EVEN SEMESTER LECTURE PLAN

Name of the college: Government College of Arts, Science and Commerce, Sanquelim Goa

Name of Faculty: Dr. Nisha Kevat	**Subject:** Cell Biology and Plant Biochemistry	
Paper code: BOT 203	**Program/Course: S.Y B.Sc.**	**Division: - --**
Academic year: 2025 - 2026	**Semester: IV**	**Total Lectures: Theory 45**

Course Objectives:

1. Provide an overview of structure of the cell and subcellular components and their functions.
2. Enhance knowledge of classification, structure and functions of biomolecules.
3. Impart skills to study properties of biomolecules and to estimate their quantities for bio-analytical research.

Course Learning Outcome:

1. On completion of this course, students will be able to:
2. Recall the types and functions of subcellular components, biomolecules, vitamins, enzymes and secondary metabolites.
3. Describe the structure of the cell, subcellular components and various biomolecules.
4. Analyze the role of subcellular components, biomolecules, vitamins, and enzymes in cell functioning.
5. 4. Develop skills in bioanalytical testing for scientific research.

Month	Lectures From:	To:	No. of lectures allotted	Topic, Subtopic to be covered	Learning outcome	ICT Tools	Reference books
December (1st Week)	01/12/2025	6/12/2025	3 h	Theory 1: Module 1: Cell and subcellular components Cell theory, ultrastructure of prokaryotic (eubacteria) and eukaryotic (plant) cell.	**Cell theory and ultrastructure**: Explain the principles of cell theory and compare the ultrastructure of prokaryotic and eukaryotic cells.	Offline lecture, power point presentation, notes, pdf	1. **Becker**, **WM**, **Kleinsmith**,

				Theory 2. Cell wall – chemical composition, structure and functions.	**Cell wall**: Analyze the chemical composition, structure, and functions of the cell wall.	Offline lecture, power point presentation, notes, pdf	**LJ**, **Hardin**, **J** and **Bertoni**, **GP** (2009). The World of the Cell. 7th edition. Pearson Benjamin Cummings Publishing, U.S.A. 2. **Berg**, **JM**, **Tymoczko**, **JL** and **Stryer**, **L** (2011). Biochemistry. WH Freeman and Company, New York. 3. **Boyer**, **R** (2001). Modern Experimental Biochemistry. 3rd edition. Pearson Education, Singapore. 4. **Campbell**, **MK** (2012). Biochemistry.
				Theory 3. Cell membrane – chemical composition, structure (Fluid Mosaic Model) and functions; cell membrane fluidity.	**Cell membrane**: Describe the chemical composition, structure (Fluid Mosaic Model), functions, and fluidity of the cell membrane.	Offline lecture, power point presentation, notes, pdf	
December (2nd Week)	8/12/2025	13/12/2025	3 h	Theory 4: Nucleus – structure (nuclear envelope,	**Nucleus**: Illustrate the structure and functions of the nuclear envelope, nucleoplasm, chromatin, and nucleolus.	Offline lecture, power point presentation, notes, pdf	
				Theory 5: nucleoplasm, chromatin – euchromatin and heterochromatin, nucleolus) and functions.	**Nucleus**: Illustrate the structure and functions of the nuclear envelope, nucleoplasm, chromatin, and nucleolus.	Offline lecture, power point presentation, notes, pdf	
				Theory 6: Plastids – types of plastids; morphology, structure and functions of chloroplast.	**Plastids**: Identify the types, morphology, structure, and functions of plastids, with emphasis on chloroplasts.	Offline lecture, power point presentation, notes, pdf	
January (3rd Week)	02/01/2026	03/01/2026	3 h	Theory 7: Mitochondria – structure and functions.	**Mitochondria**: Describe the structure and functions of mitochondria.	Offline lecture, power point presentation, notes, pdf	
				Theory 8: Ribosomes – structure of prokaryotic Ribosomes.	**Ribosomes**: Differentiate between the structure and functions of prokaryotic and eukaryotic ribosomes.	Offline lecture, power point presentation, notes, pdf	
				Theory 9: Eukaryotic ribosomes and their functions.	**Ribosomes**: Differentiate between the structure and functions of prokaryotic and eukaryotic ribosomes.	Offline lecture, power point presentation, notes, pdf	
January (4th Week)	05/01/2026	10/01/2026	3 h	Theory 10: Endoplasmic reticulum – types, structure and functions.	**Endoplasmic reticulum**: Explain the types, structure, and functions of the endoplasmic reticulum.	Offline lecture, power point presentation, notes, pdf	
				Theory 11: Golgi apparatus – structure and functions.	**Golgi apparatus**: Describe the structure and functions of the	Offline lecture, power point presentation, notes,	

