II YEAR IV SEMESTER BSc BZC SYLLABUS

SRI RAMAKRISHNA DEGREE COLLEGE (AUTONOMOUS)

NANDYAL

SRI RAMAKRISHNA DEGREE COLLEGE (AUTONOMOUS)

IV Semester/ Botany Core Course –
4 Plant Physiology and Metabolism

Unit – 1: Plant-Water relations

1. Importance of water to plant life, physical properties of water, diffusion,

Imbibitions, osmosis. Water potential, osmotic potential, pressure potential.

2. Absorption and lateral transport of water; Ascent of sap

3. Transpiration: stomata structure and mechanism of stomata movements (K+ionflux).

4. Mechanism of phloem transport; source-sink relationships.

Unit – 2: Mineral nutrition, Enzymes and Respiration

1. Essential macro and micro mineral nutrients and their role in plants; symptoms of mineral deficiency

2. Absorption of mineral ions; passive and active processes.

3. . Mechanism of enzyme action, enzyme kinetics.

4. Respiration: Aerobic and Anaerobic; Glycolysis, Krebs cycle; electron transport system, mechanism of oxidative phosphorylation,

Unit – 3: Photosynthesis and Photorespiration

1. Photosynthesis: Photosynthetic pigments, absorption and action spectra; Red drop and Emerson enhancement effect

2. Concept of two photo systems; mechanism of photosynthetic electron transport and evolution of oxygen; photophosphorylation

3. Carbon assimilation pathways (C3,C4);

Unit – 4: Nitrogen and lipid metabolism

1. Nitrogen metabolism: Biological nitrogen fixation – asymbiotic and symbiotic nitrogen fixing organisms. Nitrogenase enzyme system.

2. Lipid metabolism: Classification of Plant lipids, saturated and unsaturated fatty acids.

Unit – 5: Plant growth - development and stress physiology

1.. Physiological effects of Plant Growth Regulators (PGRs) - auxins, gibberellins, cytokine's, ABA, ethylene and brassinosteroids.

2. Physiology of flowering:Photoperiodism, role of phytochrome in flowering.

3. Seed germination and senescence; physiological changes.

SRI RAMAKRISHNA(AUTONOMOUS)DEGREE COLLEGE

IV Semester/ Botany

Plant Physiology and Metabolism-Paper-IV

Time:3Hrs   Model Question paper   Max.Marks=75

PART-A

I.Answer any FIVE from the given Questions   5x5=25M

1.osmosis
2.Nitrogenase
3.Diffusion
4.Krebs cycle
5.Gibberllins
6.Red drop and Emerson Enhancenment Effect
7.Seed germination
8.Donan Equilibrium

PART-B

II. Answer ALL the Questions   10x5=50M

1.Define and explain water potential
            (or)
   Explain ASCENT of SAP (or) Transport of water
2.Describe Kreb's cycle and significance
            (or)
    Explain Electron Transport system
3.Explain Calvin cycles (C3 cycle) and significance
            (or)
   Explain cyclic and non-cyclic photophosphorylation
4. Define nitrogen fixation
          (or)
    Explain lipid metabolism
5.Define phytochrome and explain cytokinins
          (or)
   Define phytochrome and explain Gibberllins

SRI RAMAKRISHNA DEGREE COLLEGE (AUTONOMOUS)

