SOPHIA COLLEGE FOR WOMEN

(EMPOWERED AUTONOMOUS)

Affiliated to the University of Mumbai

Programme: Life Sciences

Programme Code: SLSC

SYBSc

Syllabus for the Academic Year 2024-2025

based on the National Education Policy 2020

Programme Outline: SYBScLSc SEMESTER I

Course Code	Unit No	Name of the Unit	Credits
SLSC233MJ		**Comparative Physiology-I**	4
	1.	Physiology and Homeostatic Maintenance	
	2.	Control and Coordination in plants and animals	
	3.	Sex determination and sexual differentiation	
SLSC233MJP		Practicals	
SLSC234MJ		**Life Processes at the Tissue, Organ and Organism Level: A Biochemical Approach**	4
	1.	Enzymes and their environment	
	2.	Metabolism – Energy from Carbohydrates	
	3.	Metabolism – Energy from Lipids and Proteins	
SLSC234MJP		Practicals	

Programme Outline: SYBScLSc SEMESTER II

Course Code	Unit No	Name of the Unit	Credits
SLSC245MJ		**Comparative Physiology-II**	4
	1.	Integration and Coordination	
	2.	Adaptations to Physiological stress	
	3.	Homeostasis during infections	

SLSC245MJP		Practicals	
SLSC246MJ		**Life Processes at the Tissue, Organ and Organism Level: A Biochemical Approach-II**	4
	1.	Metabolism of Carbohydrates	
	2.	Metabolism – Nucleic acids	
	3.	Regulation of gene expression and Integration of metabolism	
SLSC246MJP		Practicals	

Preamble: The Broad-Based Integrated Biology Undergraduate Program in Life Sciences, which offers the BSc Life Sciences, is a cutting-edge integrated approach to biological sciences. The course is dedicated to the expansion of knowledge, innovation, and ethical practice in the field of life sciences, in recognition of the profound importance of these fields in understanding the complexity of living beings and ecosystems. Beyond theory, this program provides students with real laboratory activities that will help them hone their skills and obtain invaluable experience in a scientific setting. The student will be prepared to apply state-of-the-art tools and methods, which will reinforce their comprehension of the subjects taught in class. Through encouraging scientific inquiry, interdisciplinary collaboration, and the pursuit of excellence, our program aims to create a community of scholars and researchers who are ready to take on the most important problems facing both humanity and the natural world, regardless of their career goals—research, industry, environmental science, or a combination of these.

PROGRAMME OBJECTIVES

PO1	Understand and analyze fundamental biological concepts while merging perspectives from several domains related to modern biology
PO2	Expand professional studies and research in disciplines such as neurology, genetics, cell biology, physiology, biochemistry, immunology, developmental biology, ecology, and biotechnology.
PO3	Understand and apply information from a variety of scientific resources; assess and interpret graphical data; develop reliable hypotheses, plan experiments, and observational techniques in a laboratory setting; demonstrate problem-solving abilities; and present results from science in verbal and written form.
PO4	Demonstrate expertise in scientific subjects such as biostatistics, bioinformatics,

	and analytical procedures required for productive biological research; understand biotechnological processes utilized in business; and anticipate need-based entrepreneurial opportunities in all areas of biology.
PO5	Engage as a team, establish interpersonal communication skills, and get the confidence to pursue a career in any field of choice.

PROGRAMME SPECIFIC OUTCOMES

PSO1	Students will able to understand various fundamental concepts of life science and reflect them in their day to day life
PSO2	Student will be able to critical think and analyze any given problem scientifically
PSO3	Students will be proficient with analytical tools and techniques of life sciences

SEMESTER 1

NAME OF THE COURSE	Comparative Physiology-I	
CLASS	SYBSCLSC	
COURSE CODE	SLSC233MJ	
NUMBER OF CREDITS	4	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	50	50
PASSING MARKS	50	50

COURSE OBJECTIVES:

CO1	Outline physiology and homeostatic maintenance
CO2	Compare and contrast the control and coordination in plants and animals
CO3	Gain knowledge about sex determination and sexual differentiation

COURSE LEARNING OUTCOMES:

CLO1	Compare and contrast diverse mechanisms and this provides a cohesive understanding of physiology.
CLO2	Interpret the nervous system in diverse genera.
CLO3	Identify the process of sexual maturation and gamete development across the plant and animal kingdom