					Golgi apparatus.	pdf	7th edition. Cengage Learning, Boston. 5. **Gupta**, **PK** (1999). A Text Book of Cell and Molecular Biology. Rastogi Publications, Meerut, U.P. 6. **Jain**, **JL**, **Jain**, **S** and **Jain**, **N** (2007). Elementary Biochemistry. 3rd edition. S. Chand and Company Ltd., New Delhi. 7. **Karp**, **G** (2009). Cell and Molecular Biology: Concepts and Experiments. 6th edition. John Wiley & Sons Inc., U.S. 8. **Nelson**, **DL** and **Cox**, **MM**
				Theory 12: Cytoskeleton – structure and functions of microtubules, microfilaments and intermediate filaments.	**Cytoskeleton**: Examine the structure and functions of microtubules, microfilaments, and intermediate filaments in the cytoskeleton.	Offline lecture, power point presentation, notes, pdf	
January (5th Week)	12/01/2026	17/01/2026	3 h	Theory 13: Other subcellular components – structure and functions of lysosomes, peroxisomes and glyoxysomes.	**Other subcellular components**: Discuss the structure and functions of lysosomes, peroxisomes, and glyoxysomes.	Offline lecture, power point presentation, notes, pdf	
				Theory 14: Module 2: Biomolecules Carbohydrates: Classification and biological role of carbohydrates;	**Carbohydrates**: Classify carbohydrates and explain their biological roles, structures, and properties, including starch synthesis and degradation.	Offline lecture, power point presentation, notes, pdf	
				Theory 15: structure and properties of monosaccharides (glucose and fructose),		Offline lecture, power point presentation, notes, pdf	
January (6th Week)	19/01/2026	24/01/2026	3 h	Theory 16: structure and properties of oligosaccharides (sucrose and maltose)	**Carbohydrates**: Classify carbohydrates and explain their biological roles, structures, and properties, including starch synthesis and degradation.	Offline lecture, power point presentation, notes, pdf	
				Theory 17: structure and properties of polysaccharides (starch and cellulose);		Offline lecture, power point presentation, notes, pdf	
				Theory 18: synthesis and degradation of starch in plants.		Offline lecture, power point presentation, notes, pdf	
January (7th Week)	27/01/2026	31/01/2026	3 h	Theory 19: Amino acids**:** Classification	**Amino acids**: Classify amino acids and describe their structure, properties, biological roles, and the process of transamination.	Offline lecture, power point presentation, notes, pdf	
				Theory 20 Structure of Amino acids			
				Theory 21: properties and biological role of amino acids;		Offline lecture, power point presentation, notes, pdf	
February (8th Week)	02/02/2026	07/02/2026	3 h	Theory 22: Biological role of amino acids; transamination.	**Amino acids**: Classify amino acids and describe their structure, properties, biological roles, and	Offline lecture, power point presentation, notes, pdf	