IV Semester/ Botany Core Course
CELL BIOLOGY,GENETICS AND PLANT BREEDING

Unit – 1: The Cell

1. Cell theory; prokaryotic vs eukaryotic cell; animal vs plant cell; a brief account onultra-structure of a plant cell.

2. Ultra-structure of cell wall.

3. Ultra-structure of plasma membrane and various theories on its organization.

4. Polymorphic cell organelles (Plastids); ultra structure of chloroplast. Plastid DNA.

Unit – 2: Chromosomes

1. Prokaryotic vs eukaryotic chromosome. Morphology of a eukayotic chromosome.

2. Euchromatin and Heterochromatin; Karyotype and ideogram.

3. Organization of DNA in a chromosome (solenoid and nucleosome models).

Unit – 3: Mendelian and Non-Mendelian genetics

1. Mendel's laws of inheritance. Incomplete dominance and co-dominance; Multiple allelism.

2. Complementary, supplementary and duplicate gene interactions (plant based examples are to be dealt).

3. A brief account of linkage and crossing over; Chromosomal mapping - 2 point and 3 point test cross.

Unit – 4:Structure and functions of DNA

1. Watson and Crick model of DNA. Brief account on DNA Replication (Semi-conservative method).

2. Brief account on Transcription, types and functions of RNA. Gene concept and genetic code and Translation.

3. Regulation of gene expression in prokaryotes - Lac Operon.

Unit – 5:Plant Breeding

1. Definition, procedure; applications and uses; advantages and limitations of :(a) Mass selection, (b) Pure line selection and (c) Clonal selection.

2. Hybridization – schemes, and technique; Heterosis(hybrid vigour).

3. A brief account on Molecular breeding – DNA markers in plant breeding. RAPD, RFLP.

SRI RAMAKRISHNA(AUTONOMOUS)DEGREE COLLEGE

IV Semester/ Botany

Cell Biology,Genetics and Plant Breeding Paper-V

Time:3Hrs   Model Question paper   Max.Marks=75

PART-A

I.Answer any FIVE from the given Questions   5x5=25M

1.Plastid DNA

2.Hetreo chromatin

3.Translation

4.Properties of genetic code

5.RAPD

6.Karyotype

7.

8.Crossing over

PART-B

II. Answer ALL the Questions   10x5=50M

1.Discuss the structure and functions of cell wall

(or)

   Describe the structure and functions of plasma membrane

2. Difference between heterochromatin and Euchromatin

(or)

   Describe the complimentary gene interactions

3. Give an account of Linkage

(or)

   Mendal Law of inheritance

4. Describe the properties of the DNA mdoel What'son and krick model of DNA

(or)

    Explain the regulation of gene expression

5. What is selection? Write about mass selection

(or)

   What is Clonel selection? Describe it

SRI RAMAKRISHNA DEGREE COLLEGE (AUTONOMOUS),NANDYAL
ZOOLOGY SYLLABUS FOR IV SEMESTER
PAPER – IV: ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND
EMBRYOLOGY

Max. Marks: 70

UNIT I Animal Physiology - I
1.1 Process of digestion and assimilation
1.2 Respiration - Pulmonary ventilation, transport of oxygen and CO2
1.3 Circulation - Structure and functioning of heart, Cardiac cycle
1.4 Excretion - Structure and functions of kidney urine formation, counter current Mechanism

UNIT II Animal Physiology - II
2.1 Nerve impulse transmission - Resting membrane potential, origin and propagation of action potentials along myelinated and non-myelinated nerve fibers
2.2 Muscle contraction - Ultra structure of muscle, molecular and chemical basis of muscle contraction
2.3 Endocrine glands - Structure, functions of hormones of pituitary and pancreas

UNIT III Cellular Metabolism – I (Biomolecules)
3.1 Carbohydrates - Classification of carbohydrates. Structure of glucose
3.2 Proteins - Classification of proteins. General properties of amino acids
3.3 Lipids - Classification of lipids

UNIT IV Cellular Metabolism – II
4.1 Carbohydrate Metabolism - Glycolysis, Krebs cycle, Glycogen metabolism, Gluconeogenesis
4.2 Lipid Metabolism – β-oxidation of palmitic acid
4.3 Protein metabolism-Transamination, Deamination and Urea Cycle

Unit – V Embryology
5.1 Gametogenesis
5.2 Fertilization
5.3 Types of eggs
5.4 Types of cleavages

SRI RAMA KRISHNA (AUTONOMOUS) DEGREE COLLEGE ,NANDYAL
ZOOLOGY MODEL PAPER FOR IV SEMESTER
ZOOLOGY - PAPER - IV
ANIMAL PHYSIOLOGY, CELLULAR METABOLISM AND EMBRYOLOGY
Time: 3 hrs   **Max. Marks: 70**
SECTION-A

Answer any FOUR of the following
Draw labeled diagrams wherever necessary   **5x4=20**
1. Assimilation
2. Cardiac cycle
3. Counter current Mechanism
4. Action potentials
5. Parathyroid gland
6. Structure of glucose
7. β-oxidation of palmitic acid
8. Types of eggs