UNIT 1	Physiology and Homeostatic Maintenance
1.1	**(A): Transport in Plants & Animals:** Transport in plants – Transport of water and inorganic solutes – transpiration, stomatal function and regulation, role of proton pumps and factors affecting ascent of xylem sap. Transport of organic solutes – mechanism and its regulation Circulation in animals – (a) Animals without a circulatory system eg. hydra and jellyfish (b) Open and closed circulatory system eg. Insects vs worms Vertebrate circulatory system –heart, single and double circulation. Specific adaptations – mammals at high altitudes and diving mammals Cardiovascular system in health and disease – exercise, hypertension and atherosclerosis **(B): Respiration and Gaseous exchange** Aerobic and anaerobic respiration Gas exchange in small animals (across surface) and cutaneous respiration in frogs. Gas exchange in plants – also pneumatophores Gaseous exchange in invertebrates – trachea in insects, book lungs in scorpion Gaseous exchange in vertebrates – gills and lungs Respiratory pigments – O2 and CO2 balance
UNIT 2	**Control and Coordination in plants and animals**
2.1	1. Phylogenetic development of the Nervous System – nerve net, nerve plexus and ganglionated nervous system in hydra, starfish and earthworm. 2. Human Nervous System – CNS and PNS overview 3. Nature of the Nerve Impulse – Resting potential, Action Potential 4. Nature of the Nerve Impulse – Resting potential, Action Potential 5. Transmission of Nerve impulses and synapses Behaviour and behavioural adaptations (Neuronal) – Innate and learned behaviour (Habituation) with an example of Aplysia Behavioural Strategies in Bird Migration (Physiological Aspect-Accumulation of body fat and thermoregulation, Nonstop long-distance flight).
UNIT 3	**Sex determination and sexual differentiation**

3.1	1. Basis of Sex Determination (a) Plants: e.g. Maize/Papaya (b) Animals: Role of SRY gene and Aromatase (c) Role of environmental factors – Temperature and Parthenogenesis in insects e.g. Wasp/Honey bee/Ants (d) Plant-animal interaction for reproduction e.g. Fig wasp / Gall wasp (e) Sex reversal 2. Sex differentiation of gonads, internal external genitalia – e.g : Human 3. Early gametogenic development in plants alternation of generation. e.g: moss/ Ferns. Double fertilization: E.g. angiosperms. 4. Ovarian and testicular functions, puberty and regulation of uterine changes in menstrual cycle, menopause, pregnancy, parturition, lactation. 5. Artificial regulation of reproduction: Use of contraceptive methods
SLSC233MJP	1. Good Laboratory Practices 2. a. Demonstration of reproductive system and location of endocrine glands in Albino Mouse Male and Female (Virtual Lab) b. Study of Histological features of Endocrine glands 3. Study of Floral parts from the given flower (*Hibiscus* and *Pancretium*) study of microscopic structure of anthers, ovules, and seed structure (Maize and Okra) 4. a. Study of pollen germination using *Vinca* flower (*in vitro*) b. Study of pollen germination in *Vinca* (*in vivo*) c. Tracing the path of the pollen tube along the stylar canal using Aniline blue stain 5. Study of effect of temperature and caffeine on heartbeat of Daphnia 6. Principle and working of home pregnancy test slide 7. Comparative Anatomy of Brain (Invertebrate to vertebrate) 8. Comparison of rate of transpiration from leaf surface a. Cobalt chloride method b. Four leaf method 9. Probability testing using suitable example 10. Investigating and distribution of data sample using Binomial, Poisson and Normal distribution

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1. Aneja K.R., Experiments in Microbiology, Plant Pathology and Biotechnology, 2017,5th Edition, *New Age InternationalPublishers.*
2. Hardin J., Bertoni J.P., Kleinsmith L.J., Becker's World of the Cell: International Edition, 2011, 8th Edition, *PearsonPublisher*.
3. Madigan M, Martinko J., Bender K., Buckley D., Stahl D., Brock Biology of Microorganisms, 2017, 14th Edition, *Pearson Publishers*
4. TortoraG.J.,FunkeB.R.,CaseC.L.,Microbiology:AnIntroduction,20

