

# **HEMCHAND YADAV VISHWAVIDYALAYA, DURG (C.G.)**

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## **Ph.D. Course Work Syllabus**

### **CHEMISTRY**

**Session 2020-21**

## **PRE - Ph.D. COURSE**

### **COURSE – I**

#### **RESEARCH METHODOLOGY IN CHEMISTRY**

**M.M. - 100**

##### **UNIT-I RESEARCH METHODOLOGY**

Purpose of research; Research project Conceptualization, choice of methods; Elements of a research proposal, operationalization choices and illustrations. Research design: formulation, pre-testing of research instruments and procedures, units of analysis, time dimension. Experimental design and use of indicators in research. Survey Research: Guidelines for asking question and questionnaires construction, Self-administered questionnaires, Interview and other survey methods; their strength and weaknesses. Sampling: the logic of sampling , concepts and terminologies , population and Sampling frames , types of sampling design .Field studies : steps in the conducting field study ; evaluation research: how to carry out evaluation research , Patent and IPR.

##### **UNIT-II LITERATURE SEARCH TECHNIQUE**

IUPAC rule for nomenclature –Introduction to chemical abstracts –Subject Index, Substance Index, Author Index, Formula Index and other indices-Uses of these indices with examples- current contents –organization –methods of using the titles and index – other similar abstracts for special topics related to chemistry. Use of computer browsing for literature search and downloading – basics of internet services –various sources of abstracts ,articles and papers of browsing and downloading , Techniques of conversion from one format to another Structure drawing programs and their uses –searches through structure . Use of Literature, Knowledge of National and International Journals, Impact Factor, Citation-Index, h Index,SCI Journals, Plagiarism

### **UNIT-III INSTRUMENTAL TECHNIQUES**

Principle, instrumentation and application of electro-analytical, spectrophotometry, fluorimetry, AAS, AES, XRF and NMR techniques. Principle instrumentation and application of chromatography and MS techniques. Classical Method of Analysis

### **UNIT-IV SAMPLING AND MODELING**

Measurement and sampling technique of air pollutants using air monitors in selected atmospheric receptors. Statistical approach in environmental monitoring and analysis using selected parameters(correlation and regression analysis, factor analysis etc.) and graph plotting (Boxplot ,histogram etc.)

### **UNIT-V STATISTICAL ANALYSIS**

Various types of errors – precision and accuracy- significant figures, various statistical tests on the accuracy of results, positive and negative deviation from accurate results the binomial distribution, the Gaussian distribution - the normal distribution of random errors, mean value, variance and standard deviation, reliability interval, deviations, from the Gaussian law of error distribution, student's tdistribution, and t-test- comparison of the mean with the expected value, comparison of the results of two different methods, comparison of the precision of two methods by F-test, Gross errors and elimination of outlying results, graphical methods- Linear regression line, standard deviation, correlation coefficient-Multiple linear regression (one variable with two other variables).

### **COURSE - II**

**M.M. : 100**

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| I.  | PROJECT BASED ON REVIEW OF RESEARCH WORK | M.M.-50 |
| II. | SEMINARS                                 | M.M.-50 |

**BOOK SUGGESTED:**

1. Ahuja & Jespersen, Modern Instrumental Analysis, 1st Edition, Elsevier Science, 2006.
2. Douglas A. Skoog; F. James Holler; Stanley R. Crouch, Principles of instrumental Analysis,
3. Cole Pub Co., 2006. John Creswell, Research Design: Qualitative, Quantitative, and Mixed Methods Approaches (Hardcover), 2008
4. John W. Creswell, Qualitative Research & Evaluation Methods , 2008
5. Thesis and Assignment Writing – J. Anderson, B.H. Dursten and M. Poole, Wiley Eastern (1977).
6. A Hand Book of Methodology of Research – P. Rajamal and P. Devadoss, R.M.M. Vidya Press (1976).
7. Instrumental Methods of Analysis – H.H. Willard, L.L. Merritt, J.A. Dean, F.A. Settle, CBS Publishers & Distributors, 1986.
8. Practical Process, Research and Development – Neal G. Anderson, Amazo

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