MADRAS CHRISTIAN COLLEGE (AUTONOMOUS
Tambaram East, Chennai- 600 059
Broad Areas (Syllabus) for PG Entrance Test - 2024

M.A. English

1. Technical Approach to the Study of Literature (Generic, Linguistic, Social and Historical)
2. Theoretical Approaches to the Study of Literature (Literary Criticism, Theory and Poetics)
3. British Literature
4. American Literature
5. Indian Writing in English
6. World Literatures in English

M.Com. (Commerce)

1. Accounting: Financial Accounting, Corporate Accounting, Cost Accounting, Management Accounting (Theory & Problems)
2. Business Law and Company Law (Theory)
3. Business Management: Basic Concepts, Planning, Organising, Staffing, Directing, Coordination and Control (Theory)
4. Principles of Marketing: Basic Concepts, Market Segmentation, Product, Price, Promotion, Distribution, Competitive Analysis and Strategies (Theory)
5. Banking and Financial Services (Theory)
6. Income Tax: Basic Concepts, Residential Status, Income from Salary, House Property, Profits/Gains from Business & Profession, Capital Gains and Income from Other Sources (Theory & Problems)
7. Human Resource Development: Career Management, Conflict, Management Development, Group and Team, Organisational Change, Stress Management, HRD and Diversity, Recent Trends in HR (Theory)

M.Sc. Statistics

1. Basic Statistics and Programming in R
2. Probability Theory and Distribution Theory
3. Theory of Estimation and Testing of Hypothesis
4. Design of Experiments
5. Sampling Theory
6. Statistical Quality Control and Time Series Analysis
7. Regression Analysis and SPSS

M.Sc. Physics

1. Mechanics
2. Properties of Matter & Sound
3. Heat & Thermodynamics
4. Optics
5. Electricity & Electromagnetism
6. Quantum Mechanics
7. Relativity
8. Atomic Physics
9. Nuclear Physics
10. Spectroscopy & Astrophysics
11. Semiconductor & Analog Devices
12. Digital Electronics & Electronics Instrumentation
13. Materials Science
14. Mathematical & Numerical Methods

M.Sc. Chemistry

Physical Chemistry I

Atomic and Molecular Structure: Planck's black body radiation, Photoelectric effect, Bohr's theory, de Broglie postulate, Heisenberg's Uncertainty Principle; Energy spectrum of hydrogen atom; Shapes of *s*, *p*, *d* and *f* orbitals

Gaseous State: Kinetic molecular model of a gas: collision frequency; collision diameter; mean free path; Ideal gases, and deviations from ideal gas behaviour, van der Waals equation of state

Solid State: Unit Cells, Miller indices, crystal systems and Bravais Lattices, X-ray diffraction, Bragg's Law, Structure of NaCl, CsCl, and KCl, diamond, and graphite

Chemical Thermodynamics: Mathematical treatment: Exact and in-exact differentials; Reversible and irreversible processes; Laws of thermodynamics, thermochemistry

Physical Chemistry II

Chemical and Phase Equilibria: Law of mass action; Kp, Kc, Kx and Kn; Effect of temperature on K; Le-Chatelier principle

Dilute solutions; Raoult's and Henry's Laws and their applications; Colligative properties; Gibbs phase rule; Phase equilibria; single component phase diagrams.

Electrochemistry: Conductivity, equivalent and molar conductivity and their properties; Kohlrausch law; Debye-Hückel-Onsager equation; Ionic velocities, mobilities, Electromotive force of a cell, Nernst equation; Standard electrode potential, Electrochemical series

Chemical Kinetics: Order and molecularity of a reaction, differential and integrated form of rate expressions; Steady state approximation in reaction mechanisms

Temperature dependence of reaction rates, Arrhenius equation; activation energy; Collision theory of reaction rates

Spectroscopy: Beer-Lambert's law; fundamental concepts of rotational, vibrational, electronic and magnetic resonance spectroscopy.

Organic Chemistry I

Sterochemistry: Optical activity of compounds containing chiral carbon, R/S nomenclature, specific rotation (elementary problem), diasteroisomerism; geometric isomerism in double bonded compounds; conformational analysis of ethane, n-butane, cyclohexanes and mono / di substituted cyclohexanes.

Organic Reactions and Mechanisms: Nucleophilic substitution and elimination reactions; Rearrangements: Hofmann, Curtius, Lossen, Wolff, Pinacol-pinacolone, Claisen, Fries, Baeyer-Villeger, Benzidine, Beckmann, and Wolf; oxidation and reduction reactions in organic chemistry; Organometallic reagents in organic synthesis; Functional group inter-conversions and structural problems using chemical reactions.