16,12thEdition, *Pearson Publication*

5. Willey J., Sherwood L., Woolverton C., Prescott, Harley and Klein's, Microbiology, 2008, 7th Edition*, McGraw Hill HigherEducation*
6. Nelson D.L. and Cox M.M., Lehninger-Principles of Biochemistry, 2017, 7thEdition, *W H Freeman & Co Publishers.*
7. Plummer M. and Plummer D.T., Introduction to Practical Biochemistry, 1988, 3rdEdition, *McGraw Hill Publication*
8. Taylor D.J., Green N.P.O., Stout G.W., Ed. Soper R., Biological Science, 2005, 3rdEdition, *Cambridge University Press.*
9. Karp G, Cell Biology, 2013, 7thEdition- International Student Edition, *Wiley Publication.*
10. LodishH.,BerkA.,KaiserC.A.,MolecularCellBiology,201 2,7thEdition, *Macmillan Learning Publications.*
11. Plopper G, Principles of Cell Biology, 2016, 2ndEdition*, Jones and Bartlett Learning Publication.*

NAME OF THE COURSE	Life Processes at the Tissue, Organ and Organism Level: A Biochemical Approach	
CLASS	SYBSCLSC	
COURSE CODE	SLSC234MJ	
NUMBER OF CREDITS	4	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	50	50
PASSING MARKS	50	50

COURSE OBJECTIVES:

CO1	Familiarize students with the basic biochemical process in the cells and tissues and their regulation .
CO2	Acquaint the students to the lipid and protein catabolism by demonstrating its significance in terms of real life examples.
CO3	Introduce students to different techniques used to extract and purify enzymes and the parameters to study enzyme kinetics and further how enzyme activity is regulated.

COURSE LEARNING OUTCOMES:

CLO1	Help students understand the basic biochemical process.
CLO2	Students can relate the process involving their food metabolism and respiration
CLO3	To inculcate the knowledge of lipid and protein metabolism and relate the knowledge to host metabolic processes

UNIT 1	**Enzymes and their environment**
1.1	1. Extraction, purification of Enzymes techniques used: Dialysis, Gel-filtration, Ion-exchange, Affinity chromatography and Spectrophotometry 2. General protocol of enzyme extraction using the examples of RUBISCO from plants and LDH from animals. 3. Meaning and significance of Specific Activity 4. Enzyme Classification (With an example of each) 5. Effect of pH and Temperature 6. Co-enzymes and co-factors: NAD, FAD, Mn, Mg, Zn and Cu (one reaction each) 7. Enzyme Kinetics (MM, LB) 8. Regulation of enzyme activity: Inhibitors, Activators and feed-back control 9. Allosteric enzymes (Kinases in Glycolysis) and their significance in metabolic regulation
UNIT 2	**Metabolism – Energy from Carbohydrates**
2.1	A. Carbohydrates – Catabolism 1. Glycolysis – a. Brief Historical background b. process and metabolic regulation 2. Citric Acid Cycle– a. Brief Historical background b. Process and regulation. c. Importance as a central amphibolic pathway unifying all primary biological processes. d. Anaplerosis B. Bioenergetics: 1. Electron Transport System a. Localisation and b. Sequence of electron transporters 2. Oxidative Phosphorylation a. Mitchell's Chemiosmotic Hypothesis ii. ATP synthesis b. Control of respiration, uncoupling and metabolic poisons
UNIT 3	**Metabolism – Energy from Lipids and Proteins**

3.1	**A. Lipids–Catabolism:** a. Lipolysis b. Role of Carnitine in mitochondrial Permeability c. Beta– oxidation of fatty acids and integration into Kreb'scycle d. Ketone bodies and their significance **B. Proteins –Catabolism:** a. Protein Degradation and liberation of amino-acids b. Deamination, Transamination of amino-acids and ammonia disposal by Urea cycle. c. Decarboxylation of amino acids and integration into Kreb's cycle**.**
SLSC234MJP	**A. Instrumentation / Technique** 1. - pH metry 2. - Colorimetry 3. - Titration **B- Process / Concept and immediate Relevance** 4. - Extraction, Purification 5. - Analysis/Estimation 6. - GLP (Good Laboratory practices) incorporated into every practical 7. pH meter - a) principle & instrumentation and b)determination of pH (titration of Acids/Bases/Buffers/ 'chameleon balls'). *(in FY the students were introduced to the concept of pH measurement of familiar liquids-here tech & details are given practically understanding buffering using Glycine / titration curve)* 8. Protein precipitation by pH manipulation (Casein from Milk/Curds) *(From previous experiment and pH manipulation, proteins can be precipitated)* **C. Enzymology &localization:** 9. Study of Enzyme activity and Kinetics: Determination of KM of an enzyme Urease(from Jack beans)/Lipase/Protease (from detergents) *(Enzyme activity can be detected and estimated – using colorimetry)* 10. Histochemical localization ofEnzymes (Acid Phosphatase) *(Enzyme activity can be localized)* **D. Estimation /Quantitation:** 11. Colorimetric Protein Estimation by Biuret Method (Enzyme extract/Casein from previous experiments). *(Proteins, such as the isolate from experiment can be estimated by color reaction)* 12. Colorimetric Cholesterol Estimation / total Lipid Estimation from egg. *(lipid metabolism) an important component of our systems, content can be estimated by color reaction)*

