Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2025

Sixth Semester

Biomedical Engineering

BM3651 Fundamentals of Healthcare analytics

(Use of F - Table, Chi Square Table is permitted)

Regulations - 2021

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BLT	CO	Marks
1.	State any two applications of computers in biostatistical analysis.	L1	1	2
2.	Calculate the odds ratio from a given 2x2 contingency table.	L2	1	2
3.	Define p-value in the context of hypothesis testing.	L1	2	2
4.	Write a R/Python function name used for performing a Chi-square test.	L2	2	2
5.	Write an R/Python command to calculate a simple linear regression of y on x.	L1	3	2
6.	Using the equation y = 2 + 1.5x, find the predicted value of y when x = 4.	L2	3	2
7.	What is the primary purpose of META analysis in research?	L1	4	2
8.	How does a randomized complete block design (RCBD) differ from CRD?	L2	4	2
9.	Give one example of how epidemiological data is used in community health planning.	L2	5	2
10.	What type of graph is commonly used to represent lung function data?	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No		Questions	BLT	CO	Marks
11.	a	Explain the concepts of probability, likelihood, and odds with suitable examples. Differentiate these terms mathematically and conceptually.	L2	1	16
		Or			
	b	Using R or Python, demonstrate how to determine the type of distribution for a given dataset. Include data visualization and statistical tests.	L2	1	16
12.	a	Discuss the computation of test statistics in hypothesis testing. Explain the importance of the level of significance (α)	L2	2	16

			and its impact on Type I and Type II errors.			
			Or			
	b		Discuss how to test a single population variance using the Chi-square distribution. Compare this with the test of homogeneity. Provide an example for using R or Python.	L2	2	16
13.	a	i	Define correlation and distinguish between positive, negative, and no correlation. Derive the Pearson correlation coefficient (r) from a given dataset.	L3	3	10
		ii	Use R or Python to calculate the coefficient and visualize the relationship using a scatter plot.	L3	3	6
			Or			
	b		With the help of an appropriate dataset, perform both linear regression and correlation analysis using R or Python. Include steps for data import.	L3	3	16
14.	a		Explain the structure and assumptions of a Completely Randomized Design. Given the following dataset of three treatments with replication, perform ANOVA manually and verify using R or Python. Interpret the results.	L4	4	16
			Or			
	b		Describe the layout and statistical advantages of a randomized complete block design. Use the following data with 3 treatments across 4 blocks. Perform the ANOVA manually and validate with R or Python.	L4	4	16
15.	a		Explain the principles behind CT and MRI imaging techniques. Compare and contrast their applications in medical diagnostics. Provide a case study where MRI/CT was used to detect a neurological condition.	L5	5	16
			Or			
	b		Describe the fundamentals of ECG signal interpretation and its importance in cardiac diagnostics. Using a case study, explain how abnormal ECG patterns such as arrhythmia or myocardial infarction are identified.	L5	5	16