

**LESSON PLAN****BSc I year**

1. Outline learning objective
2. Develop the introduction
3. Plan the main body of the lesson
4. Plan to check for understanding
5. Develop a conclusion and a preview
6. Create realistic timeline

**ZOOLOGY**

**PAPER - I (paper code - 0813)**  
**(CELL BIOLOGY & INVERTEBRATES) M.M. 50**

**UNIT-1**

S. No.	Topic	To	No. of periods needed	Teaching Method	Lesson plan
1.	The Cell (Prokaryotic & Eukaryotic)		4	Animation, ppt-presentation, black board	<ol style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> to clear the concept of cell biology</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a. Introduction of cell</li> <li>b. Definition of cell</li> <li>c. Classification</li> <li>d. Diagram of prokaryotic and eukaryotic cells</li> <li>e. Difference between prokaryotic and eukaryotic cells</li> </ol> </li> <li>5. Homework after each class</li> </ol>
2.	Methods in cell biology (Microscopy light & Electron)		3	Black board, ppt presentation, practical	<ol style="list-style-type: none"> <li>1. <b>Based on previous General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> to give brief introduction of microscopes</li> </ol>

			demonstration of microscope	<p>3. Questions knowledge</p> <p>4. <b>Synopsis:</b></p> <p>a) History of microscope</p> <p>b) Principle of microscope</p> <p>c) Ray diagram</p> <p>d) Types of Light microscope</p> <p>e) Electron Microscope</p> <p>f) Difference between TEM and SEM</p> <p>g) Difference between light microscopy and electron microscopy</p> <p>5. Homework after each class</p>
3.	Organisation of cell extra-nuclear and nuclear (Plasma membrane, mitochondria, Chromosomes, ER. Golgi bodies, Ribosomes)	6	Animations and videos, ppt-presentation s Black-board (whenever needed)	<p><b>1. Based on previous General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the working principles of microscopes</p> <p>3. Questions knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction of cell organelles</p> <p>b) List of cell organelles and its discoverer</p> <p>c) Plasma member structure, function and its modification</p> <p>d) Endoplasmic reticulum: structure, function</p> <p>e) Mitochondria structure, function</p> <p>f) Golgi apparatus: structure and function</p> <p>g) Ribosomes: types in prokaryotes and eukaryotes, structure and function, sudberg unit</p> <p>h) Chromosome: structure, function, type, component.</p> <p>5. Homework after each class</p>
	<p>Assessment of understanding:</p> <p>1. Unit test for 30 marks: subjective/objective/oral</p> <p>2. group discussions</p> <p>3.class room quiz competitions</p>			
	<b>UNIT-2</b>			
1.	Cell divisions (Mitosis & Meiosis)	3	Black board, ppt presentation , practical	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of cell division</p>

			demonstration of microscope	<p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <ol style="list-style-type: none"> <li>Introduction of cell division</li> <li>Definition of cell division</li> <li>Cell cycle</li> <li>Types: mitosis and meiosis</li> <li>Explanation with diagram</li> <li>Difference between mitosis and meiosis</li> <li>Abnormalities in Mitosis and Meiosis</li> </ol> <p><b>5.</b> Homework after each class</p>
2.	An elementary idea of cell transformation and cancer	5	Black board, ppt presentation, practical demonstration of microscope	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of cell transformation</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <ol style="list-style-type: none"> <li>Introduction of cell transformation/cancer</li> <li>Definition of cancer</li> <li>Types: Benign and malignant</li> <li>Difference between normal cell and transformed cell</li> <li>Carcinogen: physical, chemical, and biological</li> </ol> <p><b>5.</b> Homework after each class</p>
3.	Immunity (elementary idea)	5	Black board, ppt presentation, practical demonstration of microscope	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of cell transformation</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <ol style="list-style-type: none"> <li>Introduction of immunity</li> <li>Innate and acquired immunity</li> <li>First line of defence, second line of defence and Third line of defence</li> <li>Clonal selection theory</li> <li>Cell mediated immune response</li> <li>Antigen-antibody interaction</li> <li>Types of antibody</li> </ol>

				h) Vaccines 5. Homework after each class
	Assessment of understanding: 1. Unit test for 20 marks: subjective/objective/oral 2. group discussions 3.class room quiz competitions			
	<b>UNIT-3</b>			
1.	General Characteristics & Classification of invertebrates up to orders with examples	6	Black board, ppt presentation , practical demonstration of microscope	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of taxonomy <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction of classification b) Classification of invertebrate overview c) General characteristics <b>5.</b> Homework after each class
2.	Protozoa - type study Paramecium, protozoa & disease	6	Black board, ppt presentation , practical demonstration of microscope	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of protozoa phylum <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction of paramecium b) Morphology of paramecium c) Anatomy of paramecium d) Physiology of paramecium e) Type of reproduction f) Protozoa and disease <b>5.</b> Homework after each class
3.	Porifera - type study Sycon	5	Black board, ppt presentation , practical demonstration of microscope	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of Porifera phylum <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction of Sycon b) Morphology of Sycon c) Anatomy of Sycon d) Physiology of Sycon e) Life cycle

				5. Homework after each class
4.	Coelenterata - type study Obelia	5	Black board, ppt presentation, practical demonstration of microscope	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> To clear the concept of phylum-Coelenterata <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction of Obelia b) Morphology of Obelia c) Polymorphism d) Anatomy of Obelia e) Physiology of Obelia f) Life cycle and alteration of generation <b>5.</b> Homework after each class
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. group discussions 3.class room quiz competitions				
<b>UNIT-4</b>				
1.	Helminths - type study Fasciola	6	Black board, ppt presentation, practical demonstration of microscope	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> To clear the concept of phylum-Helminths <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction of Fasciola b) Morphology of Fasciola c) Anatomy of Fasciola d) Physiology of Fasciola e) Life cycle f) Types of larva <b>5.</b> Homework after each class
2.	Annelida - type study Pheretima	6	Black board, ppt presentation, practical demonstration of microscope	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> To clear the concept of phylum-Annelida <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b>