Organic Chemistry II

Electronic effects (resonance, inductive, hyperconjugation) and steric effects and its applications (acid/base property);

Qualitative Organic Analysis: Identification of functional groups by chemical tests; elementary UV, IR and 1H NMR spectroscopic techniques as tools for structural elucidation of simple organic molecules.

Natural Products Chemistry: Chemistry of alkaloids, steroids, terpenes, carbohydrates, amino acids, peptides and nucleic acids.

Aromatic and Heterocyclic Chemistry: Monocyclic, bicyclic and tricyclic aromatic hydrocarbons, and monocyclic compounds with one hetero atom: synthesis, reactivity and properties, aromaticity; Electrophilic and nucleophilic aromatic substitution reactions.

Inorganic Chemistry I

Inorganic Chemistry Periodic Table: Periodic classification of elements, Aufbau's principle, periodicity; effective nuclear charge, atomic, covalent, and ionic radii, ionization enthalpy, electron gain enthalpy, and electronegativity with atomic number, MO electronic configuration of diatomic molecules (first and second row elements).

Chemical Bonding and shapes of molecules: Ionic bond: Packing of ions in crystals, radius ratio rule, polarizing power and polarizability; Fajan's rules; Covalent bond: Lewis structure, valence bond theory. Hybridization, molecular orbital diagrams of diatomic molecules; van der Waals forces, hydrogen bonding; VSEPR theory and shapes of molecules.

Main Group Elements (s and p blocks): Gradation in properties of main group element in a group; Inert pair effect; Synthesis, structure and properties of diborane, ammonia, silane, phosphine and hydrogen sulphide; Allotropes of carbon; Structure and chemical properties of oxides of nitrogen, phosphorus and sulphur; Structure and chemical properties of oxoacids of phosphorus, sulphur and chlorine; Halides of silicon and phosphorus; Interhalogen compounds: Types, names and their geometry; Types, structure and reactions of xenon fluorides.

Transition Metals (d block): Characteristics of d-block elements; Chemistry of Potassium permanganate and Potassium dichromate

Inorganic Chemistry II

Coordination complexes: structure and isomerism; VB and crystal field theoretical approaches for structure, color and magnetic properties of metal complexes; Jahn-Teller distortion. Organometallic compounds: Hapticity, Effect of backbonding in Metal-carbonyl complexes; Structure of first row metal carbonyls; Catalyst and the reactions involved in Hydroformylation and The oxo process.

Bioinorganic Chemistry: Essentials and trace elements of life; basic reactions in the biological systems and the role of metal ions, especially Fe^{2+}, and Zn^{2+}; structure and function of myoglobin and haemoglobin.

Instrumental Methods of Analysis: Basic principles; instrumentations and simple applications of conductometry, potentiometry and UV-vis spectrophotometry.
Analytical Chemistry: Principles of qualitative and quantitative analysis; Acid-base, oxidation reduction and complexometric titrations using EDTA; Use and types of indicators; Use of organic reagents in inorganic analysis; Radioactivity, nuclear reactions, applications of isotopes; Mathematical treatment in error analysis, elementary statistics and probability theory.

Applied and Environmental Chemistry

Fuels: Non-Renewable, Classification of fuels, Solid, Liquid and Gaseous. Solid fuels: Coal − classification by rank, proximate and ultimate analysis; Liquid fuels: Refining of crude petroleum and uses of fractions; Octane number and Cetane number. Gaseous fuels: Natural gas and Gobar gas: composition and uses.

Portland Cement: Composition, manufacture, setting and hardening of cement

Glass: Manufacture; types − soda lime glass, flint glass, borosilicate glass, alumino silicate glass, vitreosil, photochromic glass and safety glass.

Sources of water; temporary hardness and permanent hardness – Units of hardness-estimation of hardness – EDTA method, estimation of total hardness.

Synthetic polymers: Polyhydrocarbons (polythene, synthetic rubber), polychlorohydrocarbons (PVC, neoprene),

Water, Air and Noise Pollution: Causes and Control Measures; Greenhouse effect, Ozone layer depletion

M.Sc. Applied Microbiology

1. General microbiology
2. Immunology
3. Molecular biology
4. Food Microbiology
5. Environmental Microbiology and Microbial ecology
6. Microbial Technology
7. Bioinstrumentation
8. Medical microbiology

M.Sc. Data Science

1. Introduction to Probability and statistics
2. Fundamentals of Machine Learning
3. Python for Data Analysis,
4. R for Data Science,
5. Data handling and Visualization
6. AI tools for data analysis
7. Big Data Technologies.