SECTION-B

II. Answer any FIVE of the following   5x10=50
   Draw labeled diagrams wherever necessary
9. A) Explain the transport of oxygen and CO2.
                    OR
   B) Explain the working of heart.
10. A) Explain the origin and propagation of Nerve impulse
                    OR
 B) Describe the Hormonal control of reproduction in a mammal
11. A) Describe the Enzymes Classification and Mechanism of Action
                    OR
 B) Describe the Classification of carbohydrates.
12. A) Write an essay on Carbohydrate Metabolism
                    OR
B) Explain the Protein metabolism.
13. A) Explain the Gametogenesis
                    OR
B) Write an essay on Development of Frog upto formation of primary germ layers.

SRI RAMAKRISHNA DEGREE COLLEGE (AUTONOMOUS), NANDYAL
ZOOLOGY SYLLABUS FOR SEMESTER - IV
COURSE – 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY

Max. Marks: 70

Unit – I Immunology – I (Overview of Immune system)
1.1 Introduction to basic concepts in Immunology
1.2 Innate and adaptive immunity,
1.3 Cells of immune system
1.4 Organs of immune system

Unit – II Immunology – II (Antigens, Antibodies, MHC and Hypersensitivity)
2.1 Antigens: Basic properties of antigens, B and T cell epitopes, haptens and adjuvants; Factors influencing immunogenicity
2.2 Antibodies: Structure of antibody, Classes and functions of antibodies
2.3 Hypersensitivity – Classification and Types

Unit – III Techniques
3.1 Animal Cell, Tissue and Organ culture media: Natural and Synthetic media,
3.2 Cell cultures: Establishment of cell culture (primary culture, secondary culture, types of cell lines; Protocols for Primary Cell Culture); Organ culture; Cryopreservation of cultures
3.3 Stem cells: Types of stem cells and applications
3.4 Hybridoma Technology: Production & applications of Monoclonal antibodies (mAb)

Unit-IV Applications of Animal Biotechnology
41 Genetic Engineering: Basic concept, Vectors, Restriction Endonucleases and Recombinant DNA technology
4.2 Gene delivery:Microinjection, electroporation, biolistic method (gene gun), liposome and viral-mediated gene delivery
4.3 Manipulation of reproduction in animals: Artificial Insemination, In vitro fertilization, super ovulation, Embryo transfer, Embryo cloning
Unit - V
5.1. PCR:Basics of PCR.
5.2 DNA Sequencing: Sanger's method of DNA sequencing- traditional and automated sequencing
5.3 Fermentation: Different types of Fermentation and Downstream processing; Agriculture

SRI RAMA KRISHNA (AUTONOMOUS) DEGREE COLLEGE, NANDYAL
ZOOLOGY MODEL PAPER FOR V SEMESTER
COURSE – 5: IMMUNOLOGY AND ANIMAL BIOTECHNOLOGY
Time: 3 hrs Max.   Marks: 70

Answer any Four of the following
Draw labeled diagrams wherever necessary   5x4=20
1. Vaccines
2. Basic properties of antigens
3. Structure of antibody
4. Protocols for Primary Cell Culture
5. Monoclonal antibodies
6. Vectors
7. Western blotting techniques
8. Fermentation

II. Answer any FIVE of the following   5x10=50
   Draw labeled diagrams wherever necessary

9. A) Explain the Cells of immune system.
                    OR
 B) Explain the Organs of immune system.
10. A) Explain the Exogenous and Endogenous pathways of antigen presentation and processing
OR
B) Describe the Classification and Types of Hypersensitivity
11. A) Describe the types of stem cells and applications of stem cell
                    OR
B) Describe the Natural and Synthetic culture media.
12.A) Write an essay on Gene delivery any two methods
                    OR
B) Explain the Manipulation of reproduction in animals any two methods
13. A) Explain the DNA fingerprinting Procedure and applications
OR
B) Write an essay on Sanger's method of DNA sequencing traditional and automated
sequencing.

