Q.P.Code 0005330 7

	S. Y.BSc in Biotechnology Sem III examination Model Answers Biotechnology – Research Methodology	
Q 1	**Do as directed (Any fifteen)**	**15**
1.	Define Research. a careful investigation or inquiry specially through search for new facts in any branch of knowledge/ systematized effort to gain new knowledge/ research is a movement, a movement from the known to the unknown/ It is manipulation of things, concepts or symbols for the purpose of generalising to extend, correct or verify knowledge, whether that knowledge aids in construction of theory or in the practice of an art.	
2.	Research methodology	
3.	Qualitative or Quantitative	
4.	Universe or population	
5.	True	
6.	Sample Design	
7.	**State any one advantage of case study method.** 1. Being an exhaustive study of a social unit, the case study method enables us to understand 2. a researcher can obtain a real and enlightened record of personal experiences 3. enables the researcher to trace out the natural history of the social unit. 4. It helps in formulating relevant hypotheses along with the data which may be helpful in testing them. 5. The method facilitates intensive study of social units which is generally not possible **(any one point 1 mark or any other relevant point other than mentioned above)**	
8.	Extraneous variables	
9.	**Define research design** It is the designing of a research project and involves arrangement of conditions for collection and analysis of data needed for the research.	
10.	**State any one demerit of mailing questionnaires to respondents as a method for data collection (any one point – 1 mark)** Low rate of return of the duly filled in questionnaires; bias due to no-response is often indeterminate./ It can be used only when respondents are educated and cooperating./ The control over questionnaire may be lost once it is sent./ There is inbuilt inflexibility because of the difficulty of amending the approach once questionnaires have been despatched./ There is also the possibility of ambiguous replies or omission of replies altogether to certain questions; interpretation of omissions is difficult. / It is difficult to know whether willing respondents are truly representative. /This method is likely to be the slowest of all.	

11.	State True or False: Store audit is a method of data collection True	
12.	State True or False: When a particular group is exposed to specific conditions then the group is termed as control group False	
13.	The different conditions under which experimental and control groups are put are referred to as **Treatments.**	
14.	~~One significance of Interpretation~~. OBSERVATION METHOD, INTERVIEW, QUESTIONNAIRES, SCHEDULES.	
15.	What is Report writing? (any relevant meaning – 1 mark) It is a systematic organization of data	
16.	Final Draft	
17.	**Any one precaution of writing research reports. (any one point – 1 mark)** • While determining the length of the report (since research reports vary greatly in length), one should keep in view the fact that it should be long enough to cover the subject but short enough to maintain interest. In fact, report-writing should not be a means to learning more and more about less and less. • A research report should not, if this can be avoided, be dull • Abstract terminology and technical jargon should be avoided in a research report • Readers are often interested in acquiring a quick knowledge of the main findings and as such the report must provide a ready availability of the findings. • The layout of the report should be well thought out and must be appropriate and in accordance with the objective of the research problem. • The reports should be free from grammatical mistakes and must be prepared strictly in accordance with the techniques of composition of report-writing • The report must present the logical analysis of the subject matter. • A research report should show originality and should necessarily be an attempt to solve some intellectual problem. • Appendices should be enlisted in respect of all the technical data in the report. • Bibliography of sources consulted is a must for a good report and must necessarily be given. • Index is also considered an essential part of a good report and as such must be prepared and appended at the end. • Report must be attractive in appearance, neat and clean, whether typed or printed. • Calculated confidence limits must be mentioned and the various constraints experienced in conducting the research study may also be stated in the report. Objective of the study, the nature of the problem, the methods employed and the analysis techniques adopted must all be clearly stated in the beginning of the report in the form of introduction.	
18.	Report Writing	

19.	True	
20.	**What is Bibliography?** The bibliography, which is generally appended to the research report, is a list of books in some way pertinent to the research which has been done. It should contain all those works which the researcher has consulted.	
Q. 2 A	**Discuss the Criteria of good research. (one 4 points with explanation – 2 marks each)** 1. The purpose of the research should be clearly defined and common concepts be used. 2. The research procedure used should be described in sufficient detail to permit another researcher to repeat the research for further advancement, keeping the continuity of what has already been attained. 3. The procedural design of the research should be carefully planned to yield results that are as objective as possible. 4. The researcher should report with complete frankness, flaws in procedural design and estimate their effects upon the findings. 5. The analysis of data should be sufficiently adequate to reveal its significance and the methods of analysis used should be appropriate. The validity and reliability of the data should be checked carefully. 6. Conclusions should be confined to those justified by the data of the research and limited to those for which the data provide an adequate basis. 7. Greater confidence in research is warranted if the researcher is experienced, has a good reputation in research and is a person of integrity. 8. Good research is systematic 9. Good research is logical 10. Good research is empirical 11. Good research is replicable	**08**
Q. 2 B	**Explain research process in detail. (all Steps to be mentioned and briefly explained– 7 marks)** The following order concerning various steps provides a useful procedural guideline regarding the research process: (1) formulating the research problem; (2) extensive literature survey; (3) developing the hypothesis; (4) preparing the research design; (5) determining sample design; (6) collecting the data; (7) execution of the project; (8) analysis of data; (9) hypothesis testing; (10) generalisations and interpretation, and (11) preparation of the report or presentation of the results, i.e., formal write-up of conclusions reached.	**07**
	OR	
Q. 2 C	**Distinguish between Research methods and Research methodology. (Meaning of Research methods and research methodology – 1 mark each; detailed comparison – 5 marks)** Research methods may be understood as all those methods/techniques that are used for conduction of research. Research methods or techniques*, thus, refer to the methods the researchers use in performing research operations. In other words, all those methods	**08**

