M.Sc. DEGREE EXAMINATION, APRIL 2024
BIOTECHNOLOGY
SECOND SEMESTER

COURSE　　　　　：　CORE
PAPER　　　　　 ：　RESEARCH METHODOLOGY
SUBJECT CODE　 ：　23BY/PC/RM24
TIME　　　　　　：　3 HOURS　　　　　　　　　MAX. MARKS: 100

Q. No.	SECTION A　　　(10 x 1 = 10 marks) **Answer ALL Questions**	CO	KL
1	Define research.	1	1
2	What is the main significance of research methodology?	1	1
3	Recall the elements of scientific report.	1	1
4	Name the different types of plagiarism.	1	1
5	Compare population and sample.	1	1
6	List out the difference between primary and secondary data.	1	1
7	Find out the value of median from the following data, _____. 1100, 1150, 1080, 1120, 1200, 1160, 1400. (a) 100 (b)1150 (c)1400 (d) 1340.	1	1
8	Write down the expression for standard deviation.	1	1
9	The Student's t test is (a) a parametric test (b) a nonparametric test (c) a test for comparing averages (d) a test for comparing variances	1	1
10	When chi-square test is used?	1	1
Q. No.	SECTION – B　　　(5 x 2 = 10 marks) **Answer ALL Questions**	CO	KL
11	Explain research problem.	2	2
12	Illustrate the features of random sampling.	2	2
13	Interpret the various methods of statistical data collection.	2	2
14	Outline and expand the formula used in Karl Pearson's Correlation coefficient.	2	2
15	Compare and contrast one way and two-way ANOVA.	2	2

Q. No.	SECTION C (4 x 10 = 40 marks) Answer ALL Questions	CO	KL
16a	Identify the essential steps required for the collection of research data.		
	(or)	3	3
16b	Construct the funding agencies in India for research project in science and technology.		
17a	Develop a protocol for preparing an effective oral presentation.		
	(or)	3	3
17b	Build a brief account on the various methods of sampling.		

18a Analyze the standard deviation for the following data,

x	18	19	20	21	22	23	24	25	26	27
f	3	7	11	14	18	17	13	8	5	4

(or)

18b Discover the mean, median and mode from the following frequency distribution, which gives the age of first walking of infants in a locality,

Age in months	No of Infants
8-8.9	1
9-9.9	9
10-10.9	20
11-11.9	29
12-12.9	60
13-13.9	32
14-14.9	30
15-15.9	14
16-16.9	8
17-17.9	1

CO 4, KL 4

19a Categorize the procedure for testing of hypothesis.

(or)

19b Examine whether there is any significant difference in the pod length of the two varieties. The following data pertains to pod length (in cms) in 2 varieties of Bengal gram,(P-0.05,df 18, t=2.10)

Varieties	Pod Length (cm)									
A	6.2	6.7	4.8	5.9	4.9	5.4	5.0	7.1	6.9	6
B	4.9	5.8	6.1	6.3	6.9	6.5	5.6	5.3	7.0	6.8

CO 4, KL 4

Q. No.	SECTION – D (2 x 20 = 40 marks) Answer ALL Questions	CO	KL
20a	Explain in detail the different types of research and the differences between research methods and methodology.		
	(or)		
20b	Evaluate the following data of yield of tomato and potato in 5 places, find out the two regression equations. What is the probable yield of potato, when the yield of tomato happens to be 150kg?	5	5

Tomato (X)	60	20	10	40	80
Potato(Y)	90	60	50	80	120

Q. No.		CO	KL
21a	A certain manure was used on four plots of land A, B, C and D. Four beds were prepared in each plot and the manure used. The output of the crop in the beds of plot A, B, C and D is given below: P(5%), (Df 3; 12) (f= 3.49)		

A	B	C	D
8	9	15	6
12	3	10	8
1	7	4	10
3	1	7	8

Q. No.		CO	KL
	Predict whether the difference in the means of the production of crops of the plot is significant or not.	5	6
	(or)		
21b	Elaborate the various tools in MS Excel used for statistical data analysis.		

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