Dr. Bhimrao Ambedkar University, Agra

A State University of Uttar Pradesh (Paliwal Park, Agra -282004)

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A Documentary Support

for

Matric No. – 1.1.1

Programme Outcomes & Course Outcomes

under the

Criteria – I

(Curriculum Design and Development)

Key Indicator - 1.1

in

Matric No. – 1.1.1

MASTER OF SCIENCE (CHEMISTRY)

2003

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Mapping:

Local Need *Regional* *National* *Global Need*

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Programme Outcomes

Ensures the students to understand, acquire knowledge in Quantum Chemistry, Group Theory Symmetry, Photochemistry, Advanced Concepts in Spectroscopy, Polymer Science, Green Chemistry, Solid State, Natural Products, disconnection approach as well as role of Modern Synthetic Reagents in Organic Transformations, Nanotechnology, Thermodynamics, Advanced Chemical Kinetics, Surface Analytical Techniques to measure Surface Properties of materials and the Advanced Principles of various Electrochemical Techniques and all branches of Chemistry. This syllabus also ensures the students to understand acquire knowledge and have hands on experience in multistep Inorganic/ Organic Compound Synthesis and Analysis by using Spectroscopic Techniques and have hands on experience in multistep Organic Synthesis and Analysis by using Spectroscopic Techniques.

PROGRAME SPECIFIC OUTCOME (PSO)

PSO 1- Students will understand the basic concepts, fundamental principles and the scientific theories related to various scientific phenomena and their relevancies in the day to day life. They will also be able to acquire knowledge about the fundamentals and applications of chemical and scientific theories.

PSO 2- Students will find that every branch of science and technology is related to science subjects but also in all aspects related to life.

PSO 3-Student will become familiar with different branches of chemistry like analytical, organic, inorganic, physical, environmental, polymer, medicinal. They will also learn to apply appropriate techniques for the qualitative and quantitative analysis of chemicals in the laboratories in industries.

PSO 4- The student will acquire knowledge of chemical thermodynamics, kinetics, electrochemistry, organic, inorganic, bio-organic, bio-inorganic, spectroscopy and skill in industrial chemistry.

PSO 5- Viewing chemistry as a tool developing mind and critical attitude and thinking of logical reasoning that is prepared to serve in diverse fields.

PSO 6- Student will gain a thorough knowledge in the subject to be able to work in projects at different research as well as academic institution.

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C-1 COMPUTERS FOR CHEMISTS CREDITS-05

After completion of this course successfully the students will be able to

CO1- acquire knowledge about the history and development of computer.

CO2-aquint will the different softwares and the operating systems used in computer.

CO3- provide basic knowledge about the internet, networking.

CO4- aware about the tool used in chemistry.

CO5- acquire knowledge about the use of MS office, multimedia tool for presentation in chemistry.

C-2 INORGANIC CHEMISTRY CREDITS-05

After completion of this course successfully the students will be able to

CO1-understand the principle of various bonding theories and identify the structure and bonding of metal cluster and complex molecules.

CO2- have a firm foundation in the fundamental techniques and scientific theories in nuclear chemistry.

CO3- understand the bonding and structure in metal clusters and also the spatial arrangements of molecules with different oxidation state of metals.

CO4- learn the synthesis applications of macrocycles in biological system.

CO5- appreciate the existence and application of inorganic compounds.

C-3 ORGANIC CHEMISTRY CREDITS-05

After completion of this course successfully the students will be able to

CO1- acquaint with the basic ideas of chemical bonding, stability in molecules and obtain theoretical understanding of how reactive intermediates.

CO2- obtain theoretical understanding of how inorganic reaction take place in substitution reactions.

CO3- obtain theoretical understanding of stereochemistry of inorganic molecules of elimination reactions.

CO4- understand the reactions and mechanistic pathways of organic reactions.

CO5- explore about the reagents commonly used in organic synthesis.

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C-4 PHYSICAL CHEMISTRY CREDITS-05

After completion of this course successfully the students will be able to

CO1-get basic idea about fundamental of quantum chemistry.

CO2- get exposure about the statistical thermodynamics.

CO3- study the kinetics of different types of reactions and methodologies.

CO4- impart knowledge of micelles and macromolecules.

CO5- get the fundamentals and theories of electrochemistry.

C-5 ADULTERANTS (MINOR for other Faculty) CREDITS-05

After completion of this course successfully the students will be able to

CO1- get information about the different types of food and adulteration based on local and national needs.

CO2- to study the detection of adulterants.

CO3- analyze the adulterant in local materials commonly available in house hold products for employability.

CO4- impart knowledge about the false labelling and fake products in food packets available nationally and internationally.

CO5- get awareness about the food safety and standard and different standard laid down by the government.

