JABALPUR ENGINEERING COLLEGE, JABALPUR (M.P.)

Scheme of Examination w.e.f. July, 2018 batch

FOURTH SEMESTER (M.Sc. Applied Chemistry)

S.No.	SUBJECT CODE	SUBJECT	Periods Per Week				Maximum Marks (Theory Slots)			Maximum marks (Practical Slots)		Total Marks
			L	T	P	Total Credits	End Exam	Mid Sem Exam	Assignment/ Quiz	End Semester Practical/ Viva	Practical/ Record/ Assignment/ Quiz/ Presentation	
1	AC4001	Chemical Process Industries	3	1		4	70	20	10			100
2	AC4002	Analytical Chemistry -II	3	1		4	70	20	10			100
3	AC4003	Elective *	3	1		4	70	20	10			100
5	AC4004	Chemical Process Industries			4	4				45	30	75
6	AC4005	Analytical Chemistry -II			4	4				45	30	75
7	AC4006	Major Project	0	0	12	12				100	50 +50	200
			9	3	20	32	210	60	30	190	160	650

ELECTIVE* AC4003 A : DRUGS AND PHARMACEUTICAL CHEMISTRY

AC4003 B :CHEMISTRY OF COAL TAR DISTILLATION AND PETRO-CHEMICALS

AC4003 C : ENVIRONMENTAL CHEMISTRY

11/7/19 11/7/19 11/7/19 11/7/19 11/7/19 11/7/19

Applied Chemistry

M.Sc. IVSEMESTER

Course AC4001

(PAPER: CHEMICAL PROCESS INDUSTRIES)

(Effective From : July 2018)

Maximum Marks 70
Minimum Marks 28

UNIT-I

CHLOR-ALKALI INDUSTRIES :-

Manufacture of Soda, Ash, Caustic Soda. Bleaching powder and chemical from Sea, Manufacture of hydrochloric acid from common salt, Synthetic hydrochloric acid.

SULPHUFRAND SULPHURIC ACID:

Sulphur resources of the world, process of mining sulphur and recovery of sulphur from gypsom. Manufactring process of sulphuric acid (Chamber and contact processes) .

UNIT -II

PULP, PAPER AND TEXTILE TECHNOLOGY: -

Introduction; raw martial, wood chemistry, chemistry of pulping, bleaching. Manufacture of Rayon and paper pulp. Production of paper. Physico chemical analysis and test of pulp and paper.

Natural and synthetic fibers. Manufacture of textile fiber i.e. viscous cupra ammonium rayon , nylon, polyester, acrylic & poly propylene.

UNIT - III

OILS, FATS, SOAP TECHNOLOGY: -

Introduction chemistry of oils fats and soap. Chemistry of extraction, refining and bleaching of oil. Manufacture of soyabeen and cotton seed oil. Extraction of essential oil. Physico chemical properties and test of oil, fats and soap. Manufacture of anionic, cationic, nonionic & ampholytic surfactances production of difference types of soap.

UINT -I V

FERMENTATION AND SUGAR TECHNOLOGY: -

Introduction. Conditions for Fermentation. Equipment. Media preparation. Growth phase & Enzyme. Functions. Account of Some Fermentation processes. Manufacture of Alcoholic beverages. Manufacture of Vinegar. Manufacture of Lactic Acid. Manufacture of Citric Acid.

Introduction of sugar technology. Manufacture' of Cane Sugar, recovery of sucrose form molasses preparation of Celotex, Physico chemical properties and testing of Sugar and its intermediate. Sugar industry in India.

UNI- V

(A) Food and Food By-Products Processing Industries-

Types of food processing, Freezing, drying, Pasteurization and sterilization etc. Food By-Products, Gelatin, Adhesives – animal glues, Starch Adhesives, Synthetic-Resin adhesives. Food Processing Equipments- Sanitary, design and materials of construction, Cleaning & Controls.

(B) Flavors and Food additives-

Natural fruit concentrates: Vanilla, Chocolate and Cocoa, Mono sodium glutamate (MSG), E-numbers of food addition , Colors, Preservatives, Antioxidants and acidity regulations, Thickness, stabilizer, emulsifiers and gelling agents; anticaking agents, Flavors and flavor enhancers, glazing agents and sweetners.