			e	<ul style="list-style-type: none"> <li>a) Introduction of Pheretima</li> <li>b) Morphology of Pheretima</li> <li>c) Anatomy of Pheretima</li> <li>d) Physiology of Pheretima</li> <li>e) Life cycle</li> <li>f) Economic importance</li> </ul> <p><b>5. Homework after each class</b></p>
3.	Arthropoda - type study Palaemon	6	Black board, ppt presentation, practical demonstration of microscope	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> To clear the concept of phylum-Arthropoda</p> <p><b>3. Questions based on previous knowledge</b></p> <p><b>4. Synopsis:</b></p> <ul style="list-style-type: none"> <li>a) Introduction of Palaemon</li> <li>b) Morphology of Palaemon</li> <li>c) Anatomy of Palaemon</li> <li>d) Physiology of Palaemon</li> <li>e) Life cycle</li> <li>f) Economic importance</li> </ul> <p><b>5. Homework after each class</b></p>
<p>Assessment of understanding:</p> <ul style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. group discussions</li> <li>3. class room quiz competitions</li> </ul>				
<b>Unit-5</b>				
1.	Mollusca-pila (apple snail)	6	Black board, ppt presentation, practical demonstration of microscope	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> To clear the concept of phylum-Mollusca</p> <p><b>3. Questions based on previous knowledge</b></p> <p><b>4. Synopsis:</b></p> <ul style="list-style-type: none"> <li>a) Introduction of Pila (apple snail)</li> <li>b) Morphology of Pila</li> <li>c) Anatomy of Pila</li> <li>d)</li> <li>e) Physiology of Palaemon</li> <li>f) Life cycle</li> <li>g) Economic importance</li> </ul> <p><b>5. Homework after each class</b></p>
2.	Echinodermata- type study Asterias (starfish)	6	Black board, ppt	<p><b>1. General objective:</b> Scientific temperament</p>

			presentation, practical demonstration of microscope	<ol style="list-style-type: none"> <li>2. <b>Specific objective:</b> To clear the concept of phylum-Arthropoda</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) Introduction of Palaemon</li> <li>b) Morphology of Palaemon</li> <li>c) Anatomy of Palaemon</li> <li>d) Physiology of Palaemon</li> <li>e) Life cycle</li> <li>f) Economic importance</li> </ol> </li> <li>5. Homework after each class</li> </ol>
3.	Protochordata - type study Balanoglossus	4	Black board, ppt presentation, practical demonstration of microscope	<ol style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> To clear the concept of phylum-Arthropoda</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) Introduction of Palaemon</li> <li>b) Morphology of Palaemon</li> <li>c) Anatomy of Palaemon</li> <li>d) Physiology of Palaemon</li> <li>e) Life cycle</li> <li>f) Economic importance</li> </ol> </li> <li>5. Homework after each class</li> </ol>
<p>Assessment of understanding:</p> <ol style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. group discussions</li> <li>3. class room quiz competitions</li> </ol>				

**ZOOLOGY**  
**PAPER - I (paper code - 0814)**  
**(VERTEBRATES & EMBRYOLOGY) M.M. 50**

**UNIT-1**

S. No.	Topic	No. of periods needed	Teaching Method	Lesson plan
1.	Origin and classification of Chordates.	2	Animation, ppt-presentation, black board	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Origin and classification of Chordates</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>            Definition of chordates            Origin of chordates            Modern classification of chordates</p> <p>Homework after each class</p>
2.	Protochordata - type study Amphioxus	3	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of representative animal of Protochordata</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>            Definition of protochordata            Ultra structure of amphioxus            Anatomy of amphioxus            Physiology of amphioxus            Importance of amphioxus</p> <p>Homework after each class</p>
3.	A comparative account of Petromyzon & Myxine	1	ppt-presentation Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the difference between cyclostomes</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p>

				Habit and habitat of petromyzon and myxine Ultra structure of petromyzon and myxine Difference between petromyzon and myxine Homework after each class
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. group discussions 3.class room quiz competitions				
<b>UNIT-2</b>				
1.	Fishes - Skin and scales	2	Black board, ppt presentation	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of skin and scales in fishes Questions based on previous knowledge <b>Synopsis:</b> Ultra-structure of fish skin Properties of fish skin Formation of placoid scales Types of scales in fishes Homework after each class
2.	Migration in fishes	2	Black board, ppt presentation	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of migration in fishes Questions based on previous knowledge <b>Synopsis:</b> Definition Types on the basis of need Movement of fish during migration Classification of fish migration Significance of fish migration Homework after each class
3.	Parental care in fishes and amphibians	2	Black board, ppt presentation	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of parental care Questions based on previous knowledge <b>Synopsis:</b> Definition

				Parental care in fishes Parental care in amphibians Significance of parental care  Homework after each class
4.	Neoteny	1	PPT, Black board	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of neoteny Questions based on previous knowledge <b>Synopsis:</b> Definition Mechanism of Neoteny Neoteny in amphibians Significance of meoteny  Homework after each class
5.	Reptilia - Poisonous & non poisonous shakes, Poison apparatus, snake venom.	2	PPT, Black board	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Poisonous & non poisonous shakes, Poison apparatus, snake venom. Questions based on previous knowledge <b>Synopsis:</b> Definition Identification of poisonous and non poisonous snakes Structure of poison apparatus and types of venom Mechanism of snake bite Symptoms Treatment  Homework after each class
Assessment of understanding: 1. Unit test for 20 marks: subjective/objective/oral 2. group discussions 3.class room quiz competitions				
<b>UNIT-3</b>				
1.	Aves - Flight adaptation in birds	2	Black board, ppt presentation	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of flight adaptation in birds Questions based on previous

				<p>knowledge</p> <p><b>Synopsis:</b> Structure of birds Morphological adaption Anatomical adaptation Homework after each class</p>
2.	Discuss - Birds are glorified reptiles	1	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of birds as glorified reptiles Questions based on previous knowledge</p> <p><b>Synopsis:</b> Similarities in structure and functions of birds and reptiles Archaeopteryx – linking group between birds and reptiles Homework after each class</p>
3.	Mammals- comparative account of prototheria, metatheria & Eutheria and Affinities.	2	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of classification of mammals Questions based on previous knowledge</p> <p><b>Synopsis:</b> Classification of mammals Difference between prototheria, metatheria &amp; Eutheria Affinities of mammals with other classes of vertebrates Homework after each class</p>
<p>Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. group discussions 3.class room quiz competitions</p>				
<b>UNIT-4</b>				
1.	Gametogenesis, Fertilization & Parhenogenesis.	5	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Gametogenesis, Fertilization &amp; Parhenogenesis Questions based on previous knowledge</p> <p><b>Synopsis:</b> Definition of gametogenesis</p>

				Process of spermatogenesis Process of oogenesis Mechanism of fertilization Parthenogenesis definition Types of parthenogenesis Homework after each class
2.	Development of frog upto formation of three germ layers	6	Black board, ppt presentation	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Development of frog upto formation of three germ layers  Questions based on previous knowledge <b>Synopsis:</b> Cleavage Types of cleavage Blastula and morula stages Gastrulation Formation of three germ layer Fate map of three germ layer  Homework after each class
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. group discussions 3.class room quiz competitions				
<b>Unit-5</b>				
1.	Development of Chick up to formation of three germ layer, Extra embryonic membranes	6	Black board, ppt presentation	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of development of Chick up to formation of three germ layer, Extra embryonic membranes Questions based on previous knowledge <b>Synopsis:</b> Cleavage Blastula stage Gastrulation 6h, 12h, 24 h, 48 h, 72h stage Extra embryonic membranes (shell, amnion, allantois, chorion) Homework after each class

