

MANONMANIAM SUNDARANAR UNIVERSITY
DIRECTORATE OF DISTANCE AND CONTINUING EDUCATION
INTERNAL ASSIGNMENT FOR EXAMINATIONS
B.SC. CHEMISTRY – SEMESTER - VI
AGRO CHEMISTRY

SUB-CODE: JECH62

1. (a) Discuss the classification of fertilizers and explain the role of macronutrients (N, P, K) in plant growth. Describe the manufacture of urea, muriate of potash, and triple superphosphate, and explain the composition and importance of complex, mixed, and biofertilizers.

(OR)

- (b) Explain the classification of pesticides based on their use and chemical composition. Discuss different types such as insecticides, fungicides, herbicides, rodenticides, attractants, and repellents with examples. Describe their methods of application, benefits, hazards, and safety measures.

2. (a) Define soil and explain the origin and formation of soil. Discuss the components of soil and factors influencing soil formation. Describe important physical properties of soil such as texture, structure, density, and soil colloids.

(OR)

- (b) Explain the concept and objectives of soil testing. Describe the methods of soil sampling, processing, and analysis, including determination of pH, electrical conductivity, moisture content, bulk density, and nutrient content (nitrogen and phosphorus).

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B.SC. CHEMISTRY – SEMESTER - VI
FUNDAMENTALS OF SPECTROSCOPY

SUB-CODE: JECH61

1. (a) Explain the electrical and magnetic properties of molecules, including dipole moment and polarizability. Discuss the types of magnetism such as diamagnetism, paramagnetism, ferromagnetism, and antiferromagnetism, and describe the determination of magnetic susceptibility using Gouy balance.

(OR)

- (b) Explain the principles of microwave spectroscopy. Derive the expression for rotational energy levels of diatomic molecules (rigid rotator approximation) and discuss selection rules, effect of isotopic substitution, instrumentation, and applications.

2. (a) Explain the principles of UV–Visible spectroscopy. Discuss electronic transitions ($\sigma \rightarrow \sigma$, $\pi \rightarrow \pi$, $n \rightarrow \sigma^*$, $n \rightarrow \pi^*$), Frank–Condon principle, and apply Woodward–Fieser rules to conjugated dienes and α , β -unsaturated ketones.

(OR)

- (b) Describe the principles and applications of IR and Raman spectroscopy. Explain vibrational modes, selection rules, Raman effect, and mutual exclusion principle, and compare IR and Raman spectra.

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B.SC. CHEMISTRY – SEMESTER - VI
INORGANIC CHEMISTRY - II
SUB-CODE: JMCH62

1. (a) Discuss the role of essential and trace elements in biological systems. Explain the functions of Na^+ , K^+ , Mg^{2+} , Ca^{2+} , Fe^{3+} , Cu^{2+} , and Zn^{2+} , and describe the toxic effects of heavy metals such as As, Cd, Pb, and Hg.

(OR)

- (b) Explain the transport and storage of metal ions in biological systems. Describe the role of hemoglobin and myoglobin in oxygen transport, the Bohr effect, and the functioning of sodium–potassium and calcium pumps.
2. (a) Describe the structure and functions of metalloenzymes. Explain the role of Vitamin B_{12} (cyanocobalamin), carbonic anhydrase, and iron–sulphur proteins, including their biological significance.

(OR)

- (b) Discuss the structure and classification of silicates with examples. Explain different types such as ortho, pyro, chain, ring, sheet, and three-dimensional silicates, and describe their industrial importance.

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B.SC. CHEMISTRY – SEMESTER - VI
ORGANIC CHEMISTRY - II
SUB-CODE: JMCH61

1. (a) Discuss the classification, isolation, and general properties of alkaloids. Explain the structure elucidation of any two alkaloids such as coniine, piperine, or nicotine, including important reactions involved.

(OR)

- (b) Explain the classification of terpenes and the isoprene rule. Describe the isolation and structural elucidation of any two terpenes such as citral, menthol, geraniol, or camphor.

2. (a) Describe the classification of carbohydrates and explain the configuration of sugars. Discuss the structure, properties, and reactions of glucose and fructose, including their interconversion.

(OR)

- (b) Explain various molecular rearrangements with mechanisms. Discuss any four reactions such as Beckmann, Fries, Claisen, Pinacol–Pinacolone, or Hofmann rearrangement with suitable examples.

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PHYSICAL CHEMISTRY - II
SUB-CODE: JMCH63

1. (a) State and derive the Gibbs phase rule. Explain its application to one-component systems with reference to water and sulphur systems, including concepts of supercooling and sublimation.

(OR)

- (b) Explain the law of mass action and its thermodynamic derivation. Discuss the relationship between K_p and K_c and apply it to homogeneous equilibria such as the dissociation of PCl_5 and N_2O_4 , and formation of NH_3 or SO_3 .

2. (a) Explain the construction and working of galvanic cells. Derive the Nernst equation and discuss the applications of EMF measurements in determining pH, solubility product, and transport number.

(OR)

- (b) Discuss the conductance of electrolytes. Explain Arrhenius theory, Debye–Hückel theory, and Onsager equation, and describe methods for determining transport number and ionic mobility.

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INTERNAL ASSIGNMENT FOR EXAMINATIONS
B.SC. CHEMISTRY – SEMESTER - VI
TEXTILE CHEMISTRY

SUB-CODE: JNCH61

1. (a) Explain the classification of textile fibres and discuss the essential requirements and characteristics of textile fibres. Describe the impurities present in fibres and explain the various processes used for their removal such as singeing, scouring, bleaching, desizing, kier boiling, chemicking, and degumming, with suitable flowcharts.

(OR)

- (b) Discuss the natural fibres with special reference to cotton, silk, and wool. Explain their structure, properties, extraction methods, and uses. Describe the life cycle of silkworm and the processing of silk fibre.

2. (a) Explain the manufacture, properties, and applications of man-made fibres. Discuss different types such as rayon, acetate fibres, nylon, polyester, acrylic, and polyurethane fibres, and compare them with natural fibres.

(OR)

- (b) Describe the classification of dyes and methods of dyeing textile materials. Explain dyeing of cotton, wool, and silk using direct, acid, basic, vat, disperse, and reactive dyes. Discuss the fastness properties and finishing processes such as mercerizing, anti-crease, anti-shrink, and waterproofing.