Reference Books: -

1. Chemical Process Industries – R.N.Shrinivas, Mc Graw Hill Pub.
2. Out line of Chemical Technology – Drgden, Atto ated east west Press Pvt. Ltd.
3. Introduction to Chemical Engineering -- Bedger, Tata Mc Graw Hill Pub.
4. Bio Chemical – J.L. Jain. S.Chand Co. Ltd.
5. Chemical Tech. Part III & IV Published I I T Madras
6. Industrial Chemistry – B.K.Sharma, Goel Pub.
7. Manufacture of Pulp and Paper Technology -- Brite C B S Pub.8. Dyeing Chemical Technology of Textile – Fibers – Trotman Chales Griffin & Co.Ltd.

Applied Chemistry

M.Sc. IVSEMESTER

Course AC4002 (PAPER: Analytical Chemistry-II.)

(Effective From : July 2018)

Maximum Marks 70
Minimum Marks 28

UNIT-I

ELECTROANALYTICAL METHODS –I: -

General principle of conductometry, instrumentation, electrolytic conductance and electrolytic concentration relationship. Conductometric titrations including neutralization, precipitation ,oxidation-reduction, complexation and high frequency titrations. Other applications of analytical importance. Electrochemical cell, Electrolysis process, Product of Electrolysis, Redox electrodes, Reference Electrodes.

UNIT- II

ELECTROANALYTICAL METHODS –II: -

Potentiometric principles and instrumentation concept of the difference in potential in potential between two electrodes dipped in solution of ions. Types of electrodes effect of concentration of electrode potentials effect of complex formation on electrode potentials function of salt bridge cell voltage measurement by potentiometrically potentiometric titrations applied in connection with neutralisation precipitation oxidation-reduction and complexation systems. Advantages and Limitations of potentiometric methods. Application of e.m.f measurements to analytical chemistry.

UNIT-III

SOLVENT EXTRACTION: -

Basic principle of solvent extraction (Distribution law),Factor affecting extraction, Techniques of extraction, Quantitative treatment of solvent extraction equillibria, classification & types of solvent extraction system, mechanism of extraction, advantages & application in analytical chemistry
Introduction of counter current extraction, Craigg's technique & its application.

UNIT – IV

VOLTAMMETRY,POLAROGRAPHY AND AMPEROMETRIC TITRATIONS: -

General principle and instrumental set-up of polarograph important features of DME, concepts and expression of diffusion current Ilkovic equation half wave potential residual current, current - potential curves and reversible reactions. Applicaions for characterising organic compounds. Differential pulse polarography. Analytical applications of polarography. Fundamental principles of amperometric titrations instrumentation and titration procedures advantage and disadvantages of amperometric titrations.

UNIT-V

NEPHELOMETRY,TURBIDIMETRY,PHOSPHORESCENCE AND FLUORESCENCES:-

Principles of nephelometry and turbidimetry, their instrumental set-up, effect of concentration, particle size and wavelength on scattering of light. Application to analysis.
Theory of florescence and phosphoresce, instrumental requirements, interpretation of fluorescence and phosphorescence spectra, factors affecting fluorescence and phosphorescence relation between fluorescence intensity and concentration application as analytical tools and their comparision.

Reference Books: -

1. Instrumental Methods of Chemical Analysis – Will and Letton Edu.Pub. Ltd New York
2. Instrumental Methods of Chemical Analysis – Chatwal Anand, Himalaya Pub.
3. Spectroscopy of Org. Compounds – P.S. Kalsi, New Age Inter. Pub.
4. Instrumental Methods of Chemical Analysis – B.K. Sharma, Goel Pub. Meerut
5. Instrumental Methods of Chemical Analysis – H. Kaur, Pragati Pub.
6. Instrumental Methods of Chemical Analysis by Golen W. Ewing. McGraw Hill
7. Hand book of Chromatography for Chemist & Engineers

Applied Chemistry

M.Sc. IVSEMESTER

Course AC4003 A (Elective)

(PAPER: DRUGS AND PHARMACEUTICAL CHEMISTRY)

(Effective From : July 2018)

Maximum Marks 70
Minimum Marks 28

UNIT –I

ALKALOIDS: -

Introduction, classification, and General methods of determining structure of alkaloids including, Morphine/ Opium (Phananthrene Alkaloid) General structure of purines & pyrimidines includes uric acid, caffine, properties and uses.

UNIT-II

STEROIDS & HORMONES: -

Introduction, Nomenclature, classification, & stereochemistry of steroids. Absolute configuration of steroids, sterols, Chemistry of cholesterol and Stigmasterol. Constitution, isolation & Function of bile acid. Introduction of Steroidal Hormones, Chemistry of Testesterone, Estrogen, and progesterone.