2.	Placenta in mammals.	2	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Placenta in mammals.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <ul style="list-style-type: none"> <li>Definition of placenta</li> <li>Types of placenta</li> <li>Functions and significance of placenta</li> </ul> <p>Homework after each class</p>
3.	Embryonic induction organisers & differentiation.	2	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Embryonic induction organisers &amp; differentiation.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <ul style="list-style-type: none"> <li>Theories of inductions</li> <li>Embryonic induction</li> <li>Primary and secondary organizers</li> <li>Differentiation</li> </ul> <p>Homework after each class</p>
<p>Assessment of understanding:</p> <ol style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. group discussions</li> <li>3.class room quiz competitions</li> </ol>				

**LESSON PLAN****BSc II year**

7. Outline learning objective
8. Develop the introduction
9. Plan the main body of the lesson
10. Plan to check for understanding
11. Develop a conclusion and a preview
12. Create realistic timeline

**ZOOLOGY****PAPER - I (paper code - 0863)  
(Anatomy & Physiology)**

<b>UNIT-1</b>				
S. No	Topic	No. of periods needed	Teaching Method	Lesson plan
1.	Integument and its derivatives: structure of scales, hair and feathers.	8	Animation, ppt-presentation, black board	<ol style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> to clear the concept of comparative study of integument</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) General structure of skin</li> <li>b) Comparative structures of skin: fish, amphibian, reptile, birds and mammals.</li> <li>c) Function of skin</li> <li>d) Skin derivative: scales, hair and feathers</li> </ol> </li> <li>5. Homework after each class</li> </ol>
2.	Alimentary canal and digestive glands in vertebrates.	5	Black board, ppt presentation,	<ol style="list-style-type: none"> <li>1. <b>Based on previous General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> to clear the concept of comparative study of alimentary canal</li> </ol>

			practical demonstration of microscope	<ol style="list-style-type: none"> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) General structure of alimentary canal and digestive gland</li> <li>b) Function of alimentary canal and digestive system</li> <li>c) Comparative structures of alimentary canal and digestive glands: fish, amphibian, reptile, birds and mammals.</li> </ol> </li> <li>5. Homework after each class</li> </ol>
3.	Respiratory Organs Gills and lung, Air-Sac in birds	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<ol style="list-style-type: none"> <li>1. <b>Based on previous General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> to clear the general plan of respiratory organs</li> <li>3. Questions knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) General structure of respiratory organs</li> <li>b) Function of respiratory organs</li> <li>c) Comparative structures of respiratory organ: fish, amphibian, reptile, birds and mammals; Gill, Lungs and Air-sac</li> </ol> </li> <li>5. Homework after each class</li> </ol>
Assessment of understanding:				
<ol style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. Group discussions</li> <li>3. Class room quiz competitions</li> </ol>				
<b>UNIT-2</b>				
1.	Endoskeleton-Limbs, girdles and vertebrae.	10	Animations and videos, ppt-presentations Black-board (whenever needed)	<ol style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> to clear the concept of Endoskeleton</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) General plan of endoskeleton</li> <li>b) Structure of endoskeleton</li> <li>c) Function of endoskeleton</li> <li>d) Comparative structures of Limbs and Girdle: fish,</li> </ol> </li> </ol>

				amphibian, reptile, birds and mammals <b>5. Homework after each class</b>
2.	Circulatory System - Evolution of heart and aortic arches.	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of Circulatory system <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Types of Circulatory System b) Evolution of heart c) Explanation of Aortic d) Comparative structures of Aortic arches: fish, amphibian, reptile, birds and mammals <b>5. Homework after each class</b>
3.	Urinogenital System - Kidney and excretory ducts.	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of Urinogenital System <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Types of Urinogenital System b) Evolution of Kidney and excretory ducts c) Comparative structures of Kidney and excretory ducts: fish, amphibian, reptile, birds and mammals <b>5. Homework after each class</b>
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. Group discussions 3. Class room quiz competitions				
<b>UNIT-3</b>				
1.	Nervous System - General plan of brain and spinal cord.	6	Animations and videos, ppt-presentations Black-board (whenever	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of Nervous System <b>3.</b> Questions based on

			needed)	<p>previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) General plan of brain and spinal cord</p> <p>b) Comparative study of brain and spinal cord: fish, amphibian, reptiles, birds and mammal</p> <p><b>5. Homework after each class</b></p>
2.	Endocrine glands - classification and histology.	5	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of Endocrine Gland</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction of endocrine glands</p> <p>b) Types of endocrine glands</p> <p>c) Classification</p> <p>d) General regulatory function and feedback mechanism</p> <p>e) Histology</p> <p><b>5. Homework after each class</b></p>
3.	Gonads and genital ducts.	5	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of Gonads and Genital Ducts</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction of Gonads and genital ducts</p> <p>b) General structure and function of gonads and genital ducts</p> <p>c) Comparative study of gonads and genital ducts in fishes, amphibian, reptile and birds</p> <p><b>5. Homework after each class</b></p>

Assessment of understanding:

1. Unit test for 30 marks: subjective/objective/oral
2. Group discussions
3. Class room quiz competitions

#### UNIT-4

1.	Digestion and absorption of dietary components.	4	Animations and videos, ppt-presentations Black-board (whenever needed)	<ol style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> To clear the concept of Digestion and absorption of dietary components.</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) Alimentary canal</li> <li>b) Digestion in buccal cavity</li> <li>c) Digestion in stomach</li> <li>d) Digestion in intestine</li> <li>e) Absorption: passive and active</li> <li>f) Assimilation</li> <li>g) Ejection</li> </ol> </li> <li>5. Homework after each class</li> </ol>
2.	Physiology of heart and Cardiac cycle	4	Animations and videos, ppt-presentations Black-board (whenever needed)	<ol style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> To clear the concept of circulation</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) Structure of heart</li> <li>b) Types of heart</li> <li>c) Types of circulation: single and double</li> <li>d) Physiology of heart</li> <li>e) Cardiac cycle</li> </ol> </li> <li>5. Homework after each class</li> </ol>
3.	ECG.	2	Animations and videos, ppt-presentations Black-board (whenever needed)	<ol style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> To clear the concept of circulation</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b></li> </ol>

				<ul style="list-style-type: none"> <li>a) Introduction of ECG</li> <li>b) Working Principal of ECG</li> <li>c) Reading of electrocardiograph</li> <li>d) Electrocardiograph during abnormal cardiac condition</li> </ul> <p>5. Homework after each class</p>
3.	Blood Coagulation.	2	Animations and videos, ppt-presentations Black-board (whenever needed)	<ul style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> To clear the concept of phylum- Arthropoda</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ul style="list-style-type: none"> <li>a) Introduction of Palaemon</li> <li>b) Morphology of Palaemon</li> <li>c) Anatomy of Palaemon</li> <li>d) Physiology of Palaemon</li> <li>e) Life cycle</li> <li>f) Economic importance</li> </ul> </li> <li>5. Homework after each class</li> </ul>
4.	Respiration-Mechanism and control of breathing.	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<ul style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> To clear the concept of Respiration</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ul style="list-style-type: none"> <li>a) Introduction of respiration</li> <li>b) Types of respiration: Internal and external respiration</li> <li>c) Neuronal and chemical regulation of respiration</li> <li>d) Mountain Sickness</li> <li>e) Diving sickness</li> </ul> </li> <li>5. Homework after each class</li> </ul>
<p>Assessment of understanding:</p> <ul style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. Group discussions</li> </ul>				