	which are used by the researcher during the course of studying his research problem are termed as research methods. Since the object of research, particularly the applied research, it to arrive at a solution for a given problem, the available data and the unknown aspects of the problem have to be related to each other to make a solution possible. Research methodology is a way to systematically solve the research problem. It may be understood as a science of studying how research is done scientifically. In it we study the various steps that are generally adopted by a researcher in studying his research problem along with the logic behind them. It is necessary for the researcher to know not only the research methods/techniques but also the methodology. Research methodology has many dimensions and research methods do constitute a part of the research methodology. The scope of research methodology is wider than that of research methods. Thus, when we talk of research methodology we not only talk of the research methods but also consider the logic behind the methods we use in the context of our research study and explain why we are using a particular method or technique and why we are not using others so that research results are capable of being evaluated either by the researcher himself or by others. Why a research study has been undertaken, how the research problem has been defined, in what way and why the hypothesis has been formulated, what data have been collected and what particular method has been adopted, why particular technique of analysing data has been used and a host of similar other questions are usually answered when we talk of research methodology concerning a research problem or study.	
Q. 2 D	**Explain the significance of research in modern times. (example with explanation – 7 marks)** 1. The role of research in several fields of applied economics, whether related to business or to the economy as a whole, has greatly increased in modern times. 2. Research provides the basis for nearly all government policies in our economic system. 3. Research has its special significance in solving various operational and planning problems of business and industry. 4. Research is equally important for social scientists in studying social relationships and in seeking answers to various social problems. 5. To those students who are to write a master's or Ph.D. thesis, research may mean a 6. careerism or a way to attain a high position in the social structure; 7. To professionals in research methodology, research may mean a source of livelihood; 8. To philosophers and thinkers, research may mean the outlet for new ideas and insights; 9. To literary men and women, research may mean the development of new styles and creative work 10. To analysts and intellectuals, research may mean the generalisations of new theories.	**07**
Q. 3 A	**Discuss the essentials of a good questionnaire. (description with example – 8 marks)**	**08**

	Essentials of a good questionnaire. To be successful, questionnaire should be comparatively short and simple i.e . the size of the questionnaire should be kept to the minimum. Questions should proceed in logical sequence moving from easy to more difficult questions. Personal and intimate questions should be left to the end. Technical terms and vague expressions capable of different interpretations should be avoided in a questionnaire. Questions may be dichotomous (yes or no answers), multiple choice (alternative answers listed) or open-ended. The latter type of questions are often difficult to analyse and hence should be avoided in a questionnaire to the extent possible. There should be some control questions in the questionnaire which indicate the reliability of the respondent. For instance, a question designed to determine the consumption of particular material may be asked first in terms of financial expenditure and later in terms of weight. The control questions, thus, introduce a cross-check to see whether the information collected is correct or not. Questions affecting the sentiments of respondents should be avoided. Adequate space for answers should be provided in the questionnaire to help editing and tabulation. There should always be provision for indications of uncertainty, e.g . "do not know," "no preference" and so on. Brief directions with regard to filling up the questionnaire should invariably be given in the questionnaire itself. Finally, the physical appearance of the questionnaire affects the cooperation the researcher receives from the recipients and as such an attractive looking questionnaire, particularly in mail surveys, is a plus point for enlisting cooperation. The quality of the paper, along with its colour, must be good so that it may attract the attention of recipients.	
Q. 3 B	State the merits and demerits of collecting data through telephonic interview. **Telephonic interview introduction (1mark) Merits- 3 marks (any 6 points), Demerits-3 marks (any 6 points)**	**07**
	OR	
Q. 3 C	Enlist the advantages and limitations of case study methods. **Advantages (any four-1 mark each), Limitations (any four-1 mark each)**	**08**
Q. 3 D	Explain merits and demerits of observation method for collection of data Introduction- This method implies the collection of information by way of investigator's own observation (1mark) Merits – (no subjective bias, not dependent on respondent's response, observation based on current observation, useful in methods wherein subjects are not capable of giving verbal reports (explanation of any 3 points- 1 mark each) Demerits- expensive, limited information, external factors influencing data, inaccessibility of people for data collection (explanation of any three-1 mark each)	**07**
Q. 4 A	**What is interpretation? Add a note on significance of interpretation.** **(Meaning – 1 mark; Significance – 7 marks)** (i) Interpretation is essential for the simple reason that the usefulness and utility of research findings lie in proper interpretation. It is being considered a basic component of research process because of the following reasons: (ii) It is through interpretation that the researcher can well understand the abstract principle that works beneath his findings. Through this he can link up his findings with those of other studies, having the same abstract principle, and thereby can predict about the concrete world of events. Fresh inquiries can test these predictions later on. This way the continuity in research can be maintained. (iii) Interpretation leads to the establishment of explanatory concepts that can serve as a guide for future research studies (iv) It opens new avenues of intellectual adventure and stimulates the quest for more knowledge.	**08**