UNIT-III

BIOCHEMISTRY & BIOSYNTHESIS: -

Bio-chemistry and its important in pharmaceutical science, Bio-chemical organization) cell energy ATP and its biological significance. Enzyme, Carbohydrate, Lipid, Amino acid and Proteins and Nucleic acid Metabolism, Biosynthetic of carbohydrate, Sterols, free plant pigment, terpenoids.

UNIT-IV

CHEMOTHERAPY CLASSIFICATION -I

(A) Antibiotics,

Introduction of **Antibiotics, Constitution** Isolation, Synthesis, Mode of action and Therapeutic uses of following antibiotics:

Penicillin,Streptomycin,Chloromycetin,Tetracyclin,.

(B) SULPHONAMIDES :-

Synthesis Mode of action and Therapeutic uses of following Sulpha Drugs:

Sulphacetamide, Sulphadiazine, Sulphathiazole, Sulphamethoxazole.

(C) ANTIPYRETICS & ANALGESICS

Introduction, Mode of action of pyrazolines & pyrazolidines, ,Acetinalide, paracetamol, phenacetin, Aspirin , Analgin.

UNIT-V

CHEMOTHERAPY CLASSIFICATION- II

(A) ANTIMALARIALS: Chemotherapy of Malaria ,synthesis and mode of action of 4 amino quinoline derivatives. includes chloroquin, and camoquine , 8 amino quinoline derivatives.includes Pamaquine, Isopamaquine and Pentaquine

(B) ANAESTHETICS: - Introduction, Local Anaesthetic includes natural & amino benzoic acid derivatives & General Anaesthetic includes volatile & non-valatile.

Reference Books: -

1. Synthetic Drugs – Chatwal Anand, Himalaya Pub.
2. Synthetic Organic Chemistry – O.P.Agrawal, Phagati Prakashan
3. Medicinal Chemistry – Ashutosh Kar, T M H

4. Pharmaceutical Chemistry – Jayashree Ghosh, S.Chand Pub.
5.Chemistry of Natural Products Vol. I,II O.P.Agarwal Goel Pub. Meerut.
6 Chemistry of Natural Product Vol. I,II Chatwal, Anand, Himalaya Pub.
7. Pharmaceutical Chemistry Jayshree Ghosh S.Chand Pub.
8. Fundamentals of biochemistry – J.L. Jain, S.Chand Pub.
9. Medicinal chemistry by Ashutosh Kar, Wildy eastern ltd.
10. Medicinal chemistry Vol. I, II by Alferd Burgir Wiley Inter. Pub.
11Synthetic Drugs by Chatwal Anand, Himalaya pub.

Applied Chemistry

M.Sc. IVSEMESTER

Course AC4003 B (Elective)

(PAPER: CHEMISTRY OF COAL TAR DISTILLATION AND PETRO-CHEMICALS)

(Effective From : July 2018)

Maximum Marks 70
Minimum Marks 28

UNIT-I

COAL TECHNOLOGY:-

Introduction Coal reserves, production, origin, classification coal composition and utilization, synthetic liquid fuels and chemicals from coal, methods of carbonization.

Coal tar distillation:-

Sources of crude-tar composition and purification of tars, Tar products and light oil recovery, properties and testing studies of coal tar products and derivatives.

UNIT - II

PETROLEUM AND ITS PRODUCTS :-

Origin, nature and composition of petroleum, natural gas, petroleum distillation, methods of separation of products, Crystallization, Super fractionation, Azeotropic and extractive distillation study of cooling tower, cracking processes, Lubrication oil refining hydrogen processing of petroleum petro-chemical industry, Alkylation of paraffin-acid, Catalytic refining, solvent refining.

UNIT-III

PETRO-CHEMICALS:-

Scope and development of petrochemical industries of India. Raw materials. General principles involved in the production of petro-chemicals. (Hydrazine, Ethylene, Acetylene, Sulphur compounds) Engineering Aspects and industrial economy of petrochemical, products from paraffinic and petroleum aromatics nature. Auxiliary sources of petroleum. Biochemical transformation of petroleum.

UNIT –IV

CHEMISTRY OF PETROLEUM HYDROCARBONS:-

(Alkanes,Alkenes,Alicyclics,Arometics),definitions, Classification, general characteristics. Preparations of raw materials for processing, preparations of gaseous hydrocarbon, separation of liquid hydrocarbons, hydrocarbons reactions, pyrolysis medium temperature, technical realization of petroleum hydrocarbons, BTX aromatics.