## 3. Class room quiz competitions

## Unit-5

1.	Excretion-Physiology of excretion, Osmoregulation.			<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> To clear the concept of excretion and Osmoregulation</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <ol style="list-style-type: none"> <li>Introduction of excretion</li> <li>Amminotelic animals, Ureotelic animals and Uricotelic animals</li> <li>Process of urine formation</li> <li>Ornithine cycle</li> <li>Composition of urine</li> <li>Ormoregulation mechanism</li> <li>Types of animals on the basis of osmoregulation</li> <li>Osmoregulation in aquatic environment: fresh water and marine water</li> <li>Osmoregulation in terrestrial environment: ambhíbians, reptiles, birds and mammals</li> </ol> <p><b>5.</b> Homework after each class</p>
2.	Physiology of Muscle contraction.			<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> To clear the concept of connective tissue muscles</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <ol style="list-style-type: none"> <li>Introduction of muscles</li> <li>Types of muscles: cardiac, stratified and non-stratified</li> <li>Ultrastructure of stratified muscle</li> <li>Sarcomere-unit of muscle contraction</li> <li>Mechanism of muscle</li> </ol>

				<p>contraction-sliding filament theory</p> <p>f) Special conditions-fatigue, tetany, rigor mortis etc.</p> <p><b>5. Homework after each class</b></p>
3.	Physiology of nerve impulse, Synaptic transmission.			<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> To clear the concept of nervous system</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Definition of neuron and glial cells</p> <p>b) Structure of neuron: myelinated and non-myelinated</p> <p>c) Structure of glial cells</p> <p>d) Nerve impulse mechanism and properties</p> <p>e) Synaptic transmission</p> <p>f) Difference between-simple and solitary nerve impulse conduction</p> <p><b>5. Homework after each class</b></p>
4.	Ear and Eye - structure and function.			<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> To clear the concept of sensory organs</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction of eye: compound and simple eye</p> <p>b) Anatomical Structure of eye</p> <p>c) Mechanism of vision in human</p> <p>d) Eye disorders</p> <p>e) Introduction of ears</p> <p>f) Anatomical structure of ear</p> <p>g) Mechanism of hearing</p> <p>h) Hearing capacity and disorders</p> <p><b>5. Homework after each class</b></p>

Assessment of understanding:

1. Unit test for 30 marks: subjective/objective/oral
2. Group discussions
3. Class room quiz competitions

**ZOOLOGY**  
**PAPER - II (paper code - 0864)**  
**(VERTEBRATE ENDOCRINOLOGY, REPRODUCTIVE BIOLOGY BEHAVIOUR,**  
**EVOLUTION AND APPLIED ZOOLOGY)**

UNIT-1				
S. No	Topic	No. of periods needed	Teaching Method	Lesson plan
1.	General Characters of Hormones	2	Animation, ppt-presentation, black board	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of General Characters of Hormones</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Definition of hormones</p> <p>Functions of hormones</p> <p>Properties of hormones</p> <p>Types of hormones</p> <p>Homework after each class</p>
2.	Hormone Receptor	2	Black board, ppt presentation, practical demonstration of microscope	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Hormone Receptor</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Definition</p> <p>Properties of hormone receptors</p> <p>Types of hormone receptors</p> <p>Cell signalling pathway of hormone</p>

				Homework after each class
3.	Biosynthesis and secretion of thyroid, Adrenal ; Ovarian and testicular hormones.	4	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Biosynthesis and secretion of thyroid, Adrenal ; Ovarian and testicular hormones.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>          Biosynthesis of T4 and T3 hormones          Secretion and inhibition of thyroxine hormones.          Biosynthesis of adreno-corticoid hormones and medullary hormones          Secretion and inhibition of adreno-corticoid and medullary hormones          Biosynthesis and regulation of estrogen, progesterone, and testosterone hormones</p>
				Homework after each class
4.	Endocrine disorder due to hormones and other gland	2	Animation, ppt-presentation, black board	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Endocrine disorder due to hormones and other gland hormones.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>          Hypo and hyper secretion of pituitary hormones (disorder, symptoms, treatment)          Hypo and hyper secretion of thyroid hormones (disorder, symptoms, treatment)          Hypo and hyper secretion of adrenal hormones (disorder, symptoms, treatment)          Hypo and hyper secretion of sex hormones (disorder, symptoms, treatment)</p>
				Homework after each class

Assessment of understanding:

4. Unit test for 30 marks: subjective/objective/oral
5. Group discussions
6. Class room quiz competitions

### UNIT-2

1.	Reproductive cycle in vertebrate.	5	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Reproductive cycle in vertebrate.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Female gonadal system Male gonadal system Estrous cycle in non primates Menstrual cycle in primates</p> <p>Homework after each class</p>
2.	Menstruation, Lactation and pregnancy.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Menstruation, Lactation and pregnancy.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Phases of menstrual cycle Hormonal control of menstruation Mechanism of lactation Hormonal regulation of lactation Mechanism of pregnancy-changes over nine months Hormonal control during pregnancy</p> <p>Homework after each class</p>
3.	Mechanism of parturition.	1	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Mechanism of parturition.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Definition of parturition</p>

				Mechanism of parturition Hormonal control over parturition  Homework after each class
4.	Hormonal regulation of gametogenesis.	1	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Hormonal regulation of gametogenesis. Questions based on previous knowledge <b>Synopsis:</b> Oogenesis Spermatogenesis Hormonal control over oogenesis and spermatogenesis  Homework after each class
5.	Extra embryonic membrane	1	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Extra embryonic membrane Questions based on previous knowledge <b>Synopsis:</b> Definition Types of extra embryonic membrane Significance of extra embryonic membrane  Homework after each class
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. Group discussions 3. Class room quiz competitions				
<b>UNIT-3</b>				
1.	Evidences of organic evolution	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Evidences of organic evolution Questions based on previous knowledge

				<p><b>Synopsis:</b>  Evidence from embryology  Evidence from anatomy  Evidence from biochemistry  Evidence from fossil records  Evidence from cell biology  Evidence from molecular biology.  Evidence from microbiology</p> <p>Homework after each class</p>
2.	Theories of organic evolution	2	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Theories of organic evolution  Questions based on previous knowledge  <b>Synopsis:</b>  Lamarckism theory  Darwin's theory  Mutation theory  Neo-darwinism</p> <p>Homework after each class</p>
3.	Variation, Mutation, Isolation and Natural selection.	5	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Variation, Mutation, Isolation and Natural selection.  Questions based on previous knowledge  <b>Synopsis:</b>  Variation from mutation  Variation from recombination  Variation from migration  Variation from inbreeding and assortative mating  Mutation: definition  Types of chromosomal mutation  Types of gene mutation  Mutation and evolution  Significance of mutation  Definition of natural selection  Types of natural selection with examples.</p>