C-6 GROUP THEORY AND SPECTROSCOPY CREDITS-05

After completion of this course successfully the students will be able to

CO1- understanding the basic concepts of molecular symmetry and to analyze the point group of chemical molecules.

CO2- apply the applications of rotational and vibrational spectroscopy.

CO3- On learning the course, students will be able to apply the concepts of electrostatic transitions in molecules.

CO4- familiarize the importance of AAS in metal analysis.

CO5- perform low cost, analysis of metals using flame photometry for local need.

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C-7 BIO-INORGANIC CHEMISTRY — CREDITS-05

After completion of this course successfully the students will be able to

CO1- learn the transport mechanism of metal ions in biological systems.

CO2- familiarize with structure and functions of biomolecules.

CO3-impart knowledge of bio-inorganic pigments.

CO4- learn the concepts of biochemistry of metals as well as nitrogen fixation.

CO5- to study the fundamentals of toxicity of metals and also to learn the metals ions as chelating agent in medicine.

C-8 BIO-PHYSICAL CHEMISTRY — CREDITS-05

After completion of this course successfully the students will be able to

CO1- to understand the structure and theories of enzymes.

CO2- appreciate the importance and function of coenzymes.

CO3- study of the free energy in biochemical reactions.

CO4- learn the functions of transport of ion in cell membrane.

CO5- understand the different physical parameters in biological systems.

C-9 SPECTROSCOPIC METHODS OF ANALYSIS — CREDITS-05

After completion of this course successfully the students will be able to

CO1- understand the theories of absorption spectroscopy.

CO2- know the fundamentals of raman spectroscopy.

CO3- learn the fundamentals and applications of NMR spectroscopy.

CO4- understand the fragmentation takes in mass spectrometry.

CO5- know the fundamentals of electronic spin resonance spectroscopy.

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C-10 M.Sc. CHEMISTRY PRACTICAL (Semester VIII) CREDITS-04

After completion of this course successfully the students will be able to

CO1-analyze common chemical from their identity and composition

CO2- estimate different ions, and organic compounds quantitative and qualitatively.

CO3- gather experience on synthesis of inorganic materials and organic compounds.

CO4- analyze structure of organic compounds by use of spectra

CO5- have hand on experience / practical knowledge in performing physical experiments.

C-11 RESEARCH PROJECT CREDITS-08

After completion of this course successfully the students will be able to

CO1- understand research problems.

CO2- execute literature search on a research topic.

CO3- design new experiments to address research problems.

CO4- conducts experiments in a scientific way.

CO5-analyze and interpretation of the results.

C-12 PHOTO AND STEREOCHEMISTRY CREDITS-05

After completion of this course successfully the students will be able to

CO1- acquaint with the general principles involved in photochemistry.

CO2- understand the organic reactions involved in photochemistry and able to differentiate between photochemical and thermal reaction.

CO3- provide concept of chirality, various method for projection of chiral molecules, and effect of rotation on energy level.

CO4- learn the chiroptical properties and will able to analyze how a chiral compound is optical active.

CO5- get knowledge of separation of stereo organic compounds i.e., resolution of racemates and also how the organic compounds show selectivity based on functional group.

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C-13 **SOLID STATE CHEMISTRTY, SURFACE PHENOMENONAND CHEMICAL EQUILIBRIA** **CREDITS-05**

After completion of this course successfully the students will be able to

CO1- understand the basic knowledge of crystal structure.

CO2- provide understanding of crystal defects in solid state and the properties associated in solid.

CO3- impart knowledge of electronic properties of metal, insulators and semiconductors.

CO4- learn the concept of physical and spectral properties of the surface of solid.

CO5- study the fundamental physical properties of mixing of one and two component system.

C-14 **COORDINATION CHEMISTRY** **CREDITS-05**

After completion of this course successfully the students will be able to

CO1- identify the bonding, structure and energy of selected coordination complexes.

CO2-perform applicationsof coordination compounds.

CO3- study the physical parameters of coordination compounds.

CO4- understanding the reaction mechanism in coordination compounds.

CO5- understanding the applications of spectral and magnetic properties of lanthanides and actinides.

C-15 **BASIC ANALYTICAL CHEMISTRY** **CREDITS-05**

After completion of this course successfully the students will be able to

CO1- apply amperometry technique in the characterization of metal ion

CO2- apply colometry for the identification and characterization.

CO3- understand and apply the conductometry for the characterization of metal ion

CO4- estimate metal ion using polarographic technique

CO5- estimate metal ion through voltammetry

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C-16 CHEMISTRY OF NATURAL PRODUCTS CREDITS-05

After completion of this course successfully the students will be able to

CO1-understand the structure of selected plant pigments.

CO2- appreciate the importance of alkaloids.

CO3- understand the basic of terpenoids and carotenoids from local plants materials as natural products.

CO4- understand the isolation of steroids.

CO5-perform the synthesis of selected antibiotics and action of antibiotics as drugs.