UNIT-V

INORGANIC CHEMICALS FROM PETROLEUM AND CATALYSTS IN PETROLEUM REFINING:-

Sulpher, Sulphuric acid, Hydrogen and other material from petroleum

Catalysts- Introduction, classification, morphology, catalysts for refining and petrochemical industries and industrial catalysis.

Reference Books: -

1. Chemical Technology of Petroleum – William . A Gruse & Donald R. Stevens. McGraw will
2. Modern Petroleum Refining Processes – B.K. Bhaskara Rao. Oxford & IBH Pbl.
3. Fundamental of Petroleum Chemicals Technology – T. Belov. Mair Publication
4. Chemical Technology Vol I – II Pandey – Shukla
5. Chemical Process Industries - Drgden

Applied Chemistry

M.Sc. IVSEMESTER

Course AC4003 C (Elective)

(PAPER: ENVIRONMENTAL CHEMISTRY **)**

(Effective From : July 2018)

Maximum Marks 70
Minimum Marks 28

UNIT:-I

FUNDAMENTALS OF ENVIRONMENTAL & GREEN CHEMISTRY :-

Concept and scope of Environmental & Green chemistry, The 12 Principles of Green Chemistry, Designing safer chemicals, safer solvents & auxiliaries, Design of Energy sufficiency, Reduction of derivatives, Design for degradation, Real time analysis for pollution prevention, Inherently safer chemicals for accident prevention.

UNIT – II

WATER POLLUTION:-

Chemical Composition of aquatic environment (solubility's of gases Oxygen, CO2 Alkalinity, nitrogen, silicon, phosphate, sulfur Cl_2, F and heavy metal in water) .

Redox equilibria in water, complexation in water , Micro organism, water pollution and trace level substance in water physico chemical and Biological analysis of waste water. Different case studies. Waste water treatment.

SOIL POLLUTION:-

Chemistry of Soil, soil profile, sources of soil pollution, effect of urban and Industrial solid waste, Physico-Chemical analysis of soil, Radioactive pollution, Radiation chemistry source and effect of radioactive pollution.

UNIT – III

AIR POLLUTION:-

The chemical Nature and composition of the Atmosphere, oxides of carbon, sulfur and Nitrogen in the atmosphere.Organic pollutant and photochemical smog in the atmosphere, Inorganic pollutants and particular matter in the atmosphere. Monitoring and Analysis of Atmosphere pollution. Different case studies.

UNIT – IV

CHEMICAL TOXICOLOGY IN THE ENVIRONMENT:-

Impact of Toxic chemical on Enzymes, Biochemical effect of arsenic, lead mercury cyanide, pesticides ,carcinogens. CO, NOx ,SOx, O_3 & PAN. Legal aspect of Environment , Water & Air pollution prevention Act, Environmental Impact Assessment (EIA)

UNIT – V

ENVIRONMENTAL ETHICS AND LEGISLATIONS

Enforcement of Environment Laws in India-The water act, the air (prevention and control of pollution)act.1981,the environment(protection) act,1986,Environmental auditing

SUSTAINABLE HABITAT, INDUSTRIALIZATION AND URBANIZATION

Concept of green buildind ,volatile organic compounds (VOC).GRIHA rating, LEED rating, HVAC car technology .green technology ,green business : green computing,E- waste management

ENVIRONMENTAL CHALLENGES-LOCAL CHALLENGES –solid waste –impact of solid waste on natural resourses .deforestation,global challenges – Climate change and global warming ,Kyoto Protocol ,green gases ,ways to reduce green house gases emissions ,carbon Footprint,ways to reduce carbon footprint,carbon trading.

Reference Books: -

1. Environmental Chemistry by A.K.Dej Weley Esterh ltd.
2. Environmental Chemistry by S.E. Manahan, Willgrd grant Press.
3. Inorganic Chemistry by Wahid V. Malik, G.D.Tuli, R.D. Madan S.Chand Co. Ltd.
4. Chemistry of the Soil- Firman Bear Oxford & IBH Pub.
5. Environment chemistry by B.K.Sharma & Miss H. Kaur
6. Chemistry and Biological Method for water Pollution studies by Goel & Trivedi Env Pub
7. Air Pollution by V.P. Kudesia Pragati Prakashan.