MALLA REDDY UNIVERSITY

SCHOOL OF ALLIED AND HEALTHCARE SCIENCES

M.Sc. I Year II Semester

Subject:Research Methodology & Biostatistics

This is a common syllabus and a common question bank for AOTT, CBC, CLM, CND, CREM, CVT, EMCCT, MBT, MLT, OPTOMETRY, and RIT.

Duration: **2 Hours** Max. Marks: **40M**

S. No	Questions	Marks	Section	Unit
1	Define research methodology and explain its significance in scientific studies.	**8**	**Section-I**	**1**
2	What are the characteristics of good research? Illustrate with examples.	**8**	**Section-I**	**1**
3	Describe the techniques involved in defining a research problem.	**8**	**Section-I**	**1**
4	List and explain the various types of research, highlighting their unique features.	**8**	**Section-I**	**1**
5	What is a hypothesis? Discuss the difference between null and alternative hypotheses.	**8**	**Section-I**	**1**
6	a) Explain the objectives of research. b) Discuss the criteria that determine good research.	**8**	**Section-I**	**1**
7	a) Define descriptive research and explain its types with examples. b) How does analytical research differ from descriptive research?	**8**	**Section-I**	**1**
8	a) Outline the steps involved in writing research questions. b) How does formulating a research problem contribute to the success of a study?	**8**	**Section-I**	**1**
9	a) Discuss the types of hypotheses with examples.	**8**	**Section-I**	**1**

	b) Explain the procedure of hypothesis testing.			
10	a) Highlight the significance of research in clinical and life sciences. b) Explain the role of research in public health with examples.	**8**	**Section-I**	**1**
11	Define research design and explain the features of a good research design.	**8**	**Section-II**	**2**
12	Describe the types of informal experimental designs with examples.	**8**	**Section-II**	**2**
13	What are probability sampling techniques? Briefly explain stratified and clustered sampling.	**8**	**Section-II**	**2**
14	Explain the sources of errors in measurement and their impact on research outcomes.	**8**	**Section-II**	**2**
15	Discuss the importance of data quality and integrity in research, highlighting methods to ensure it.	**8**	**Section-II**	**2**
16	a) Differentiate between primary and secondary data with examples. b) Explain methods of collecting primary data using observation and interviews.	**8**	**Section-II**	**2**
17	a) Outline the steps involved in determining sample size for a research study. b) Discuss the advantages and limitations of simple random sampling.	**8**	**Section-II**	**2**
18	a) Define measurement and scaling techniques in research. b) Explain the scale construction techniques: arbitrary and cumulative scales.	**8**	**Section-II**	**2**
19	a) What are formal experimental designs?	**8**	**Section-II**	**2**

	Explain the completely randomized and Latin square designs. b) How does factorial design differ from other experimental designs?			
20	a) Discuss the factors influencing the selection of a suitable data collection method. b) Explain the process of checking errors in data and ensuring data reliability.	**8**	**Section-II**	**2**
21	Define statistics and differentiate between descriptive and inferential statistics.	**8**	**Section-III**	**3**
22	Explain the measures of central tendency and their appropriate applications in data analysis.	**8**	**Section-III**	**3**
23	What is the significance of skewness and kurtosis in the analysis of data symmetry?	**8**	**Section-III**	**3**
24	Define correlation and discuss the types of correlation with examples.	**8**	**Section-III**	**3**
25	Describe the properties of probability and explain the significance of probability distributions.	**8**	**Section-III**	**3**
26	a) Define variance, standard deviation, and interquartile range as measures of variability. b) Discuss the importance of variability measures in statistical analysis.	**8**	**Section-III**	**3**
27	a) What is a normal distribution? Explain its key properties. b) Describe the process of calculating probabilities and percentage points from a	**8**	**Section-III**	**3**

	normal distribution.			
28	a) Define regression and explain the concept of a simple linear regression. b) How are regression equations used for making predictions?	**8**	**Section-III**	**3**
29	a) Discuss the significance of the coefficient of correlation and its interpretation. b) Differentiate between Pearson's correlation and Kendall rank correlation coefficient.	**8**	**Section-III**	**3**
30	a) Explain the differences between normal, binomial, and Poisson distributions. b) Provide real-world examples where each distribution would be appropriately applied.	**8**	**Section-III**	**3**
31	What is the role of contingency tables in data analysis, and how are P-values derived from them?	**8**	**Section-IV**	**4**
32	Explain the difference between statistical significance and clinical/experimental significance.	**8**	**Section-IV**	**4**
33	Define hypothesis testing and describe its importance in statistical inference.	**8**	**Section-IV**	**4**
34	What is the Chi-square test, and how is it calculated?	**8**	**Section-IV**	**4**
35	Describe the purpose of one-way ANOVA and its applications in data analysis.	**8**	**Section-IV**	**4**
36	a) Differentiate between the t-test for two independent means and the t-test for paired (matched) data.	**8**	**Section-IV**	**4**

	b) Provide examples of scenarios where each type of t-test is appropriate.			
37	a) What is the z-test for two independent proportions? b) Explain how the z-test differs from the Chi-square test in hypothesis testing.	**8**	**Section-IV**	**4**
38	a) Describe the F-test and its use in statistical analysis. b) How does the F-test differ from the Wilcoxon two-sample signed rank test?	**8**	**Section-IV**	**4**
39	a) Explain the McNemar's test for paired proportions. b) Describe the Wilcoxon matched pairs test and its application.	**8**	**Section-IV**	**4**
40	a) What is two-way ANOVA, and how does it differ from one-way ANOVA? b) Explain the components of an ANOVA table and their significance in data analysis.	**8**	**Section-IV**	**4**
41	Explain the role of statistical software in data analysis and discuss the features of SPSS and SAS.	**8**	**Section-V**	**5**
42	Describe the various types of diagrammatic representations of data and their applications.	**8**	**Section-V**	**5**
43	What are the general rules of tabulation, and how are tables used to summarize data?	**8**	**Section-V**	**5**
44	Define a thesis and outline the steps involved in writing one.	**8**	**Section-V**	**5**
45	Explain the significance of citation index, impact factor, and ISBN/ISSN in research reporting.	**8**	**Section-V**	**5**
46	a) Differentiate between bar diagrams and pie	**8**	**Section-V**	**5**

	diagrams in data representation. b) Describe the importance of box diagrams and frequency polygons in graphical analysis.			
47	a) Discuss the structure of an original research report. b) Explain how abstracts and keywords are written effectively for research articles.	**8**	**Section-V**	**5**
48	a) What are plagiarism and its consequences in research? b) Explain the role of ethics committees in clinical and laboratory studies.	**8**	**Section-V**	**5**
49	a) Define intellectual property rights and discuss the significance of patents in research. b) Differentiate between copyrights and plagiarism in the context of academic integrity.	**8**	**Section-V**	**5**
50	a) What is a histogram, and how does it differ from a line diagram? b) Explain the components and uses of a periodic report in research documentation.	**8**	**Section-V**	**5**