B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

July 2023 Semester End Main Examinations

Programme: B.E.   Semester: VI
Branch: Medical Electronics Engineering   Duration: 3 hrs.
Course Code: 19ML6PE3CD   Max Marks: 100
Course: Clinical Data Analytics   Date: 17.07.2023

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

			UNIT - I	CO	PO	Marks
1	a)		Elucidate the features of various measurement scales used in biostatistics.	CO1	PO3	**08**
	b)		A researcher studied 13 HIV-positive patients who were treated with highly active antiretroviral therapy for at least 6 months. The CD4 T cell counts ($X\ 10^6$/L) at baseline for the 13 subject are listed below.	CO1	PO3	**08**

230	205	313	207	227	245	173
58	103	181	105	301	169	

Compute i) the mean   ii) the median   iii) the mode and iv) the range.

				CO	PO	Marks
	c)		Given the binomial parameters p=0.8 and n=3, show by means of the binomial expansion that $\sum f(x) = 1$.	CO1	PO3	**04**
			OR			
2	a)		Construct a box and whisker plot for the data given below.	CO1	PO3	**08**

0.5	1.2	2.1	2.5	2.5	2.5
3.0	3.8	4.0	4.2	4.5	4.5
5.0	5.0	5.0	5.0	5.0	6.0
6.5	7.0	8.0	9.5	9.5	13.0

				CO	PO	Marks
	b)		In the study of a certain aquatic organism, a large number of samples were taken from a pond, and the number of organisms in each sample was counted. The average number of organisms per sample was found to be two. Assuming that the number of organisms follows a Poisson distribution, i) Find the probability that the next sample taken will contain one or fewer organisms. ii) Find the probability that the next sample taken will contain three organisms. iii)Find the probability that the next sample taken will contain more than five organisms.	CO1	PO3	**06**

		c)	State the properties of t-distribution. (Any six)	CO1	PO3	**06**
			UNIT - II			
	3	a)	Explain the three main study designs.	CO2	PO4	**09**
		b)	Referring to the OC_MI data in the table below, provide a point estimate and a 95%CI for the difference between the proportion of women who develop MI among OC users and the comparable proportion among non-OC users.	CO2	PO4	**08**
		c)	What is called power of the study and its significance?	CO2	PO4	**03**
			UNIT - III			
	4	a)	Examine the steps involved in the hypothesis testing procedure.	CO3	PO3	**05**
		b)	Explain the types of Errors in Hypothesis Testing.	CO3	PO3	**05**
		c)	Researchers wish to know if the data they have collected provide sufficient evidence to indicate a difference in mean serum uric acid levels between normal individuals and individuals with Down's syndrome. The data consist of serum uric readings on 12 individuals with Down's syndrome and 15 normal individuals. The means are x_1=4.5mg/100 ml and x_2=3.4mg/100ml. Assume α=0.05.	CO3	PO3	**10**
			OR			
	5	a)	The goal of a study by a group of researchers was to determine how symptom recognition and perception influence clinical presentation as a function of race. They characterized symptoms and care-seeking behavior in Indo-American patients with chest pain seen in the emergency department. One of the presenting vital signs was systolic blood pressure. Among 157 Indo-American men, the mean systolic blood pressure was 146mm Hg with a standard deviation of 27. On the basis of these data, can you conclude that the mean systolic blood pressure for a population of Indo-American men is greater than 140?	CO3	PO3	**10**
		b)	Daniel et al. performed a study to validate a translated version of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) questionnaire used with Spanish-speaking patients with hip or knee osteoarthritis. For the 76 women classified with severe hip pain, the WOMAC mean function score (on a scale from 0 to 100 with a higher number indicating less function) was 70.7 with a standard	CO3	PO3	**10**

Table for question 3 b):

	MI incidence over 3 years		
OC-use group	Yes	No	Total
Current OC users	13	4987	5000
Never-OC users	7	9993	10,000
Total	20	14,980	15,000

deviation of 14.6. We wish to know if we may conclude that the mean function score for a population of similar women subjects with severe hip pain is less than 75.(α=0.01).

UNIT - IV

6	a)	Memory capacity of students was tested before and after giving the nourishing food (CHAVANPRASH). State whether CHAVANPRASH was effective or not from the following scores. The value of $t_{0.05}$ for 9 d.f. = 2.26.	CO3	PO3	10

Roll No	1	2	3	4	5	6	7	8	9	10
Before	12	14	11	8	7	10	3	0	5	6
After	15	16	10	7	5	12	10	2	3	8

	b)	From the table given below, find whether the colour of son's eyes is associated with that of father's eyes. The tabulated value using chi-square test for α =0.05 is 3.84.	CO3	PO3	10

		Eye's colour in sons	
		No light	light
Eye's colour in fathers	No light	230	148
	light	151	471

UNIT - V

7	a)	For 5 patients, temperature(X) and pulse (Y) are given in the table below. Find the correlation of coefficient for these two measurements and indicate the nature of correlation.	CO3	PO3	08

Patient	Temperature	Pulse Y
A	102	100
B	101	90
C	100	80
D	99	70
E	98	60

	b)	Ten competitors in a dance competition were ranked by two judges in the following order:	CO3	PO3	08

Judges	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
Rank by 1st judge	1	4	8	9	6	10	7	3	2	5
Rank by 2nd judge	4	8	7	5	9	6	10	2	3	1

Calculate coefficient of rank correlation.

	c)	Differentiate positive and negative correlation using dot diagram.			04

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