	13. Titrimetric estimation of Ascorbic acid (VitC). *(Estimation of biological materials by non- colorimetric method).*

References:

1. 1. Lehninger's Principles of Biochemistry, Nelson and Cox, 4th edition (2005)W. H FreemanPublishers.
2. 2. Biochemistry, J.M. Berg, J L Tymencko and L. Stryer, 5th edition (2002)W H Freeman andco.
3. 3. Fundamentals of Biochemistry, D.Voet , J. G.Voet, 1st ed (2004)John Wiley &Co., New YorkPratt.
4. 4. Principles of Biochemistry, Lehninger.A, 2nd Edition (1993)CBS Publishers and Distributors,
5. 5. Principles of Biochemistry, Zubay G.L, Parson W.W. and Vance D.E., 1stedition (1995) W. C.Brown.
6. 6. An Introduction to Genetic Analysis, Griffiths A.J. etal, 7thedition (2002), W. H. Freeman(London).
7. 7. Concepts of Genetics, Robert Brooker, 2ndedition (2015), McGraw-HillEducation.
8. 8. Karp's Cell Biology, Iwasa, Janet, Mashall, Wallace, Global edition (2018), John Wiley &Sons.

ASSESSMENT DETAILS:

I. Internal Assessment (IA): 50 marks

- IA is a separate head of passing.
- A learner should get a minimum of 20 marks out of 50 to be declared PASS in the course.
- 2 activities of 25 marks each.
- If the learner does not get 20 marks out of 50, the learner will have to appear for the IA ATKT.

II. Semester End Examination (SEE): 50 marks

- SEE is a separate head of passing.
- A learner should get a minimum of 20 marks in SEE to be declared PASS in the course.
- All units of the syllabus will be covered in SEE and will be given equal weightage.
- Decisions will be made by college administration for those who are absent, due to valid reasons, for the main/regular SEE.
- If the learner does not get 20 marks out of 50, the learner will have to appear for the SEE ATKT.

SEMESTER 2

NAME OF THE COURSE	Comparative Physiology-II	
CLASS	SYBSCLSC	
COURSE CODE	SLSC245MJ	
NUMBER OF CREDITS	4	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD	INTERNAL ASSESSMENT	SEMESTER END EXAMINATION
TOTAL MARKS	50	50
PASSING MARKS	50	50

COURSE OBJECTIVES:

CO1	Interpret the Integration and coordination in the living system.
CO2	Gain knowledge of endocrine glands and hormones
CO3	Identify the mechanisms of homeostasis during infections

COURSE LEARNING OUTCOMES:

CLO1	Develop an understanding of homeostatic mechanisms and cellular communications.
CLO2	Delineate the conditions due to derailing of homeostasis as happening in case of stress.
CLO3	Inculcate an understanding of defense mechanisms in case of infections plants and animals.

