

GUJARAT TECHNOLOGICAL UNIVERSITY
Ph.D. COURSE WORK EXAMINATION – 2024 (REGULAR)

Subject Code: PHD2301**Date: 01/09/2024****Subject Name: Research Methodology_Pharmacy & Biotechnology****Time: 01:30 PM – 04:30 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a) Match the following : 10**
- | | |
|--------------------------|---|
| a) Basic research | i) Research that aims to explain characteristic of population of phenomenon |
| b) Deductive research | ii) Research that aims to understand the relationship between variables |
| c) Qualitative research | iii) Research that involves manipulation of variable to determine cause and effect relationship |
| d) Longitudinal research | iv) Research conducted over a long period of time to observe changes |
| e) Analytical research | v) Research that explore phenomena through the collection of non-numerical data like interviews, observations and open ended surveys. |
| f) Exploratory research | vi) Research approach that starts with a general theory or hypothesis and then test it through specific observations and experiments. |
| g) Quantitative research | vii) Research that aimed at expanding knowledge without immediate practical application |
| h) Descriptive research | viii) Research that involves the collection and analysis of numerical data to identify patterns, test hypothesis and make prediction. |
| i) Applied research | ix) Research aimed at solving practical problems |
| j) Experimental research | x) Research conducted to explore a problem or issue when there are few or no earlier studies to refer to. |
- (b) Describe various graphs and charts. Discuss charts and graphs suitable to report your proposed research findings. 10**
- Q.2 (a) Mr. Ranch has prepared following document for the research proposal, help Mr. Ranch by rewriting the following paragraph in organized manner. 10**

Drug delivery to the anterior chamber of eye is a very challenging task for scientists, due to the complex anatomy of eye and resistance to foreign substances, including drugs. The conventional eye drop therapy commonly shows low bioavailability to target ocular tissue, due to various pre-corneal loss factors, such as tearing and blinking (tear dynamics), non-productive absorption through conjunctiva, nasolacrimal drainage and also due to low permeability of the corneal membrane. High-dosing frequency exaggerates the side effects and reduces patient compliance, especially in treatment of chronic diseases like glaucoma and dry eye syndrome. At present, majority of the ocular medications are instilled topically either through eye drop solutions or suspensions. Thus, due to physiological and anatomical restrictions, the eye drop solution shows a reduced-drug residence time of 1–3 minutes in the tear film and consequently a very-low bioavailability of 1–3%. To compensate for the low bioavailability, clinicians are forced to prescribe eye drops with frequent doses at high-drug loading, to attain desired therapeutic drug level at the target tissue.

The ideal drug delivery system delivers a required amount of drug to the ocular tissue with comfort, easy to administer, and does not interfere with vision or normal eye functioning. In this context, therapeutic contact lenses have been proposed for controlled and sustained ocular drug delivery, due to their unique properties like extended wear and more than 50% bioavailability in comparison to eye drop formulation. To overcome the limitations associated with conventional eye drop therapy, novel delivery systems and devices have been explored by many researchers. The high drug residence time increases the bioavailability up to 50%, which eventually reduces the dose, dosing frequency, systemic drug absorption and its associated side effects. Drug releases from therapeutic contact lenses in pre- and post-lens tear film, leading to a residence time of more than 30 minutes, in comparison to just 1–3 minutes for eye drop solutions. There are many innovations on therapeutic contact lenses to treat anterior ocular diseases which uses soaking method, molecular imprinting, entrapment of drug-laden colloidal nanoparticles, drug plate, ion ligand polymeric systems, supercritical fluid technology, etc. Scientists do achieve controlled and sustained drug delivery using contact lenses, but the critical properties such as swelling, storage modulus, ion permeability, transparency and oxygen permeability was affected, thus limiting the use of therapeutic contact lenses.

- (b) Prepare a draft project proposal for funding based on your proposed research. 10
- or**
- (a) Differentiate parametric and non-parametric statistical tests. Discuss methods to study correlation between variables of your research work. Explain the interpretation of correlation coefficient. 10
- (b) Explain type-I and type-II errors in hypotheses testing. Discuss the significance of p-value and degrees of freedom. How will you reduce the type-I and type-II error? 10
- Q.3** (a) Design an unstructured questionnaire for collecting data related to your research problem from an expert in the field, making suitable assumption wherever needed. Also Criticize the drawback of using this method over a structured method of data collection (Note: Please specify your research problem of PhD, give a brief backdrop of expertise of the expert being interviewed, and then mention the set of questions in unstructured format) 05
- (b) Describe briefly how you have identified research gap for your Ph. D. work. Write general and specific objectives related to your Ph.D. work 05
- Q.4** (a) Rewrite the following citation as per APA 05
- Asim, Mulazim Hussain, et al. "Per-6-thiolated cyclodextrins: a novel type of permeation enhancing excipients for BCS class IV drugs." *ACS applied materials & interfaces* 12.7 (2020): 7942-7950.
 - Mannava MC, Garai A, Bommaka MK, Solomon KA, Nangia AK. Solubility and permeability enhancement of BCS class IV drug ribociclib through cocrystallization. *CrystEngComm*. 2022;24(45):7915-23.
- (b) Design a structured questionnaire having minimum 5 questions for evaluating the effect of excessive screen time on cognitive skills of students (Note: The questionnaire should have an appropriate mixture of open ended, close ended, dichotomous, MCQ , Likert scale, filter or contingency questions etc) 05
- Q.5** (a) Hypothesis, is a “testable statement” justify this statement in context of your research problem. 05
- (b) Based on your proposed research problem of PhD, describe, classify and enlist various primary and secondary sources of information which you have referred, to create your hypothesis. 05