				Homework after each class
4.	Evolution of Horse.	2	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Evolution of Horse. Questions based on previous knowledge</p> <p><b>Synopsis:</b> Migration of horses and types of horses Modification of molar teeth, middle digit and height of horse</p> <p>Homework after each class</p>
<p>Assessment of understanding:</p> <ol style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. Group discussions</li> <li>3. Class room quiz competitions</li> </ol>				
<b>UNIT-4</b>				
1.	Introduction to Ethology	2	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Introduction to Ethology Questions based on previous knowledge</p> <p><b>Synopsis:</b> Definition History Instinct Learning Mating and fight for supremacy Living in groups</p> <p>Homework after each class</p>
2.	Patterns of Behaviour Taxes, Reflexes, Drives and Stereotyped Behaviour	4	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Patterns of Behaviour Taxes, Reflexes, Drives and Stereotyped Behaviour Questions based on previous knowledge</p> <p><b>Synopsis:</b> Taxes: definition, classification</p>

				<p>(aerotaxis, anemotaxis, barotaxis, galvanotaxis, hydrotaxis, rheotaxis, phototaxis, thermotaxis, thigmotaxis)</p> <p>Reflexes: types of human reflexes-myotatic, tendon, reflexes involving cranial nerves, infant reflexes, grading, reflex modulation</p> <p>Drives: hunger and thirst drive, hoarding drive, migratory drive, aggression drive, territorial drive, hormones in sexual drive, parental care drive</p> <p>Stereotype behaviour: eclosion behaviour, moulting behaviour, punding behaviour</p> <p>Homework after each class</p>
3.	Reproductive Behavioural Patterns.	2	<p>Animations and videos, ppt-presentations Black-board (whenever needed)</p>	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Reproductive Behavioural Patterns.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Behavioural pattern for mating and courtship</p> <p>Behavioural pattern in parental care</p> <p>Behavioural pattern in setting territory and defence</p> <p>Homework after each class</p>
4.	Hormones, Drugs and Behaviour.	2	<p>Animations and videos, ppt-presentations Black-board (whenever needed)</p>	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Hormones, Drugs and Behaviour.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Principles of drug action</p> <p>The classification of psychoactive drugs</p>

				<p>Drugs, experience, context and genes The hierarchical control of hormones (homeostatic hormones, reproductive hormones, stress hormones, ending a stress response)</p> <p>Homework after each class</p>
<p>Assessment of understanding:</p> <ol style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. Group discussions</li> <li>3. Class room quiz competitions</li> </ol>				
<b>Unit-5</b>				
1.	Aquaculture	1	Class seminar, PPT, Black board	<p><b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Aquaculture Questions based on previous knowledge <b>Synopsis:</b> Characteristics of aquaculture Types of aquaculture (freshwater, brackish water, metahaline, mariculture) Significance of aquaculture</p> <p>Homework after each class</p>
2.	Sericulture	1	Class seminar, PPT, Black board	<p><b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Sericulture Questions based on previous knowledge <b>Synopsis:</b> Characteristics of Sericulture Types of Sericulture Significance of a Sericulture</p> <p>Homework after each class</p>
3.	Apiculture	1	Class seminar, PPT, Black board	<p><b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Apiculture</p>

				<p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>            Characteristics of Apiculture            Types of Apiculture            Significance of Apiculture</p> <p>Homework after each class</p>
4.	Pisciculture	1	Class seminar, PPT, Black board	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Pisciculture</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>            Characteristics of Pisciculture            Types of Pisciculture            Significance of Pisciculture</p> <p>Homework after each class</p>
5.	Poultry keeping	1	Class seminar, PPT, Black board	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Poultry keeping</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>            Characteristics of Poultry keeping            Types of Poultry keeping            Significance of Poultry keeping</p> <p>Homework after each class</p>
6.	Elements of Pest Control - 1. Chemical control 2. Biological Control	1	Class seminar, PPT, Black board	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Elements of Pest Control</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>            Characteristics of pest control            Chemical pest control and its pros and cons            Biological pest control and its pros and cons            Mixed type of pest control</p>

				Homework after each class
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. Group discussions 3. Class room quiz competitions				

**LESSON PLAN****BSc III year**

13. Outline learning objective
14. Develop the introduction
15. Plan the main body of the lesson
16. Plan to check for understanding
17. Develop a conclusion and a preview
18. Create realistic timeline

**ZOOLOGY****PAPER-II (Paper Code-0918)****(Genetic's, Cell Physiology, Biochemistry, Biotechnology And Biotechniques)****UNIT-1**

S. No.	Topic	No. of periods needed	Teaching Method	Lesson plan
1.	Linkage and Linkage maps	6	Animation, ppt-presentation, black board	<ol style="list-style-type: none"> <li><b>1. General objective:</b> Scientific temperament</li> <li><b>2. Specific objective:</b> to clear the concept of Genetics-Mendelian ratio</li> <li><b>3.</b> Questions based on previous knowledge</li> <li><b>4. Synopsis:</b> <ol style="list-style-type: none"> <li>a. Experiment of Bateson and Punnet on Sweet Pea-Genetic Coupling and Genetic Repulsion</li> <li>b. Experiment of T. H. Morgan on Drosophila</li> <li>c. Linkage and Linked gene</li> <li>d. Experiment of Sturtevant-postulates</li> <li>e. Linkage Maps</li> </ol> </li> <li><b>5.</b> Homework after each class</li> </ol>
2.	Varieties of gene expression -	3	Black board, ppt	<ol style="list-style-type: none"> <li><b>1. Based on previous General objective:</b> Scientific temperament</li> </ol>