UNIT 1	**Integration and Coordination**

	A. Homeostatic mechanisms and cellular communication Terminology: Homeostasis and Feedback loop, variables, receptors, integrators, effectors **B. Biochemical basis of cell signaling** Types of hormones: Lipid-derived, amino acid-derived and peptide hormone. Mechanism of hormone action: 1. Hormone receptor interactions 2. Receptor specificity 3. Receptor affinity 4. Saturation 5. Agonist and Antagonist Intracellular signaling from receptors: 1.Ion channel receptor 2. G protein-coupled receptors 3. Enzyme-linked receptors 4. Target cell response. **C. Endocrine glands and their hormones (An Overview)** Pineal Gland and Circadian system, Hypothalamus and Pituitary Thyroid, Parathyroid, Pancreas, Adrenal cortex, Testis and Ovary. **D. Plant hormone homeostasis: Signalling and functions during development.** Auxins, Gibberellic acid, Cytokinin, Abscisic acid, Ethylene **E. Interdependence of Muscle and support systems:** Role of muscle in locomotion a. Locomotion in earthworm b. Locomotion in humans – axial and appendicular skeleton and points of contact. Types of skeletons – hydrostatic (nematodes), exoskeleton (arthropods/molluscs) and endoskeletons (vertebrates) Homeostatic problems with locomotion: Muscular dystrophy/ sprain and strain/Osteoarthritis. Support system in plants – herbaceous and woody plants
UNIT 2	**Adaptations to Physiological stress**
	A. Ion & Water Homeostasis 1. In plants – water and salt regulation under normal and stressed

	conditions 2. In animals – Phylogenetic review of organs and processes - contractile vacuole, flame cells, nephridium, Malpighian tubules, kidney and skin in man 3. Concept of osmoregulation and processes associated with osmoregulation (ultrafiltration, selective re-absorption, secretion, acid-base regulation) 4. Nitrogenous excretory products (ammoniotelism, ureotelism and uricotelism) 5. Case studies: mammals in arid regions (camel); salt glands in birds. **B. Homeostasis to stress: Thermal physiology:** 1. Plant adaptation in extreme thermal conditions 2. Thermal strategies in poikilotherms Homeotherms, ecto and endotherms. 3. Fever, Hyperthermia, heat exhaustion and heat stroke. 4. Antifreeze proteins. **C. Fuel Homeostasis during exercise and Stress:** 1. Regulation of energy stores: control of food intake 2. Role of Leptin, Ghrelin and Kisspeptin 3. Eating disorders: Anorexia and Bulimia Nervosa 4. Overweight and obesity 5. Type I and Type II Diabetes
UNIT 3	**Homeostasis during infections**
	A. Host Parasite Relationship 1. Virulence factors and toxins: virulence factors, exotoxins, enterotoxins, Endotoxins 2. Host factors in infection: host risk factors, innate resistance 3. Parasite escape mechanisms **B. Defense mechanisms in plants** Biomolecules such as secondary metabolites, surface protectants and enzymes **C. Defense mechanisms in animals** 1. Innate and Adaptive Immunity 2. Introduction to primary and secondary Lymphoid organs and Lymphatic Systems 3. Mechanisms of Innate Immunity – In Invertebrates (hemocytes)and Vertebrates (physical, physiological barriers, phagocytosis, inflammation) 4. Mechanisms of Adaptive Immunity – T and B cells. (Mode of Recognition of Antigen)
SLSC245MJP	1. Good Laboratory Practices 2. Estimation of chlorophyll stability Index and carotenoid stability

	index in leaf tissue. 3. Estimation of ABA content in leaf and root. 4. Alkaloid separation by TLC 5. ABO blood typing 6. Detection of activity of plant hormone (Dose-dependent response). 7. Widal Test-Qualitative. 8. Streak plating (T, Pentagon and Quadrant –Any 2) to isolate microorganisms from a mixed culture using differential media. 8. Antibiotic sensitivity of microorganism (Plant extract, Tetracycline/ Gentamycin) 9. Study of Histological features of Endocrine glands

REFERENCES:

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2. Essential Developmental Biology, J.M. W. Slack, 2nd edition (2006), BlackwellPublishers.
3. Developmental Biology, Scott Gilbert, 9th edition (2010), Sinauer Associates.
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7. Principles of Animal Physiology, C Moyes and Schulte, 2nd edition (2007) PeasonEducation.
8. Microbiology, Davis, Dulbecco and Ginsberg (1990) Lippincott Company,Philadelphia.
9. Textbook of Microbiology, Ananthanarayanan and Panniker, 5th edition (1996)OrientLongman.

NAME OF THE COURSE	Life Processes at the Tissue, Organ and Organism

	Level: A Biochemical Approach-II	
CLASS	SYBSCLSC	
COURSE CODE	SLSC246MJ	
NUMBER OF CREDITS	4	
NUMBER OF LECTURES PER WEEK	3	
TOTAL NUMBER OF LECTURES PER SEMESTER	45	
EVALUATION METHOD TOTAL MARKS PASSING MARKS	INTERNAL ASSESSMENT 50 50	SEMESTER END EXAMINATION 50 50

COURSE OBJECTIVES:

CO1	Familiarize students with the basic biochemical process in the cells and tissues and their regulation
CO2	Understand the molecular process involved in gene expression
CO3	Introduced to the anabolism of biomolecules like carbohydrates, lipids, and amino acids, further they will get a deeper understanding of photorespiration and C3 and C4 cycles in photosynthesis.