					the process of transamination.		(2008). Lehninger Principles of Biochemistry. 5th edition. WH Freeman and Company, New York. 9. **Nigam**, **A** and **Ayyagari**, **A** (2007). Lab Manual in Biochemistry, Immunology and Biotechnology. Tata McGraw-Hill Publishing Company Ltd., New Delhi. 10. **Pollard**, **TD**, **Earnshaw**, **WC** and **Lippincort-Schwartz**, **J** (2007). Cell Biology. 2nd edition. Elsevier Health Sciences, Philadelphia.
				Theory 23: **Proteins:** Classification;	**Proteins**: Classify proteins and explain their structure (primary, secondary, tertiary, and quaternary), properties, and biological roles.	Offline lecture, power point presentation, notes, pdf	
				Theory 24: structure of proteins (primary and secondary)		Offline lecture, power point presentation, notes, pdf	
February (9^{th} Week)	9/02/2026	14/02/2026	3 h	Theory 25: tertiary and quaternary);	To learn the process of meiosis	Offline lecture, power point presentation, notes, pdf	
				Theory 26: properties and biological role of proteins.	**Proteins**: Classify proteins and explain their structure (primary, secondary, tertiary, and quaternary), properties, and biological roles.	Offline lecture, power point presentation, notes, pdf	
				Theory: 27: **Lipids:** Classification and biological role of lipids;	**Lipids**: Classify lipids and describe the structure, properties, synthesis, and breakdown of triglycerides, including fatty acid β-oxidation.	Offline lecture, power point presentation, notes, pdf	
February (10^{th} Week)	16/02/2026	21/02/2026	3 h	Theory 28: properties and structure of triglycerides.	**Lipids**: Classify lipids and describe the structure, properties, synthesis, and breakdown of triglycerides, including fatty acid β-oxidation.	Offline lecture, power point presentation, notes, pdf	
				Theory 29: Synthesis of fatty acids;			
				Theory 30: Synthesis and breakdown of triglycerides;			
February (11^{th} Week)	23/02/2026	28/02/2026	3 h	Theory 31: β-oxidation of fatty acids.	**Lipids**: Classify lipids and describe the structure, properties, synthesis, and breakdown of triglycerides, including fatty acid β-oxidation.	Offline lecture, power point presentation, notes, pdf	
				Theory 32: **Nucleic acids:** Structure of nucleotides;	**Nucleic acids**: Explain the structure of nucleotides, DNA (Watson & Crick's model and forms), and RNA (types and	Offline lecture, power point presentation, notes, pdf	
				Theory 33: Watson & Crick's model of		Offline lecture	

				DNA,	tRNA structure).		11. **Rao**, **BR** and **Deshpande**, **S** (2005). Experimental Biochemistry. IK International Pvt. Ltd., New Delhi. 12. **Verma**, **SK** and **Verma**, **M** (2007). A Textbook of Plant Physiology, Biochemistry and Biotechnology. 6th edition. S. Chand and Company Ltd., New Delhi. 13. **Wilson**, **K** and **Goulding**, **KH** (1986). A Biologists Guide to Principles and Techniques of Practical
March (12^{th} Week)	2/03/2026	07/03/2026	3 h	Theory 34: forms of DNA;	**Nucleic acids**: Explain the structure of nucleotides, DNA (Watson & Crick's model and forms), and RNA (types and tRNA structure).	Offline lecture	
				Theory 35: types of RNA, structure of tRNA.		Offline lecture	
				Theory 36: Module 3: Vitamins, enzymes and secondary metabolites Vitamins: Classification of vitamins;	**Vitamins**: Classify vitamins and explain their properties, occurrence, functions, and deficiency symptoms.	Offline lecture	
March (13^{th} Week)	09/03/2026	14/03/2026	3 h	Theory : 37- properties, occurrence, functions and deficiency symptoms of vitamins A, B complex, C, D, E and K.	To understand about the composition of nucleotide & nucleosides	Offline lecture	
				Theory : 38 - **Enzymes:** Nomenclature, classification, importance and physico-chemical properties of enzymes;	**Enzymes**: Explain enzyme nomenclature, classification, properties, mechanism of action, specificity, inhibition, and factors affecting activity.	Offline lecture	
				Theory : 39- structure of enzyme molecule; isoenzymes;		Offline lecture	
March (14^{th} Week)	16/03/2026	21/03/2026	3 h	Theory : 40- mechanism of enzyme action (lock and key hypothesis, induced-fit theory); Michaelis-Menten equation; enzyme specificity;	**Enzymes**: Explain enzyme nomenclature, classification, properties, mechanism of action, specificity, inhibition, and factors affecting activity.	Offline lecture	
				Theory 41: enzyme inhibition; factors affecting enzyme activity.		Offline lecture	
				Theory 42: **Secondary metabolites**: Broad classification of secondary metabolites;	**Secondary metabolites**: Classify secondary metabolites and describe the properties and functions of terpenoids, phenolics, and alkaloids.	Offline lecture	
March (15^{th} Week)	23/03/2026	28/03/2026	3 h	Theory 43: properties and functions of terpenoids, phenolics and alkaloids.	**Secondary metabolites**: Classify secondary metabolites and describe the properties and functions of terpenoids, phenolics, and alkaloids.	Offline lecture	
				Theory 44: Revisions		Offline lecture	
				Theory 45: Revisions	Revisions		

March (16th Week)	30/03/2026	31/03/2026	3 h	Theory 46: Revisions	Revisions		Biochemistry. Edward Arnold, London
				Theory 47: Revisions	Revisions		
				Theory 48: Revisions	Revisions		
				Theory 54: Revisions	Revisions		

*****Note: Data filled in the above form is sample data.