## Scheme of Examination (w.e.f. 2009-10)

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<tr>
<th>Class</th>
<th>Semester</th>
<th>Paper No.</th>
<th>Title of paper</th>
<th>Marks</th>
<th>Internal Assessment</th>
<th>Total Marks</th>
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<tr>
<td>B.Sc.- III</td>
<td>V</td>
<td>XIII</td>
<td>Plant Biochemistry</td>
<td>45</td>
<td>5</td>
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<td>XIV</td>
<td>Clinical Biochemistry</td>
<td>45</td>
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<td>XV</td>
<td>Lab Course – 5</td>
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<td>B.Sc.- III</td>
<td>VI</td>
<td>XVI</td>
<td>Immunology</td>
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<td>XVII</td>
<td>Biochemical Techniques</td>
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<td>XVIII</td>
<td>Lab Course - 6</td>
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**Note:** Practical examinations will be held at the end of even semesters.
B.Sc. - III (Biochemistry) Semester-V

Paper – XIII (Plant Biochemistry)

Max Marks=45
Internal Assessment=5
Time allowed=3 Hrs

NOTE: Seven questions will be set in all. Question No.1 comprising of objective/short answer type questions from the entire syllabus, will be compulsory. The remaining six questions will be set taking three questions from each section. The candidates will be required to attempt Q.No.1 & four others selecting two questions from each section. All questions carry equal marks.

SECTION-A

Photosynthesis: Photosynthetic pigments, Pigment system I and II, Mechanism of pigment system function, Generation of NADPH and ATP by non-cyclic electron flow; cyclic electron flow; Reagents which affect photosynthetic electron flow. Photosynthetic CO₂ Assimilation: Calvin cycle including its regulation, Photorespiration, Hatch & Slack pathway of CO₂ fixation and CAM pathway.

Electron transport Chain and energy coupling in plant mitochondria.

SECTION –B

Nitrate Assimilation: Nitrate uptake, structure and function of nitrate reductase and nitrite reductase; Regulation of nitrate assimilation.

Sulphate assimilation: Sulphate uptake; assimilation of sulphate into cysteine.

Biological N₂-fixation: N₂-fixing organisms, structure and mechanism of action of nitrogenase, strategies for protection of nitrogenase from inhibition by oxygen; role of leghaemoglobin; Ammonia assimilation.

Plant Hormones: Physiological functions of Auxins, Gibberellins, Cytokinins, Ethylene and ABA.

Suggested Reading:

NOTE: Seven questions will be set in all. Question No.1 comprising of objective/short answer type questions from the entire syllabus, will be compulsory. The remaining six questions will be set taking three questions from each section. The candidates will be required to attempt Q.No.1 & four others selecting two questions from each section. All questions carry equal marks.

SECTION – A

Hormones: General characteristics, classes with examples, major endocrine systems and their target tissues, physiological roles of hormones, Role of cyclic nucleotides and calcium in hormones action; Mechanism of action of epinephrin and steroid hormones. Biochemical aspects of diabetes mellitus.

Minerals: Functions of various major and trace minerals.

SECTION-B


Metabolic Disorders: Metabolic disorders of carbohydrate (Hypo- and hyper-glycemia, galactosemia, lactose intolerance, glycogen storage diseases), lipid (Sphingolipidosis, atherosclerosis, lipoproteinemia), protein (Phenylketonuria, alkapturinuria, tyrosenimea, maple syrup urine disease, Hartnup’s disease, homocysteinuria etc.) and nucleic acids (Gout, Lesch-Nyhan syndrome).


Detoxification mechanism of the body: Phase I and phase II pathways.

Acid-Base balance

Suggested reading:
Paper – XV (Lab Course- 5)

1. Separation of serum from blood.
2. Qualitative analysis of sugar, protein, ketone bodies and bile pigments in urine.
3. Determination of serum alkaline phosphatase.
4. Determination of blood urea and uric acid.
5. Determination of blood creatinine.
7. Estimation of chlorophyll content of leaves using acetone.

Suggested reading:
NOTE: Seven questions will be set in all. Question No.1 comprising of objective/short answer type questions from the entire syllabus, will be compulsory. The remaining six questions will be set taking three questions from each section. The candidates will be required to attempt Q.No.1 & four others selecting two questions from each section. All questions carry equal marks.

SECTION –A


Antigens: Immunogenicity versus antigenicity, factors influencing immunogenicity; Adjuvants; Epitopes (properties of B-Cell and T-cell epitopes); Haptens.

Immunoglobulins: Structure, classification & physicochemical properties of different classes of immunoglobulins.

Monoclonal Antibodies: Introduction, formation and selection of hybrid cells, their production and applications.

SECTION –B

Antigen–antibody interactions: Antibody affinity, antibody avidity, Agglutination & Precipitation reactions; Immunodiffusion; Radio immunoassay & ELISA.

Major Histocompatibility Complex (MHC): Location and function of MHC regions; Structure of class I & II MHC molecules; Role of MHCs.

Antigen Processing & Presentation: A brief account of antigen processing and presentation pathways.

Complement system: Components, activation and functions.

Suggested Reading:

1. A Short Course in Immunology by Benjamini
3. Immunology, 4th ed. by Roitt et al., Mosby Publications
NOTE: Seven questions will be set in all. Question No.1 comprising of objective/short answer type questions from the entire syllabus, will be compulsory. The remaining six questions will be set taking three questions from each section. The candidates will be required to attempt Q.No.1 & four others selecting two questions from each section. All questions carry equal marks.

SECTION – A

Hydrodynamic Methods: Sedimentation: sedimentation velocity including factors affecting it, preparative and analytical centrifugation techniques, ultracentrifugation, determination of molecular weight by hydrodynamic methods (derivations excluded and numericals included).
Chromatographic techniques: General principles and applications of adsorption, ion-exchange, molecular-sieve, thin layer, hydrophobic, affinity & paper chromatography.

SECTION – B
Electrophoresis: Basic principles of electrophoresis; Native & SDS-PAGE; Agarose gel electrophoresis and Isoelectric focussing.

Radioisotopic Techniques: Types of radiations, radioactive decay, units of radioactivity, detection and measurement of radioactivity (methods based on gas ionization and liquid scintillation counting) and Quenching. Autoradiography: overview, nuclear emulsions used in biological studies, isotopes commonly used in biochemical studies (\(^{32}\)P, \(^{35}\)S, \(^{14}\)C and \(^{3}\)H), track length of emitted particles and physical arrangements between emitting source and emulsion. Biological hazards of radiations and safety measures in handling radioisotopes. Biological applications of radioisotopes.

Spectroscopic Techniques
Beer-Lambert law, light absorption and its transmittance, extinction coefficient, a brief account of instrumentation and applications of visible and UV spectroscopic techniques (structure elucidation excluded).

Suggested reading:
Paper – XVIII (Lab Course- 6)

Max. Marks: 100 (For both Lab Courses 5&6)
Time allowed: 6 hours (Two sessions; For both Lab Courses 5& 6)

1. Separation and identification of amino acids \lipids by TLC.
2. Separation and identification of amino acids \ sugars by paper chromatography.
3. Separation of proteins by SDS-PAGE.
4. Estimation of serum protein and determination of albumin\ globulin ratio.
5. Demonstration of immunodiffusion

6. Identification of blood group

7. Estimation of haemoglobin

Suggested reading