SRI RAMA KRISHNA DEGREECOLLEGE (AUTONOMOUS),NANDYAL

SEMESTER - IV CHEMISTRY SYLLABUS PAPER-IV

(INORGANIC, ORGANIC AND PHYSICAL CHEMISTRY)   60hrs (4 h / w)

UNIT -I
Organometallic Compounds   classification of organometallic Compounds on the basis of bond type, Concept Definition of hapticity   of organicligands. Metalcarbonyls:18 electron rule, electron count of mononuclear, polynuclear and substituted metalcarbonyls of 3dseries.General methods of preparation of mono and binuclear carbonyls of 3dseries.P-acceptor behaviour of carbon monoxide. Synergic effects (VB approach) - (MOdiagram of CO can be referred to for synergic effect to IRfrequencies) Classification of organometallic Compounds on the basis of bond type.

UNIT – II
Carbohydrates
Occurrence,classificationandtheirbiologicalimportance,Monosaccharides:Constitutionand
absolute configuration of glucose and fructose, epimers and anomers, mutarotation, determination of ring size of glucose and fructose, Haworth projections and conformational structures; Inter conversions of aldoses and ketoses; Killiani-Fischer synthesis and Ruff degradation; Disaccharides– Elementary treatment of maltose,   lactose   and   sucrose. Polysaccharides–Elementary treatment of starch.

UNIT- III Amino acids and proteins
Introduction: Definition of Amino acids, classification of Amino acids into alpha, beta, and gamma amino acids. Natural and essential amino acids - definition and examples, classification of   alpha amino acids into acidic, basic and neutral amino acids with examples. Methods of synthesis: General methods of synthesis of alpha amino acids (specific examples - Glycine, Alanine, valine and leucine) by following methods: a) from halogenated carboxylic acid b) Gabriel Phthalimide synthesis c) strecker's synthesis.

Physical properties: Zwitter ion structure - salt like character - solubility, melting points, amphoteric character, definition of isoelectric point.

Chemical properties: General reactions due to amino and carboxyl groups - lactams from gamma and   delta amino acids by heating- peptide bond (amide linkage). Structure and nomenclature of peptides and   protein of maltose, lactose and sucrose. Polysaccharides–Elementary treatment of starch.

UNIT -IV   Heterocyclic Compomunds
Introduction and definition: Simple five membered ring compounds with one hetero atom
Ex. Furan. Thiophene and pyrrole - Aromatic character – Preparation from 1, 4, -dicarbonyl compounds: Acidic character of pyrrole - electrophillic substitution at 2 or 5 position, Halogenation, Nitration and Sulphonation under mild conditions - Diels Alder reaction in furan.

Pyridine – Structure - Basicity - Aromaticity- Comparison pyrrole- one method of preparation and properties - Reactivity towards Nucleophilic substitution with reaction.

Nitrogen Containing Functional Groups
Nitrohydrocarbons   3h
Nomenclature and classification-nitro hydrocarbons, structure Properties-Tautomerism of nitroalkanes leading to aci and keto form, Preparation of Nitroalkanes, reactivity -halogenation, reaction with HONO (Nitrous acid), Nef reaction
Amines: 11h
Introduction, classification, importance and general methods of preparation.
Properties : Physical properties, Basicity of amines: Effect of substituent, solvent and steric effects. Distinction between Primary, secondary and tertiary aminesusingHinsberg's method and nitrousacid.
Discussion of thefollowing reactions with emphasis on the mechanistic pathway: Gabriel Phthalimide synthesis, Hoffmann-Bromamidereaction, Carbyl amine reaction, Mannich reaction, Hoffmann's exhaustive   methylation, Hofmann- elimination reaction and Cope elimination.
Diazonium Salts: Preparation and synthetic applications of diazonium salts preparation of arenes, haloarenes, phenols, cyano and nitro compounds. Coupling reactions of diazonium salts (preparation of azo dyes).
UNIT- V   Photochemistry
Difference between thermal and photochemical processes, Laws of photochemistry- Grothus-
Draper's law and Stark-Einstein's law of photochemical equivalence, Quantum yield-
Photochemical   reaction mechanism- hydrogen- chlorine and hydrogen- bromide reaction. Qualitative description of fluorescence, phosphorescence, Jablonski diagram, Photosensitized reactions-energy transfer processes (simple example)
Thermodynamics
The first law of thermodynamics-statement, definition of internal energy and enthalpy, Heat capacities and their relationship, Joule-Thomson effect- coefficient, Calculation of work for the expansion of perfect gas under isothermal and adiabatic conditions for reversible its efficiency, Carnot theorem, Concept of entropy, entropy as a state function, entropy changes in reversible and irreversible processes. Entropy changes in spontaneous and equilibrium processes. energies- Criteria Third law of thermodynamics Spontaneous and non- spontaneous processes, Helmholtz and Gibbs equation for spontaneity.