	(v) Researcher can better appreciate only through interpretation why his findings are what they are and can make others to understand the real significance of his research findings. (vi) The interpretation of the findings of exploratory research study often results into hypotheses for experimental research and as such interpretation is involved in the transition from exploratory to experimental research. (vii) Since an exploratory study does not have a hypothesis to start with, the findings of such a study have to be interpreted on a *post-factum* basis in which case the interpretation is technically described as '*post factum*' interpretation.	
Q. 4 B	**Give a detailed account on types of research reports. (each type explanation in detail - 3.5 marks each)** (A) Technical Report In the technical report the main emphasis is on (i) the methods employed, (it) assumptions made in the course of the study, (iii) the detailed presentation of the findings including their limitations and supporting data. (B) Popular Report The popular report is one which gives emphasis on simplicity and attractiveness. The simplification should be sought through clear writing, minimization of technical, particularly mathematical, details and liberal use of charts and diagrams.	**07**
	OR	
Q. 4 C	**Explain the layout of the research report.** Comprehensive layout of the research report should comprise 1. preliminary pages – 2marks 2. The main text – 4 marks • Introduction; • Statement of findings and recommendations; • The results; • The implications drawn from the results • The summary. 3. The end matter. – 2 marks	**08**
Q. 4 D	**Explain the precaution to be taken while doing interpretation of results.(7 points - 1 mark each)** 1. At the outset, researcher must invariably satisfy himself that (a) the data are appropriate, trustworthy and adequate for drawing inferences; (b) the data reflect good homogeneity; and that (c) proper analysis has been done through statistical methods. 2. The researcher must remain cautious about the errors that can possibly arise in the process of interpreting results. 3. The researcher must remain vigilant 4. He should be well equipped with and must know the correct use of statistical measures for drawing inferences concerning his study. 5. He must always keep in view that the task of interpretation is very much intertwined with analysis and cannot be distinctly separated. 6. He must never lose sight of the fact that his task is not only to make sensitive observation of relevant occurrences, but also to identify and disengage the factors that are initially hidden to the eye.	**07**

	7. Broad generalisation should be avoided as most research is not amenable to it because the coverage may be restricted to a particular time, a particular area and particular conditions. 8. The researcher must remember that "ideally in the course of a research study, there should be constant interaction between initial hypothesis, empirical observation and theoretical conceptions. He must pay special attention to this aspect while engaged in the task of interpretation.	
Q 5	Write Short notes on **any three** of the following	**15**
a.	**Technique for defining a problem – 1 mark each** The technique for the purpose involves the undertaking of the following steps generally one after the other: (i) statement of the problem in a general way; (ii) understanding the nature of the problem; (iii) surveying the available literature (iv) developing the ideas through discussions; and (v) rephrasing the research problem into a working proposition.	
b.	**Any 2 types of research (any 2 types explained in detail – 2.5 marks each)** Descriptive/ Analytical/ Applied/ Fundamental/ Quantitative/ Qualitative/ Conceptual/ Empirical/ field-setting research/ laboratory research/ simulation research/ one-time research/ longitudinal research/ clinical/ diagnostic research/ Historical research	
c.	**Experimental and control groups in research** In an experimental hypothesis-testing research when a group is exposed to usual conditions, it is termed a 'control group', but when the group is exposed to some novel or special condition, it is termed an 'experimental group'. (2 marks) Explanation with an example **(3 marks)**	
d.	**Collection of data through schedules** **Explanation of collection method (3 marks), Method Merit (1 mark), demerit (1mark)** Under this method the enumerators are appointed and given training. They are provided with schedules containing relevant questions. These enumerators go to respondents with these schedules. Data are collected by filling up the schedules by enumerators on the basis of replies given by respondents. This method of data collection is very useful in extensive enquiries and can lead to fairly reliable results. It is, however, very expensive and is usually adopted in investigations conducted by governmental agencies or by some big organisations. Population census all over the world is conducted through this method.	
e.	**Significance of report (5 marks)** Research is incomplete till the report has been presented and/or written. As a matter of fact even the most brilliant hypothesis, highly well designed and conducted research study, and the most striking generalizations and findings are of little value unless they are effectively communicated to others. The purpose of research is not well served unless the findings are made known to others. Research results must invariably enter the general store of knowledge. All this explains the significance of research report.	