Name: Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2022

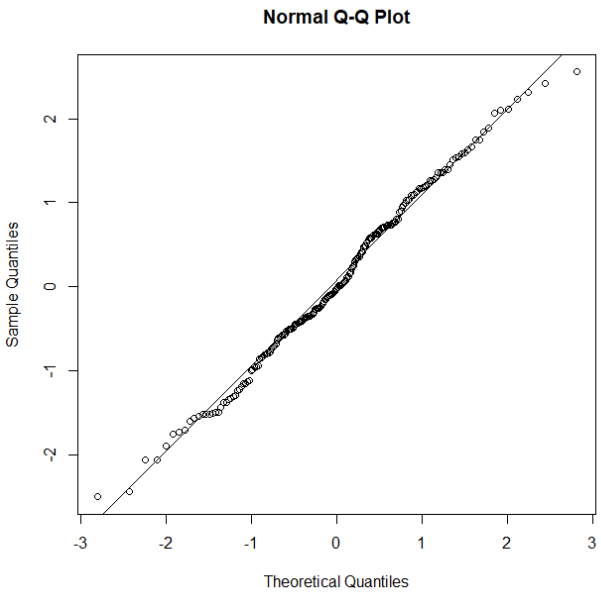
Course: Research Methodology and Biostatistics **Semester: I**
Program: M.Sc. Nutrition and Dietetics / Microbiology **Time : 03 hrs.**
Course Code: HSCC7005 **Max. Marks: 100**

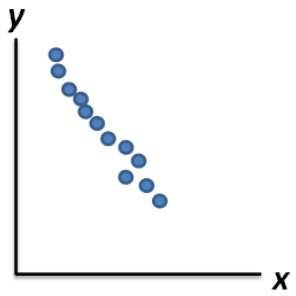
Instructions: Attempt all questions.

SECTION A
(20Qx1.5M=30Marks)

S. No.		Marks	CO
Q01	Authenticity of a research finding is its: a. Validity b. Objectivity c. Originality d. All the above	**1.5**	**CO1**
Q02	What is the main aim of interdisciplinary research? a. To oversimplify the problem of research b. To bring out the holistic approach to research c. To create a new trend in research methodology d. To reduce the emphasis on a single subject in the research domain	**1.5**	**CO1**
Q03	How to judge the depth of any research? a. By research title b. By research duration c. By research objectives d. By total expenditure on research	**1.5**	**CO1**
Q04	Which one of the following is the main feature of qualitative research? a. Avoids positivist assumptions and data analysis b. Subscribes to pre-existing categories c. Collects data in numerical form d. Uses the empirical method of data analysis	**1.5**	**CO1**
Q05	In which of the following research methods, process of hypothesis testing optimally safeguards the role of extraneous variables? a. Expost Facto method b. Experimental method c. Historical method d. Descriptive survey method	**1.5**	**CO1**

Q06	What are the conditions in which Type-II error occurs? a. The null hypothesis gets accepted even if it is false b. The null hypothesis gets rejected even if it is true c. Both the null hypothesis as well as alternative hypothesis are rejected d. None of the above	**1.5**	**CO2**
Q07	What does the longitudinal research approach deal with? a. Long-term research b. Short-term research c. Horizontal research d. None of the above	**1.5**	**CO2**
Q08	In which of the following research methods, manipulation and control of variables, and randomization of sample are two of the basic requirements? a. Ex-post facto research b. Descriptive research c. Case study research d. Experimental research	**1.5**	**CO2**
Q09	Consider an experiment of the drawing balls from a lot which are numbered as 1, 2, 3, 4, 5, 6, 7, 8, 9, 10. The complement of the event that only even number balls are drawn is defined by a. {1, 3, 5, 7, 9} b. {All orderings of (1, 2, 3, 4, 5, 6, 7, 8, 9, 10)} c. {2, 4, 6, 8, 10} d. {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}	**1.5**	**CO3**
Q10	A random experiment can result in one of the outcomes {a, b, c, d} with probabilities 0.1, 0.3, 0.5, and 0.1, respectively. Let A denote the event {a, b}, and B the event {b, c, d}. Then a. $P(A \cap B) = 0.3,\ P(A \cup B) = 1$ b. $P(A \cap B) = 0,\ P(A \cup B) = 1$ c. $P(A \cap B) = 1,\ P(A \cup B) = 0.3$ d. $P(A \cap B) = 0.3,\ P(A \cup B) = 0$	**1.5**	**CO3**
Q11	Consider a bank credit card with a three-digit personal identification number (PIN) code. The total number of possible combinations for the PIN is a. 1000 b. 10000 c. 100 d. 6	**1.5**	**CO3**