	Multiple alleles ; lithogenesis ; Pleiotropic genes; gene interaction; epistasis.		presentation , practical demonstration of microscope	<ol style="list-style-type: none"> <li>2. <b>Specific objective:</b> introduction of Neo-Mendelism</li> <li>3. Questions knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) Multiple allelism; multiple alleles</li> <li>b) Theories of multiple alleles</li> <li>c) Pleiotropic genes</li> <li>d) Lithogenesis: example of pleiotropism</li> <li>e) Gene interaction</li> <li>f) Epistasis: dominant and recessive</li> </ol> </li> <li>5. Homework after each class</li> </ol>
3.	Sex chromosome systems and sex-linkage.	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<ol style="list-style-type: none"> <li>1. <b>Based on previous General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> to clear the concept of sex determination</li> <li>3. Questions knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) Introduction of sex chromosome</li> <li>b) XY;XO type</li> <li>c) Quantitative Ration Theory</li> <li>d) Sex-determining genes-tra/tra</li> <li>e) Sex-determination by Hormones</li> <li>f) Sex-determination by metabolism</li> <li>g) Sex-determination by environment</li> <li>h) Sex-linked genes: colour blindness; night blindness; Haemophilia</li> </ol> </li> <li>5. Homework after each class</li> </ol>
4.	Mutation and chromosomal alterations; meiotic consequences.	3	Black board, ppt presentation , practical demonstration of microscope	<ol style="list-style-type: none"> <li>1. <b>General objective:</b> Scientific temperament</li> <li>2. <b>Specific objective:</b> to clear the concept of mutation</li> <li>3. Questions based on previous knowledge</li> <li>4. <b>Synopsis:</b> <ol style="list-style-type: none"> <li>a) Introduction</li> <li>b) mutation in chromosome</li> <li>c) Chromosomal alteration: change in number and change in structure</li> <li>d) Change in number: euploidy and aneuploidy</li> <li>e) Change in structure: deletion, duplication, inversion, translocation</li> </ol> </li> </ol>

				<p>f) Molecular basis of mutation g) Non disjunction: mutation in somatic cell and mutation in germplasm</p> <p><b>5. Homework after each class</b></p>
5.	Human genetics - chromosomal and single gene disorders (somatic cell genetics)	5	Black board, ppt presentation , practical demonstration of microscope	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of cell transformation</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Chromosomal disorder in somatic chromosome: Down syndrome, Patau's syndrome, Tay sach Disorder etc.</p> <p>b) Chromosomal disorder in sex-chromosome: turner's syndrome, Klinefelter's syndrome, super female etc</p> <p>c) Disorders due to point mutation: sickle cell anaemia, phenylketonuria, alkaptonuria, albinism, creatinism etc.</p> <p><b>5. Homework after each class</b></p>
<p>Assessment of understanding:</p> <p>1. Unit test for 30 marks: subjective/objective/oral</p> <p>2. group discussions</p> <p><b>6.</b> 3.class room quiz competitions</p>				
<b>UNIT-2</b>				
1.	General idea about pH and Buffer.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of pH</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction</p> <p>b) Calculation of Ph for strong acids and base</p> <p>c) Henson-Heselbatch equation</p> <p>d) Introduction of Buffer</p> <p>e) Isoelectric point</p> <p>f) Types of Buffers</p>

				<b>5. Homework after each class</b>
2.	Transport across membrane - cell membrane; Mitochondria and Endoplasmic reticulum.	6	Animations and videos, ppt- presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of structure and functions of plasma membrane <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Osmosis: transport of water through membrane b) Active and passive transport c) Diffusion: simple and facilitated d) Types of facilitated diffusion e) Active diffusion f) Carrier proteins involve in active diffusion-Sodium pump, ABC complex protein, H <sup>+</sup> -K <sup>+</sup> Pump, light dependent pump, Ca <sup>+</sup> pump etc g) Bulk transport: exocytosis and endocytosis (Pinacoderm and coanoderm) <b>5. Homework after each class</b>
3.	Active transport and its mechanism; Active transport in Mitochondria and Endoplasmic reticulum.	2	Animations and videos, ppt- presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of structure of mitochondria and endoplasmic reticulum <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Active transport in mitochondria b) Active transport in endoplasmic reticulum <b>5. Homework after each class</b>
4.	Hydrolytic enzymes - Their chemical nature, Activation and specificity.	2	Animations and videos, ppt- presentations Black-board (whenever	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of hydrolysis <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b>

			needed)	<p>a) Hydrolytic enzymes involve in carbohydrate digestion</p> <p>b) Hydrolytic enzymes involve in protein digestion (exopeptidase and endopeptidase)</p> <p>c) Hydrolytic enzymes involve in compounds consisting C-N bond hydrolysis</p> <p>d) Hydrolytic enzymes involve in breakdown of ester bond</p> <p>e) Hydrolytic enzymes involve in breakdown of non-ester and other bonds</p> <p><b>5. Homework after each class</b></p>
<p>Assessment of understanding:</p> <p>1. Unit test for 20 marks: subjective/objective/oral</p> <p>2. Group discussions</p> <p>3. Class room quiz competitions</p>				
<b>UNIT-3</b>				
1.	Amino acids and Peptides - Basic structure and biological function.	4	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of biochemistry</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction of amino acids</p> <p>b) Types of amino acids</p> <p>c) Structure of amino acids</p> <p>d) Physical and chemical properties of amino acids</p> <p>e) Peptide bonds-property, break down and formation</p> <p>f) Function and significance of peptide bond and amino acid in formation of 3 dimensional structure of protein</p> <p><b>5. Homework after each class</b></p>
2.	Carbohydrate and its metabolism - Glycogenesis; Gluconeogenesis; glycolysis, Glycogenolysis; Cori-cycle.	8	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of biochemistry</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction of carbohydrate</p>

				b) Classification of carbohydrates c) Physical and chemical properties of carbohydrates d) Glycolysis e) Krebs's cycle f) Glycogenesis g) Glycogenolysis h) Gluconeogenesis i) Cori-cycle <b>5. Homework after each class</b>
3.	Lipid metabolism - Oxidation of glycerol; oxidation of fatty acid.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of biochemistry <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) <b>5. Homework after each class</b>
4.	Protein metabolism - Deamination, Transamination, Transmethylation ; Biosynthesis of Protein	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of biochemistry <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction b) Deamination c) Transamination d) Transmethylation e) Biosynthesis of protein <b>5. Homework after each class</b>
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. Group discussions 3. Class room quiz competitions				
<b>UNIT-4</b>				
1.	Biotechnology - Scope and importance.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of biotechnology <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) General Introduction

				<p>b) Scope and importance of biotechnology in agriculture, food industries, medicines and sewage treatment</p> <p><b>5. Homework after each class</b></p>
2.	Recombinant DNA and Gene cloning.	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of DNA and gene</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) DNA isolation</p> <p>b) Vector</p> <p>c) cDNA injection in host</p> <p>d) gene amplification-cloning</p> <p>e) PCR</p> <p>f) Merits and demerits of techniques</p> <p><b>5. Homework after each class</b></p>
3.	Cloned genes and other tools of biotechnology.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> as above</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Organogenesis</p> <p>b) Synthesis of biochemicals: insulin and interferons</p> <p>c) Gene manipulation</p> <p>d) Organogenesis</p> <p>e) Test-tube babies</p> <p>f) Hybridization</p> <p><b>5. Homework after each class</b></p>
	4. Applications of biotechnology in (i) Pharmaceutical industry, and (ii) Food processing industry.	5	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of cell transformation</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) General Introduction</p> <p>b) Scope and importance of biotechnology in agriculture</p> <p>c) Scope and importance of biotechnology in food industries</p> <p>d) Scope and importance of</p>

				biotechnology in medicines 5. Homework after each class
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. Group discussions 3. Class room quiz competitions				
<b>Unit-5</b>				
1.	Principles and techniques of pH meter	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of pH <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction b) Principle of pH meter c) Types and method of pH meter d) Importance of pH meter e) Significance and drawbacks of technique <b>5.</b> Homework after each class
2.	Colorimeter	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of wavelength and colors <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction b) Principle of colorimeter: Lambert-Beer's Law c) Methodology d) Significance and drawbacks of technique <b>5.</b> Homework after each class
3.	Microscopy- Light microscopes, Phase contrast and Electron microscopes.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>1. General objective:</b> Scientific temperament <b>2. Specific objective:</b> to clear the concept of cell transformation <b>3.</b> Questions based on previous knowledge <b>4. Synopsis:</b> a) Introduction b) Principle of microscopy:

