Enrollment No._____

NAVRACHANA UNIVERSITY
a UGC recognized University

School: School of Science
Program: M.Sc. in Chemistry
Year: 2nd **Semester:** 3rd
Examination: End Semester Examination
Examination year: December - 2021

Course Code: CH252 **Course Name:** Research Methodology

Date: 08/12/2021
Time: 08:30 am to 10:30 am

Total Marks: 40
Total Pages: 3

Instructions:

- *Write each answer on a new page.*
- *Use of a calculator is not required.*
- ** COs=Course Outcome mapping. # BTL=Bloom's Taxonomy Level mapping*

Q. No.	Details	Marks	COs*	BTL#
Q.1	Choose the most appropriate answer A. How is random sampling helpful? a) Reasonably accurate b) An economical method of data collection c) Free from personal biases d) All of the above B. Concepts are ..... of Research a) Guide b) Tools c) Methods d) Variables C. In the process of conducting research 'Formulation of Hypothesis" is followed by a) Statement of Objectives b) Analysis of Data c) Selection of Research Tools d) Collection of Data D. Your colleague is confused about using the dissertation research process, as he knows that some phenomena is there in chemistry but is not sure of the specific causes to investigate. He seems to be having problems with _____, which is often the hardest step to take.	**8**	CO1, CO2, CO3, CO4, CO5	BT1, BT2, BT3, BT4, BT5

	a) Developing the research plan b) Determining a research approach c) Defining the problem and research objectives d) Selecting a research agency E. The existing company information is an example of which data?? a) Primary b) Secondary c) Both a and b d) None of the above F. Which one is called non-probability sampling? a) Quota sampling b) Cluster sampling c) Systematic sampling d) Stratified random sampling G. A complete list of all the sampling units is called: a) Sampling design b) Sampling frame c) Population frame d) Cluster H. Analytical research is the types of research that a) Discovers ways of finding solution of an immediate problem b) Gathers knowledge skill c) Is useful for formulating hypothesis or testing hypothesis d) Analyze the facts or information already available			
Q.2	Match the following		**2**	
	a) Fundamental research	i. Research based on data		CO1, CO2, CO3 BT1, BT2, BT3, BT4
	b) Descriptive research	ii. Gathering knowledge skill		
	c) Qualitative research	iii. Finding solution of an immediate problem		
	d) Applied research	iv. Fact finding enquiry of social events and system		
Q.3	Answer the following in brief **(Any four)** a) Interdisciplinary Research b) Impact Factor c) Extraneous variables d) Haphazard sampling e) Criteria for Good Research		8	CO1, CO2, CO3, CO4, CO5 BT1, BT2, BT3, BT4

Q.4	Explain in detail **(Any three)** A. Significance of literature review B. Peer reviewed journal C. Differentiate between stratified sampling and cluster sampling D. Code of ethics in research/significance of ethics in research. E. i) Research Methods vs Research Methodology ii) Public Research vs Private Research	12	CO1, CO2, CO3, CO4, CO5	BT1, BT2, BT3, BT4
Q.5	Answer the following in detail **(Any one)** A. Describe the Type I and Type II Errors with examples B. What are the prime objectives of Research? Enlist different types of research. Explain at least 4 types of research in brief.	5	CO1, CO2, CO4	BT1, BT2, BT3, BT4, BT5
Q.6	Cite the following journal article in MLA and APA Style Author: Samuel Brown, Volume: 4, Pages: 164-184, Title: Working for the Union, Issue: 1, Journal: Workplace Review, Year: 1995	2	CO1, CO5	BT1, BT2, BT3
Q.7	Read the short communication attached and Draw a schematic of the Research Process in Flow chart. **Fluorescence Determination of Aspirin in APC Tablets** The determination of aspirin, phenacetin, and caffeine in APC tablets according to the procedure of Jones and Thatcher (*1*) is popular as an undergraduate laboratory experiment because it illustrates several principles, including separation by solvent extraction and spectrophotometric analysis of a two-component system. In the original procedure the tablet is dissolved in chloroform and the aspirin is extraction into aqueous Na_2CO_3 solution. The aqueous solution is then acidified so that the aspirin can be back-extracted into chloroform and determined by spectrophotometry. We have modified the procedure so that the aspirin is hydrolyzed to salicylate and determined by fluorescence. This enables us to introduce students to fluorescence methods without adding a separate experiment to our usual sequence. It also reduces the cost of the experiment since the back-extraction is eliminated and less chloroform is required. We have also scaled down the procedure to reduce chloroform consumption. In the modified procedure about 0.1 g of a crushed APC tablet is accurately weighed and dissolved in 20 ml of chloroform. The chloroform is extracted with two 10-ml portions of 1% Na_2CO_3 and one 5-ml portion of water. The Na_2CO_3 solution is then poured into a 50-ml volumetric flask and 20 ml of 0.5 *M* NaOH is added. The high base concentration causes the aspirin to rapidly hydrolyze to salicylate. The solution in the 50-ml volumetric is diluted to the mark with deionized water. One milliliter of this solution is added to a 250-ml volumetric flask and diluted to the mark with 1% Na_2CO_3. A 10 ppm salicylate standard solution is prepared by weighing and diluting salicylic acid. The pH of the standard solution is brought to 11 by adding KOH. The analysis was performed on a Perkin-Elmer Model 204 spectrofluorometer. The salicylate standard is used to set 100% emission and deionized water to set 0% emission. The spectrofluorometer was set for excitation at 310 nm and emission at 435 nm. These are the maximum excitation and emission wavelengths reported in the literature.[2] On the Perkin-Elmer 204, the maxima are shifted to 305 and 405 nm respectively, because spectra are not corrected for variations in source intensity and detector sensitivity with wavelength. The analysis for phenacetin and caffeine was performed as in the original procedure. Four different Empirin® (APC) tablets analyzed by the above procedure were found to contain 0.254, 0.222, 0.211, and 0.217 g of aspirin per tablet, respectively. These values are all within the manufacturer's specifications (0.226 gms/l tablet ± 15%). A separate portion of the fourth tablet was analyzed and found to contain 0.218 g. Thus we feel confident that the above procedure yields satisfactory results. In preliminary experiments with acetylsalicyclic acid it was verified that hydrolysis to salicylate is complete within seconds when the 0.5 *M* NaOH is added to the aspirin containing extracts. [1] Jones, M., and Thatcher, R. L., *Anal. Chem.*, 23, 957 (1951). [2] Udenfriend, S., Duggan, D. E., Vasta, B. M., and Brodie, B. B., *J. Pharmacol. Experimental Therapeutics*, 120, 26 (1957). University of New Hampshire Durham, NH 03824 R. A. Fiigen J. L. Plude W. R. Seitz	3	CO1, CO2, CO3, CO4, CO5	BT1, BT2, BT3, BT4, BT5, BT6

**********End of Question Paper**********