944.

Z	0.00	0.01	0.02	0.03	0.04	0.05	0.06	0.07	0.08	0.09
0.0	0.0000	0.0040	0.0080	0.0120	0.0160	0.0190	0.0239	0.0279	0.0319	0.0359
0.1	0.0398	0.0438	0.0478	0.0517	0.0557	0.0596	0.0636	0.0675	0.0714	0.0753
0.2	0.0793	0.0832	0.0871	0.0910	0.0948	0.0987	0.1026	0.1064	0.1103	0.1141
0.3	0.1179	0.1217	0.1255	0.1293	0.1331	0.1368	0.1406	0.1443	0.1480	0.1517
0.4	0.1554	0.1591	0.1628	0.1664	0.1700	0.1736	0.1772	0.1808	0.1844	0.1879
0.5	0.1915	0.1950	0.1985	0.2019	0.2054	0.2088	0.2123	0.2157	0.2190	0.2224
0.6	0.2257	0.2291	0.2324	0.2357	0.2389	0.2422	0.2454	0.2486	0.2517	0.2549
0.7	0.2580	0.2611	0.2642	0.2673	0.2704	0.2734	0.2764	0.2794	0.2823	0.2852
0.8	0.2881	0.2910	0.2939	0.2969	0.2995	0.3023	0.3051	0.3078	0.3106	0.3133
0.9	0.3159	0.3186	0.3212	0.3238	0.3264	0.3289	0.3315	0.3340	0.3365	0.3389
1.0	0.3413	0.3438	0.3461	0.3485	0.3508	0.3513	0.3554	0.3577	0.3529	0.3621
1.1	0.3643	0.3665	0.3686	0.3708	0.3729	0.3749	0.3770	0.3790	0.3810	0.3830
1.2	0.3849	0.3869	0.3888	0.3907	0.3925	0.3944	0.3962	0.3980	0.3997	0.4015
1.3	0.4032	0.4049	0.4066	0.4082	0.4099	0.4115	0.4131	0.4147	0.4162	0.4177
1.4	0.4192	0.4207	0.4222	0.4236	0.4251	0.4265	0.4279	0.4292	0.4306	0.4319
1.5	0.4332	0.4345	0.4357	0.4370	0.4382	0.4394	0.4406	0.4418	0.4429	0.4441
1.6	0.4452	0.4463	0.4474	0.4484	0.4495	0.4505	0.4515	0.4525	0.4535	0.4545
1.7	0.4554	0.4564	0.4573	0.4582	0.4591	0.4599	0.4608	0.4616	0.4625	0.4633
1.8	0.4641	0.4649	0.4656	0.4664	0.4671	0.4678	0.4686	0.4693	0.4699	0.4706
1.9	0.4713	0.4719	0.4726	0.4732	0.4738	0.4744	0.4750	0.4756	0.4761	0.4767
2.0	0.4772	0.4778	0.4783	0.4788	0.4793	0.4798	0.4803	0.4808	0.4812	0.4817
2.1	0.4821	0.4826	0.4830	0.4834	0.4838	0.4842	0.4846	0.4850	0.4854	0.4857
2.2	0.4861	0.4864	0.4868	0.4871	0.4875	0.4878	0.4881	0.4884	0.4887	0.4890
2.3	0.4893	0.4896	0.4898	0.4901	0.4904	0.4906	0.4909	0.4911	0.4913	0.4916
2.4	0.4918	0.4920	0.4922	0.4925	0.4927	0.4929	0.4931	0.4932	0.4934	0.4936
2.5	0.4938	0.4940	0.4941	0.4943	0.4945	0.4946	0.4948	0.4949	0.4951	0.4952
2.6	0.4953	0.4955	0.4956	0.4957	0.4959	0.4960	0.4961	0.4962	0.4963	0.4964
2.7	0.4965	0.4966	0.4967	0.4968	0.4969	0.4970	0.4971	0.4972	0.4973	0.4974
2.8	0.4974	0.4975	0.4976	0.4977	0.4977	0.4978	0.4979	0.4979	0.4980	0.4981
2.9	0.4981	0.4982	0.4982	0.4983	0.4984	0.4984	0.4985	0.4985	0.4986	0.4986
3.0	0.4987	0.4987	0.4987	0.4988	0.4988	0.4989	0.4989	0.4989	0.4990	0.4990
3.1	0.4990	0.4991	0.4991	0.4991	0.4992	0.4992	0.4992	0.4992	0.4993	0.4993
3.2	0.4993	0.4993	0.4994	0.4994	0.4994	0.4994	0.4994	0.4995	0.4995	0.4995
3.3	0.4995	0.4995	0.4995	0.4996	0.4996	0.4996	0.4996	0.4996	0.4996	0.4997
3.4	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4997	0.4998