				<p>resolution and magnification</p> <p>c) Methodology</p> <p>d) Types of microscopes</p> <p>e) Significance and limitations of microscopes</p> <p><b>5. Homework after each class</b></p>
4.	Centrifugation	3	<p>Animations and videos, ppt-presentations</p> <p>Black-board (whenever needed)</p>	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of centrifugal force</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction</p> <p>b) Principle of centrifugation</p> <p>c) Methodology</p> <p>d) Types of centrifuge</p> <p>e) Significance and limitations of centrifugation</p> <p><b>5. Homework after each class</b></p>
5.	Separation of bio-molecules by chromatography, and Electrophoresis	4	<p>Animations and videos, ppt-presentations</p> <p>Black-board (whenever needed)</p>	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of bio-molecules and their occurrence</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction</p> <p>b) Principle of chromatography</p> <p>c) Types of chromatography</p> <p>d) Significance and limitations of chromatography</p> <p>e) Principle of electrophoresis</p> <p>f) Types of electrophoresis</p> <p>g) Significance and limitations of electrophoresis</p> <p><b>5. Homework after each class</b></p>
6.	6. Histochemical methods for determination of Protein, Lipids, and carbohydrate	4	<p>Animations and videos, ppt-presentations</p> <p>Black-board (whenever needed)</p>	<p><b>1. General objective:</b> Scientific temperament</p> <p><b>2. Specific objective:</b> to clear the concept of nature of biomolecules</p> <p><b>3.</b> Questions based on previous knowledge</p> <p><b>4. Synopsis:</b></p> <p>a) Introduction</p>

				b) Methods of protein determination: qualitative and quantitative analysis c) Methods of Lipids determination: qualitative and quantitative analysis d) Methods of carbohydrate determination: qualitative and quantitative analysis <b>5. Homework after each class</b>
Assessment of understanding: 1. Unit test for 30 marks: subjective/objective/oral 2. group discussions 3.class room quiz competitions				

**ZOOLOGY**  
**PAPER-I (Paper Code-0917)**

**(Ecology, Environmental-biology; Toxicology ; Microbiology and Medical Zoology)**

**UNIT-1**

S. No.	Topic	No. of periods needed	Teaching Method	Lesson plan
1.	Aims and scopes of Ecology	6	Black board, ppt presentation	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of aims and scopes of Ecology Questions based on previous knowledge <b>Synopsis:</b> Definition of ecology History of ecology Branches of ecology Scope of ecology  Homework after each class
2.	Major ecosystems of the	3	Black board, ppt	<b>General objective:</b> Scientific temperament

	world-Brief introduction Population-Characteristics and regulation of densities.		presentation	<p><b>Specific objective:</b> to clear the concept of major ecosystems of the world, Brief introduction Population- Characteristics and regulation of densities.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b> Major ecosystems: artificial and natural ecosystem (terrestrial-forest, grassland, desert; aquatic-marine; fresh water-lentic and lotic ecosystems) Population: density and dispersion; sex ratio, survivorship curves, logistic and exponential model of population growth, r and k selection species, density dependent and density independent population growth, population cycles</p> <p>Homework after each class</p>
3.	Communities and Ecosystems	6	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Communities and Ecosystems</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b> Introduction Stratification Species richness Species diversity. Diversity index Dominance, abundance Ecotone Edge effect</p> <p>Homework after each class</p>
4.	Biogeochemical cycles	3	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of Biogeochemical cycles</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b> Definition Importance Types: gas cycle and sedimentary cycle</p>

				<p>Carbon cycle Oxygen cycle Nitrogen cycle Phosphorus cycle Sulphur cycle Water cycle How human disrupt these cycles</p> <p>Homework after each class</p>
5.	Air and water pollution	5	Black board, ppt presentation	<p><b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Air and water pollution Questions based on previous knowledge <b>Synopsis:</b> Introduction of pollution Nature, causes and burden of air and water pollution Source of air and water pollution Impact of air and water pollution on health Precaution, laws, and measure for controlling air and water pollution.</p> <p>Homework after each class</p>
6.	Ecological succession			<p><b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Ecological succession Questions based on previous knowledge <b>Synopsis:</b> Introduction of ecological succession Primary succession Secondary succession Autogenic succession Cyclic succession Allogenic succession Autotropic succession Heterotropic succession Induced succession Retrogressive succession Directional succession</p> <p>Homework after each class</p>

Assessment of understanding:

1. Unit test for 30 marks: subjective/objective/oral
2. group discussions
7. 3.class room quiz competitions

### UNIT-2

1.	General idea about pH and Buffer.	3	Animations and videos, ppt-presentation s Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of general idea about pH and Buffer</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>pH definition</p> <p>Equation of pH.</p> <p>Henderson-hasselbalch equation</p> <p>Acid-base concept</p> <p>Buffer system</p> <p>Buffer in living system</p> <p>Acidosis, alkalosis, tetany</p> <p>Homework after each class</p>
2.	Transport across membrane - cell membrane; Mitochondria and Endoplasmic reticulum.	6	Animations and videos, ppt-presentation s Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of transport across membrane - cell membrane; Mitochondria and Endoplasmic reticulum.</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Diffusion: passive and facilitated</p> <p>Osmosis</p> <p>Active and passive transport</p> <p>Mass transport: endocytosis, exocytosis, phagocytosis and pinocytosis.</p> <p>Transport across inner and outer membrane of mitochondria</p> <p>Transport across endoplasmic reticulum</p> <p>Homework after each class</p>
3.	Active transport and its mechanism;	2	Animations and videos, ppt-	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of</p>

			presentations Black-board (whenever needed)	cell biology Questions based on previous knowledge <b>Synopsis:</b> Ligand gated channel Voltage gated channel Uniportal transport Symport transport Antiportal transport  Homework after each class
4.	Hydrolytic enzymes - Their chemical nature, Activation and specificity.	2	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of hydrolytic enzymes. Questions based on previous knowledge <b>Synopsis:</b> Introduction of enzymes Properties of enzymes Types of hydrolytic enzymes Proteolytic enzymes, carbohydrase enzymes, nuclease enzymes, lipase enzymes, phosphorylase enzymes Activation and regulation of enzymes  Homework after each class
Assessment of understanding: 1. Unit test for 20 marks: subjective/objective/oral 2. Group discussions 3. Class room quiz competitions				
<b>UNIT-3</b>				
1.	Amino acids and Peptides - Basic structure and biological function.	4	Animations and videos, ppt-presentations Black-board (whenever needed)	<b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Amino acids and Peptides - Basic structure and biological function. Questions based on previous knowledge <b>Synopsis:</b> Introduction Structure of amino acid Properties of amino-acid Primary, secondary, tertiary and quaternary structures of amino acids Functions of protein and amino acids  Homework after each class