COURSE LEARNING OUTCOMES:

CLO1	To understand the basic biochemical process.
CLO2	To relate the process involving their food metabolism and respiration
CLO3	To understand the process involving gene expression.

UNIT 1	**Metabolism of Carbohydrates**
	Anabolism of biomolecules: **A. Carbohydrate Anabolism:** 1. Gluconeogenesis 2. Pentose phosphate pathway

	3. Short account of polysaccharide synthesis (Glycogen) **B. Lipids Anabolism:** 1. Fatty acid biosynthesis 2. Cholesterol biosynthesis (4 Stages – Condensation, Conversion, Polymerization and Cyclization) and prostaglandin biosynthesis **C. Amino-acid Anabolism:** 1. Transamination and its significance 2. Glutamate and Glutamine metabolism and significance **D. Photosynthesis** 1. Photophosphorylation, Hill reaction 2. C3 and C4cycles 3. Photorespiration
UNIT 2	**Metabolism – Nucleic acids**
	Chemistry of nucleic acids – 1. Existence of two pathways for purine and pyrimidine synthesis and Significance of the 'salvage pathway'. 2. Transcription a. Prokaryotes - binding, initiation, elongation & termination b. Eukaryotes - only in terms of different RNA polymerase along with promoters RNA processing – of rRNA, tRNA, and mRNA (5'cap, poly-A tail, and intron splicing (snRNPs only). 3. Concept of Reverse transcription.
UNIT 3	**Regulation of gene expression and Integration of metabolism**
	1. Translation: Genetic code; Translation system – Prokaryotes and Eukaryotes, post translational modification(Phosphorylation, methylation and Acetylation) 2. Regulation of gene expression and its significance (a) Operon model (Lac and Trp). (b) Alternate splicing (c) Concept of RNAi
SLSC246MJP	**A. Instrumentation / Technique** PAGE (Demonstration) Chromatography – Paper, Thin layer, Column **B. Process / Concept and Immediate Relevance** - Extraction, Purification - Analysis/Estimation - GLP (Good Laboratory practices) incorporated into every practical

	C. Separation / Extraction techniques 1. Extraction and Detection of RNA/Ribose Sugars. *(Extraction of nucleic acid and detection by color reaction)* 2. Chromatography of Sugars –Circular Paper *(Separation of carbohydrates and detection by color reaction)* 3. Thin Layer Chromatography for separation of Plant Pigments *(Slide technique)* *(Separation techniques for charged, and uncharged materials based on solvent partition)* 4. Solvent Extraction of Lipids**.** (Extraction of lipid and proportional estimation by weight) 5. Column Chromatography of Proteins / Pigments. *(Separation technique for proteins/ other materials based on charge/size)* 6. Protein separation by PAGE *(Demonstration)* *(Separation techniques for charged materials based on electrophoretic mobility)* 7&8. Plant enzyme *(Qualitative / Quantitative)* 9. Interpretation of pathological reports based on biochemical analysis.

References:

1. Lehninger's Principles of Biochemistry, Nelson and Cox, 4th edition (2005)W. H FreemanPublishers.
2. Biochemistry, J.M. Berg, J L Tymencko and L. Stryer, 5th edition (2002)W H Freeman and co.
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ASSESSMENT DETAILS:

I. Internal Assessment (IA): 50 marks

- IA is a separate head of passing.
- A learner should get a minimum of 20 marks out of 50 to be declared PASS in the course.
- 2 activities of 25 marks each.
- If the learner does not get 20 marks out of 50, the learner will have to appear for the IA ATKT.

II. Semester End Examination (SEE): 50 marks

- SEE is a separate head of passing.
- A learner should get a minimum of 20 marks in SEE to be declared PASS in the course.
- All units of the syllabus will be covered in SEE and will be given equal weightage.
- Decision will be made by college administration for those who are absent, due to valid reasons, for the main/regular SEE.
- If the learner does not get 20 marks out of 50, the learner will have to appear for the SEE ATKT.