SRI RAMAKRISHNA DEGREE (AUTONOMOUS) COLLEGE,NANDYAL
MODEL PAPER
SECOND YEAR B.Sc., DEGREE EXAMINATION SEMESTER-IV
CHEMISTRY COURSE -IV: INORGANIC, ORGANIC PHYSICAL CHEMISTRY
Time: 3 hours   Maximum Marks: 70

PART-A

Answer any FOUR of the following questions. Each carries FIVE marks 4 X 5= 20M

1. Describe the 18 electron rule of mono nuclear and polynuclear metal carbonyls with suitable examples.

2. What are epimers and anomers. Give examples.

3. Discuss about iso electric point and zwitter ion.

4. Discuss the Paul-Knorr synthesis of five membered heterocyclic compounds.

5. Explain Tautomerism shown by nitro alkanes

6. Discuss the basic nature of amines.

7. Write the differences between thermal and photochemical reactions.

8. Derive heat capacities and derive $C_p - C_v = R$

PART- B

Answer ALL the questions. Each carries TEN marks   5 X 10 = 50M

9 (a). What are organometallic compounds? Discuss their Classification on the basis of type of bonds with examples.

(or)

(b). Discuss the general methods of preparations of mono bi-nuclear carbonyls of 3d series.

10 (a). Discuss the constitution, configuration and ring size of glucose. Draw the Haworth and Conformational structure of glucose.

(or)

(b). (i) Explain Ruff's degradation.

   (ii) Explain Kiliani- Fischer synthesis.

11.(a). What are amino acids? Write any three general methods of preparation of amino acids.

(or)

(b). Discuss the aromatic character of Furan, Thiophene and Pyrrole

12.(a). Write the mechanism for the following.

   (i) Nef reaction

   (ii) Mannich reaction

(or)

(b).(i) Explain Hinsberg separation of amines.

   (ii) Discuss any three synthetic applications of diazonium salts.

13.(a). What is quantum yield? Explain the photochemical combination of Hydrogen- Chlorine and Hydrogen - Bromine.

(or)

(b). Define entropy. Describe entropy changes in the reversible and irreversible process.

***

INORGANIC CHEMISTRY
UNIT –I2 h
Coordination Chemistry 12 h
IUPAC nomenclature of coordination compounds, Structural and stereoisomerism in

complexes with coordination numbers 4 and 6. Valence Bond Theory (VBT): Inner and outer

orbital complexes. Limitations of VBT, Crystal field effect, octahedral symmetry. Crystal field

stabilization energy (CFSE), Crystal field effects for weak and strong fields. Tetrahedral

symmetry, Factors affecting the magnitude of crystal field splitting energy, Spectrochemical

series, Comparison of CFSE for Octahedral and Tetrahedral complexes, Tetragonal distortion of

octahedral geometry.Applications of crystal field theory.

UNIT –II

1. **InorganicReactionMechanism**:   **4h**

   Introduction to inorganic reaction mechanisms.Concept of reaction pathways, transitionstate,

   intermediate and activated complex. Labile and inert complexes, ligand substitution reactions -

   SN^1 and SN^2,Substitutionreactions in square planar complexes, Trans-effect, the ories of trans

   effect and its applications

2. **Stability   ofmetal complexes:**   **2h**

   Thermodynamic stability and kinetic stability, factors affecting the stability of metal

   complexes, chelate effect, determination of composition of complex by Job's method and mole

   ratio method.

   BioinorganicChemistry:8h
   Metalions present inbiological systems, classification of elements according to their action in

   biological system.