2.	Carbohydrate and its metabolism - Glycogenesis; Gluconeogenesis; glycolysis, Glycogenolysis; Cori-cycle.	8	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Carbohydrate and its metabolism          Questions based on previous knowledge  <b>Synopsis:</b>          Introduction          Structure of carbohydrates          Properties of carbohydrates          Glycolysis and energy budget          Kerb cycle and energy budget          Cori cycle          Glycogenesis          Glycogenolysis          Glyconeogenesis          Biological functions of carbohydrates</p> <p>Homework after each class</p>
3.	Lipid metabolism - Oxidation of glycerol; oxidation of fatty acid.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Lipid metabolism          Questions based on previous knowledge  <b>Synopsis:</b>          Introduction of lipid          Classification of lipids          Structure and functions of lipids          Beta-oxidation of lipid</p> <p>Homework after each class</p>
4.	Protein metabolism - Deamination, Transamination, Transmethylation ; Biosynthesis of Protein	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Protein metabolism          Questions based on previous knowledge  <b>Synopsis:</b>          Protein catabolism- deamination, transamination and transmethylation of protein          Ornithine cycle          Biosynthesis of protein in prokaryotic and eukaryotic cells (transcription, post-transcriptional modification, translation, post-translational modifications)</p> <p>Homework after each class</p>
<p>Assessment of understanding:</p> <ol style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. Group discussions</li> </ol>				

## 3. Class room quiz competitions

## UNIT-4

1.	Biotechnology - Scope and importance.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of cell biology</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Introduction of biotechnology</p> <p>Branches of biotechnology</p> <p>Significance of biotechnology</p> <p>Homework after each class</p>
2.	Recombinant DNA and Gene cloning.	6	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of biotechnology - Scope and importance</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Natural process of recombination of DNA-conjugation, transformation, transduction, and recombination during pachetene stage of meiosis I.</p> <p>Recombination of DNA in lab: restriction endonuclease digestion, and ligation</p> <ol style="list-style-type: none"> <li>1. Gene cloning: Isolation of donor DNA fragment or gene.</li> <li>2. Selection of suitable vector.</li> <li>3. Incorporation of donor DNA fragment into the vector.</li> <li>4. Transformation of recombinant vector into a suitable host cell.</li> <li>5. Isolation of recombinant host cell.</li> </ol> <p>Homework after each class</p>
3.	Cloned genes and other tools of biotechnology.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament</p> <p><b>Specific objective:</b> to clear the concept of cloned genes and other tools of biotechnology</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b></p> <p>Vectors: plasmid, cosmid, phage-virus</p> <p>Restriction enzymes</p> <p>Ligation enzymes</p> <p>Host</p>

				<p>PCR Gene-machine Genomic library Electroporation Gene-gun</p> <p>Homework after each class</p>
	4. Applications of biotechnology in (i) Pharmaceutical industry, and (ii) Food processing industry.	5	<p>Animations and videos, ppt-presentations Black-board (whenever needed)</p>	<p><b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of Applications of biotechnology Questions based on previous knowledge <b>Synopsis:</b> Pharmaceuticals: genetically engineered INSULIN Gene therapy Molecular diagnosis Transgenic animals-normal physiological development, study of disease, biological products, vaccine safety, chemical safety testing.</p> <p>Food processing industry: organic agriculture, GMO Crops, insect and pest resistant plants, HYV plants, fortified plants.</p> <p>Homework after each class</p>
<p>Assessment of understanding:</p> <ol style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. Group discussions</li> <li>3. Class room quiz competitions</li> </ol>				
<b>Unit-5</b>				
1.	Principles and techniques of pH meter	3	<p>Animations and videos, ppt-presentations Black-board (whenever needed)</p>	<p><b>General objective:</b> Scientific temperament <b>Specific objective:</b> to clear the concept of principles and techniques of pH meter Questions based on previous knowledge <b>Synopsis:</b> Principle of pH meter pH electrode and reference electrode design types of pH meters</p> <p>Homework after each class</p>

2.	Colorimeter	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Colorimeter</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>  Principle of colorimeter-lambert-beer's law  Ray diagram of colorimeter  Significance and limitations of colorimeter</p> <p>Homework after each class</p>
3.	Microscopy- Light microscopes, Phase contrast and Electron microscopes.	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Microscopy</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>  Principle of microscopy-resolution and magnification  Types of microscopes  Bright field, oblique illumination, dark field, dispersion staining  Phase contrast  Interference reflection  Fluorescence  Confocal  x-ray  electron microscopy  scanning microscopy  limitations</p> <p>Homework after each class</p>
4.	Centrifugation	3	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Centrifugation</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>  Introduction  Mathematical formula  Principal of centrifugation machine  Types: microcentrifuges; low-speed centrifuges; high speed centrifuges; ultracentrifuge  Limitations and applications</p> <p>Homework after each class</p>

5.	Separation of bio-molecules by chromatography, and Electrophoresis	4	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of chromatography, and Electrophoresis</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>  Principle of chromatography  Column and planar chromatography (paper and TLC)  Displacement chromatography  Physical state of mobile phase: gas and liquid  Affinity: supercritical fluid  Separation mechanism: ion exchange  Size exclusion and expanded bed adsorption</p> <p>Homework after each class</p>
6.	6. Histo-chemical methods for determination of Protein, Lipids, and carbohydrate	4	Animations and videos, ppt-presentations Black-board (whenever needed)	<p><b>General objective:</b> Scientific temperament  <b>Specific objective:</b> to clear the concept of Histo-chemical methods</p> <p>Questions based on previous knowledge</p> <p><b>Synopsis:</b>  Homopolysaccharide: starch-iodine test; glycogen-carminic method; cellulose and chitin-calcofluor white staining method.  Heteropolysaccharide: glycosaminoglycan-hale's colloidal iron method; periodic-acid-schiff reaction; alcian blue; iron diamine method</p> <p>Protein: biuret test, ninhydrin test, xanthoproteic test, saharouchi test, hopkin's test</p> <p>Lipid: oil red O method, osmium tetroxide method, bromine-sudan black method, marchi method, Nile blue method</p> <p>Homework after each class</p>
<p>Assessment of understanding:</p> <ol style="list-style-type: none"> <li>1. Unit test for 30 marks: subjective/objective/oral</li> <li>2. group discussions</li> <li>3. class room quiz competitions</li> </ol>				