Q12	Which of the following is the correct statement from the following quantile-quantile plot?  a. The parent population from where the sample is drawn is reasonably normal. b. The parent population from where the sample is drawn is positively skewed. c. The parent population from where the sample is drawn is negatively normal. d. Nothing can be said about the normality of the parent population from where the sample is drawn.	**1.5**	**CO3**
Q13	The nature of variables defined by “temperature of a place in Uttarakhand” and “number of people living in a town in Uttarakhand” are a. discrete and continuous variables, respectively. b. continuous and discrete variables, respectively. c. both are discrete variables. d. both are continuous variables.	**1.5**	**CO3**
Q14	Consider a class where students have some choices for a subject. The probability that a randomly chosen student chooses mathematics is 0.50, chooses biology is 0.40 and chooses mathematics and biology is 0.30. The probability that a student chooses either or both subjects is a. 0.80 b. 0.90 c. 0.20 d. 0.60	**1.5**	**CO3**

Q15	Suppose a discrete random variable X has a probability mass function $P(x = 0) = 0.2$, $P(x = 1) = 0.5$, $P(x = 2) = 0.3$. The value of $E(X + 3)$ is a. 4.1 b. 1.1 c. 3.1 d. 2.1	**1.5**	**CO4**
Q16	If X is uniformly distributed over the interval [0, 10], the probability that $1 < X < 4$ is a. 0.3 b. 0.4 c. 0.6 d. 0.7	**1.5**	**CO4**
Q17	The sum of square of grouped data is minimum when it is measured around a. Median of the data. b. Arithmetic mean of the data. c. Mode of the data. d. Geometric mean of the data.	**1.5**	**CO4**
Q18	The limits of the Carl Pearson correlation coefficient are a. (-1, 1) b. (0,1) c. (-∞, ∞) d. (0,100)	**1.5**	**CO4**
Q19	The coefficients of kurtosis of a frequency distribution are $\beta_2 = 4,\ \gamma_2 = 1$. The frequency distribution is a. Leptokurtic b. Platykurtic c. Mesokurtic d. Symmetric	**1.5**	**CO4**
Q20	Which of the following is the correct statement from the following scatter plot to know about the correlation coefficient of the given data?  a. The correlation coefficient of the given data is -0.8. b. The correlation coefficient of the given data is +0.8. c. The correlation coefficient of the given data is +0.08. d. The correlation coefficient of the given data is -0.08.	**1.5**	**CO4**

Hospital Data

ID no.	Duration of hospital stay	Age	Sex 1 = M 2 = F	First temp. following admission	First WBC ($\times 10^3$) following admission	Received antibiotic? 1 = yes 2 = no	Received bacterial culture? 1 = yes 2 = no	Service 1 = med. 2 = surg.
1	5	30	2	99.0	8	2	2	1
2	10	73	2	98.0	5	2	1	1
3	6	40	2	99.0	12	2	2	2
4	11	47	2	98.2	4	2	2	2
5	5	25	2	98.5	11	2	2	2
6	14	82	1	96.8	6	1	2	2
7	30	60	1	99.5	8	1	1	1
8	11	56	2	98.6	7	2	2	1
9	17	43	2	98.0	7	2	2	1
10	3	50	1	98.0	12	2	1	2

Nutrition Data

Baseline vitamin E intake by treatment group in a clinical trial of nutritional supplements

Subject	Group 1	Group 2	Group 3	Group 4
1	5.92	5.22	4.33	5.37
2	8.24	3.29	16.31	6.39
3	7.27	3.67	6.19	4.90
4	6.24	4.29	7.95	4.75
5	5.21	109.17	4.02	3.07
6	8.25	5.82	6.12	10.64
7	8.33	7.17	5.60	6.50
8	4.12	4.42	12.20	159.90
9	6.27	5.29	3.33	6.00
10	5.38	55.99	7.33	7.31

SECTION B (4Qx5M= 20 Marks)			
Q21	Write a short note on the "Task of defining a research problem."	**5**	**CO1**
Q22	Plot a Histogram of data in Group 3 of **Nutrition Data** chart.	**5**	**CO3**
Q23	Find the CDF (cumulative distribution function) of the following data on number of episodes of Otitis media. *r* denotes the number of episodes and *P(X=r)* denotes the probability of *r* number of episodes. r 0 1 2 3 4 5 6 $P(X=r)$ 0.129 0.264 0.271 0.185 0.095 0.039 0.017	**5**	**CO4**
Q24	Describe all the parts of technical writing (in one or two sentences each).	**5**	**CO5**
SECTION-C (2Qx15M=30 Marks)			
Q25	What is research design? Give a detailed description of three types of research design.	**15**	**CO2**
Q26	Test the hypothesis that the average baseline vitamin E intake in Group 1 is 6 units (refer to **Nutrition Data**) with a 5% level of significance. (Assume that the population standard deviation is 2 units and critical value at 5% significance level is 1.645)	**15**	**CO5**
SECTION-D (2Qx10M=20 Marks)			
Q27	Find the mean, median, and variance of "duration of hospital stay" (refer to **Hospital Data** above). Evaluate the coefficient of correlation between "duration of hospital stay" and "age".	**10**	**CO3**
Q28	Find the regression coefficients for "Age" as independent variable and "First WBC" as dependent variable. Hence predict the First WBC for a patient with age 35.	**10**	**CO4**