   Excess and deficiency of sometracemetals.Toxicityofmetalions(Hg,Pb,CdandAs), reasons

   fortoxicity, Use of chelatingagentsinmedicine, Cisplatinasananti-cancerdrug. Iron and its

   application in bio-systems, Haemoglobin, Myoglobin.Storage and transfer of iron.

PHYSICALCHEMISTRY 34 h
UNIT-III
1 .Phase rule

Explanation of the terms phase, component and degrees of freedom. Thermodynamic derivation of Gibbs phase rule. Phase diagram of one component system - water system, Study of Phase diagrams of Simple eutectic systems i) Pb-Ag system, desilverisation of lead ii) NaCl-Water system .

UNIT-IV
Electrochemistry 14h

Specific conductance, equivalent conductance and molar conductance- Definition and effect of dilution. Cell constant. Strong and weak electrolytes, Kohlrausch's law and its applications, Definition of transport number, determination of transport number by Hittorf's method. Debye-Huckel- Onsager's equation for strong electrolytes (elementary treatment only), Application of conductivity measurements- conduct metric titrations.

Electrochemical Cells- Single electrode potential, Types of electrodes with examples: Metal-metal ion, Gas electrode, Inert electrode, Redox electrode, Metal-metal insoluble salt- salt anion. Determination of EMF of a cell, Nernst equation, Applications of EMF measurements

- Potentiometric titrations. Fuel cells- Basic concepts, examples and applications

UNIT-V
Chemical Kinetics: 14h

The concept of reaction rates. Effect of temperature, pressure, catalyst and other factors on reaction rates. Order and molecularity of a reaction, Derivation of integrated rate equations for zero, first and second order reactions (both for equal concentrations of reactants). Half–life of a reaction. General methods for determination of order of a reaction.Concept of activation energy and its calculation from Arrhenius equation. Theories of Reaction Rates: Collision theory and Activated Complex theory of bimolecular reactions. (Qualitativetreatmentonly). Enzymecatalysis-Specificity, factors affecting enzyme catalysis, Inhibitors and Lock & key model. Michaels- Menten equation- derivation, significance of Michaelis-Menten constant.

SRI RAMAKRISHNA DEGREE (AUTONOMOUS) COLLEGE,NANDYAL
MODEL PAPER
SECOND YEAR B.Sc., DEGREE EXAMINATION
SEMESTER-IV
CHEMISTRY COURSE V: INORGANIC PHYSICAL CHEMISTRY
Time: 3 hours   **Maximum Marks:70**
PART- A
Answer any FOUR of the following questions. Each carries FIVE marks   4 X 5 = 20M
1. Write note on Jahn-Teller distortion.
2. Explain Labile; inert complexes.
3. Explain Job's method for determination of composition of complex.
4. Explain Thermodynamic derivation of Gibb's phase rule.
5. Explain any two conductometric titrations.
6. Write note on Fuel Cells with examples and applications.
7. What is enzyme catalysis? Write any three factors effecting enzyme catalysis.
8. Derive Michaels- Menten equation.

PART- B
Answer ALL the questions. Each carries TEN marks   5 X 10 = 50M
9 (a). Explain Valence Bond theory with Inner and Outer orbital complexes. Write limitations of VBT.
(or)
(b). Define CFSE. Explain the factors effecting the magnitude of crystal field splitting energy.
10 (a). Explain Trans effect. Explain the theories of trans effect and write any two applications of trans effect.
(or)
(b). (i) Write the biological functions of Haemoglobin and Myoglobin.
     (ii) Write note on use of chelating agents in medicines
11.(a). Define Phase rule and terms involved in it. Explain phase diagram of Pb-Ag system.
(or)
(b). (i) Explain phase diagram for NaCl-water system.
(ii) Explain briefly about Freezing mixtures.
12.(a). Define Transport number. Write experimental method for the determination of transport number by Hittorf method
(or)
(b).(i) Define single electrode potential.
    (ii) Explain four types of electrodes with examples.
13.(a). Explain general methods for determination of order of a reaction.
(or)
  (b).Explain Collision theory and Activated complex theory of bimolecular reactions.
***