Name:

Enrolment No:

UPES

End Semester Examination, May 2024

Course: Fundamentals of Biostatistics — **Semester :** II

Program: B.Sc. Microbiology/B.Sc. FND — **Duration :** 3 Hours

Course Code: HSCC1029 — **Max. Marks:** 100

Instructions: Read the following instructions carefully:

1. Mention name and enrolment number at the top of question paper.
2. Attempt all questions from section A.
3. Attempt any four questions from section B.
4. In section C, Q1 has an internal choice.
5. In section D, Q1 has an internal choice.

S. No.	Section A Short answer questions/ MCQ/T&F (20Qx1.5M= 30 Marks)	Marks	COs
1	Who among the following is known as father of Biostatistics: a. Neyman b. Adolphe Queste c. Francis Galton d. Willam Gosset	1.5	CO1
2	Sample is regarded as a subset of: a. Data b. Set c. Population d. Distribution	1.5	CO1
3	Define nominal, ordinal, discrete, and continuous variables.	1.5	CO1
4	Both qualitative and quantitative data can be displayed using a _____ graph.	1.5	CO1
5	The primary goal of descriptive statistics is: a. To test hypothesis. b. To establish causality. c. To make inferences about population. d. To summarize and describe data.	1.5	CO1
6	The sum of deviations of items taken from their arithmetic mean is: a. minimum b. maximum c. zero	1.5	CO2

	d. not defined		
7	Mention the formulas of mean, median and mode for grouped data.	**1.5**	**CO2**
8	Differentiate between mean deviation and standard deviation.	**1.5**	**CO2**
9	If median of a grouped data is 72 and mean is 78, then mode will be. a. 53 b. 32 c. 60 d. 17	**1.5**	**CO2**
10	For the Poisson distribution find the standard deviation if mean is 4.	**1.5**	**CO2**
11	Differentiate between Binomial and Poisson distributions.	**1.5**	**CO3**
12	The independent variable is used to explain the dependent variable in: a. Multiple regression analysis b. Linear regression analysis c. Non-linear regression analysis d. None of the above	**1.5**	**CO3**
13	If $r = 0.817$, $b_{xy} = 0.75$, then what will be the value of b_{yx} a. 0.741 b. 0.817 c. 0.752 d. 0.613	**1.5**	**CO3**
14	The correlation for the values of two variables moving in the opposite direction is: a. Perfect positive b. Negative c. Positive d. No correlation	**1.5**	**CO3**
15	Three coins are tossed simultaneously. The probability of getting at least one head or one tail is: a. 1/8 b. 3/8 c. 6/8 d. 8/8	**1.5**	**CO3**
16	The difference between Type I and Type II error is: a. Type I error occurs when the null hypothesis is correctly rejected, while Type II error occurs when the null hypothesis is correctly accepted. b. Type I error occurs when the alternative hypothesis is incorrectly rejected, while Type II error occurs when the alternative hypothesis is incorrectly accepted.	**1.5**	**CO4**

	c. Type I error occurs when the null hypothesis is incorrectly rejected, while Type II error occurs when the null hypothesis is incorrectly accepted. d. Type I error occurs when the alternative hypothesis is correctly rejected, while Type II error occurs when the alternative hypothesis is correctly accepted.		
17	Which statistical test is used to determine the association between two categorical variables? a. Correlation coefficient b. Chi-square test c. Regression analysis d. ANOVA	**1.5**	**CO4**
18	What does SPSS stand for?	**1.5**	**CO4**
19	In SPSS, variables names are case sensitive. a. True b. False	**1.5**	**CO4**
20	In SPSS the _____command provides a list of available charts: a. rank case. b. categorize variable. c. Both a and b. d. gallery	**1.5**	**CO4**
Section B **(4Qx5M=20 Marks)** **Attempt any four questions.**			
Q 1	Define the following: a. Confidence limit b. Null and alternate hypothesis c. Level of significance d. Degree of freedom e. small sample test	**5**	**CO4**
Q 2	If the probability of an individual suffering a bad reaction from a particular injection is 1/1000, determine the probability that out of 2,000 individual (i) exactly three (ii) more than two individual will suffer a bad reaction.	**5**	**CO2**
Q 3	Mean of 100 items is found to be 30. If at the time of calculation, two items are wrongly taken as 32 and 12 instead of 23 and 11, find the correct mean.	**5**	**CO2**
Q 4	Calculate the arithmetic mean, standard deviation, and variance of the height of 230 children with the help of the values given below: $A(assumed\ mean) = 105, \sum fd^2 = 75{,}300, \sum fd = 1250$	**5**	**CO2**
Q 5	A simple correlation coefficient between temperature x_1, corn yield x_2, and rainfall x_3 is $r_{12} = 0.59,\ r_{13} = 0.46, and\ r_{23} = 0.77$. Find the coefficient multiple correlation $R_{1.23}$.	**5**	**CO3**
Section C			

(2Qx15M=30 Marks)

Question no. 1 has an internal choice.

Q 1 | **15** | **CO4**

The Haemoglobin levels of three groups of children fed three different diets are given below. Test whether the means of these three groups differ significantly.

Haemoglobin levels (g%) of children fed with three different diets		
Group 1	Group II	Group III
11.6	11.2	9.8
10.3	8.9	9.7
10.0	9.2	11.5
11.5	8.8	11.6
11.8	8.4	10.8
11.8	9.1	9.1
12.1	6.3	10.5
10.8	9.3	10.0
11.9	7.8	12.4
10.7	8.8	10.7
11.5	10.0	
	9.7	

Tabulated value: $F_{0.05}\ for\ (2, 30) d.f\ is\ 3.32$

OR

The following table gives the figures of monthly drop in acidity level and chlorine concentration in a lake water. Apply two-way classification of analysis of variance and interpret your results.

Chlorine concentration	Acidity level			
	Low	Medium	High	Very high
Low	22	19	9	7
Medium	11	11	8	4
High	9	10	6	4

Tabulated values: $F(2, 6) = 5.14\ and\ F(3, 6) = 4.76$ at 5% level of significance.

Q 2 | **15** | **CO4**

From the following table test the colour of son's eye is associated with that of fathers

	Eye colour of sons			
		Not light	light	Total
Eye colour of fathers	Not Light	230	148	378
	Light	151	471	622
	Total	381	619	1000

Given that table value of $\chi^2_{0.05}$ for 1 d.f. is 3.841

Section D

(2Qx10M=20 Marks)

Question no. 1 has an internal choice.

Q 1 | **10** | **CO3**

Apply method of least square to find:

(i) Regression line of y on x

(ii) Regression line of x on y

(iii) The most probable value of y, when x is 10.

x	1	2	3	4	5
y	2	5	3	8	7

OR

The following table gives the score obtained by 11 students in Statistics and Physics. Find the coefficient of rank correlation.

Scores in Statistics	40	46	54	60	70	80	82	85	85	90	95
Scores in Physics	45	45	50	43	40	75	55	72	65	42	70

Q 2 | **10** | **CO4**

The body length of fishes of a species was obtained from two ponds. They were measured as follows (in cm.):

Pond A	20	24	20	28	22	20	24	32	24	26
Pond B	12	10	8	10	6	4	14	20	10	6

Test whether the mean difference in total body length between the two ponds of fishes is significant or not.

Tabulated $t_{0.05}$ for 18 degree of freedom is 2.10.