C-17 INTERDISCIPLINARY TOPICS CREDITS-04

After completion of this course successfully the students will be able to

CO1- appreciate the importance of nanoscience and technology.

CO2- understand the role of green chemistry in chemical science.

CO3- study the concept of supra molecular chemistry and its applications.

CO4- understand the environment and atmosphere and the role of greenhouse effect, acid rain, air pollution in the environment.

CO5- understand the role of aquatic pollution and also study the hydrosphere and soils.

C-18 SEPARATION TECHNIQUES CREDITS-04

After completion of this course successfully the students will be able to

CO1- learn the applications of TLC and column chromatography in analysis of mixtures.

CO2- understand the principle, experimental setup and applications of partition.

CO3-acquaint the knowledge of GC in analysis of samples.

CO4- understand analyze and applications of HPLC and also applications of supercritical fluid and gel permeation chromatography.

CO5- learn the experimental setup and applications of solvent extraction.

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C-19 ADVANCED ANALYTICAL METHODS CREDITS-04

After completion of this course successfully the students will be able to

CO1- appreciate the importance of data analysis in chemistry.

CO2-analyze common metal using inductively coupled plasma spectroscopy.

CO3- familiarize with instrumentation and application of x-ray diffraction.

CO4-gather knowledge of scanning electron microscopy and transmission electron microscopy in analysis of samples.

CO5- study the fundamental applications of thermal gravimetric analysis of materials.

C-20ADVANCED INORGANIC CHEMISTRY CREDITS-04

After completion of this course successfully the students will be able to

CO1- advance learning of transition metal complexes in chemistry.

CO2-understanding of bio-inorganic metals in living system.

CO3- learning the role of metalloenzymes in biological system.

CO4- study the metal nucleic acid interaction as well as metal in biological systems.

CO5- known the excited states of metal complexes in coordination chemistry.

C-21 ADVANCED ORGANIC CHEMISTRY CREDITS-04

After completion of this course successfully the students will be able to

CO1- learning the basic of heterocyclic chemistry.

CO2- getting an idea about the mechanistic pathway of various common organic rearrangements.

CO3- understanding the concept and applications of pericyclic reactions in advanced organic chemistry.

CO4- learning the concept of disconnection approach in the designing and synthesis of complexed molecules.

CO5- understanding the structure and used of some important drugs.

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C-22 ADVANCED PHYSICAL CHEMISTRY — CREDITS-04

After completion of this course successfully the students will be able to

CO1- understanding and appreciate the advanced concepts of thin film and Langmuir-Blodgett films and liquid crystal.

CO2- advanced study of polymeric materials and its applications.

CO3-study ionic conductors its properties and applications.

CO4- developing skill in computational treatment of atoms and molecules.

CO5- studying of general properties of liquids.

C-23 POLYMER CHEMISTRY — CREDITS-04

After completion of this course successfully the students will be able to

CO1- understanding the basic importance of polymers.

CO2- developing skill in the polymer characterization.

CO3- evaluating the structure and various properties of crystalline polymer.

CO4- learning the process of polymerizations.

CO5- understanding the properties of commercial polymer and its applications.

C-24 INDUSTRIAL CHEMISTRY — CREDITS-04

After completion of this course successfully the students will be able to

CO1- understanding and apply of cement, ceramic and glass.

CO2- learning the basic of composites formation and its application.

CO3- understanding the different fertilizer and its specific application.

CO4- knowing the utilization and preparation of petrochemicals and lubricants.

CO5- knowledge of paints and its formulation.

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C-25 MEDICINAL CHEMISTRY CREDITS-04

After completion of this course successfully the students will be able to

CO1- understanding the advanced knowledge of drug design and developments of new drugs.

CO2- studying of various pharmacokinetics of drugs and its applications in drug developments.

CO3- learning pharmacodynamics of drugs in medicinal chemistry.

CO4- understanding the drugs used as antineoplastic.

CO5- understanding the drugs used as cardiovascular drugs.

C-26 M.Sc. CHEMISTRY PRACTICAL (SEMESTER X) CREDITS-04

After completion of this course successfully the students will be able to

CO1- learn about the role of flame photometry in the analysis of metals.

CO2- learn about the spectroscopic and chromatographic technique in the analysis of substance.

CO3- evaluate the organic compound from natural resources.

CO4- learn the multistep and green synthesis of organic compounds.

CO5- utilization of thermodynamic spectroscopy, polarography in the analysis of sample.

C-27 RESEARCH PROJECT CREDITS-08

After completion of this course successfully the students will be able to

CO1- understand research problems specific topic.

CO2- execute literature search on a research topic assigned to students.

CO3- design new experiments to address research problems based on the allotted research topics.

CO4- conducts experiments in a scientific way.

CO5-analyze and interpretation of the results.

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