

**ST. PHILOMENA'S COLLEGE (AUTONOMOUS), MYSORE-570 015**

**Subject- ZOOLOGY**

**Syllabus for B.A, Course under Semester Scheme.**

The Scheme of Teaching & Examination  
FROM THE ACADEMIC YEAR- 2016 Onwards

Semester Number	Title of the Paper	Q. P. Code	Teaching Scheme Hours per Week			Duration in hours	Examination Scheme		
			Theory	Practical	Credits		Theory/ Practical Proper Max. Marks	I A Max Marks	Total Marks
I	Animal Diversity I	MA 630 MA 631 IA MA 632 PR-1 MA 633 PR-IA	3	3	4.5	6	T-60 P-20	T IA-10 P IA-10	100
II	Animal Diversity II	MB 630 MB 631 IA MB632 PR-1 MB 633 PR-IA	3	3	4.5	6	T-60 P-20	T IA-10 P IA-10	100
III	Animal Diversity III	MC 630 MC 631 IA MC 632 PR-1 MC 633 PR-1	3	3	4.5	6	T-60 P-20	T IA-10 P IA-10	100
IV	Biochemistry and physiology	MD 630 MD 631 IA MD 632 PR-1 MD 633 PR-1	3	3	4.5	6	T-60 P-20	T IA-10 P IA-10	100
V	Cell biology & Immunology (P-5)	ME 630 T IA ME 631 T IA ME 634 PR ME 635 PR IA	3	3	4.5	6	T- 80 P- 40	T IA -20 P IA- 10	150
	Development biology & endocrinology (P-6)	ME 632 T IA ME 633 T IA ME 636 PR ME 637 PR IA	3	3	4.5	6	T- 80 P- 40	T IA -20 P IA- 10	150
VI	Genetics & evolution (P-7)	MF 630 T IA MF 631 T IA MF 634 PR MF 635 PR IA	3	3	4.5	6	T- 80 P- 40	T IA -20 P IA- 10	150
	Environmental Biology & Ethnology (P-8)	MF 632 T IA MF 633 T IA MF 636 PR MF 637 PR IA	3	3	4.5	6	T- 80 P- 40	T IA -20 P IA- 10	150



**ST. PHILOMENA'S COLLEGE (AUTONOMOUS),**

**MYSORE 570015**

**A COLLEGE OF EXCELLENCE**

**(UGC)**

**SUBJECT: ZOOLOGY**

**SYLLABUS FOR B Sc COURSE UNDER SEMESTER SCHEME**

**DURATION OF THE COURSE : 3 YEARS (6 SEMESTERS )**

**FOR THE ACADEMIC YEAR 2016 ONWARDS**

The Objective of this syllabus is to impart a comprehensive understanding of the classical and applied aspects of zoology .Modern developments in the field of the subject are given sufficient weightage to help the students to be updated with information on these aspects. Certain new topics such as those related to Eco toxicology, human reproduction and impact of modern lifestyle on reproduction etc; are added to make teaching and learning more interesting and pertinent.

Following the UGC guidelines, using animals for dissections and mountings is removed from the syllabus, which creates a huge void in teaching and learning zoology. However, efforts are taken to make the subject interesting by introducing topics on parasitic and vector biology and it is proposed to make use of modern ICT tools and simulation gadgets (demonstrating dissections and related studies) to compensate for this loss. For each semester a

set of clear objectives are mentioned indicating the expected outcome after studying the course material.

Sufficient care is taken to include relevant and interesting practical components that help the students to appreciate the subject and its application in their life.

Salient features should be elaborated while giving general characters of each group. Local examples with common and scientific names and one or two salient features from all the groups to be mentioned. Some of the examples are not found in India can be included because of taxonomic / phylogenetic or other significance.

# I SEMESTER

## PAPER I

### ANIMAL DIVERSITY – I

3 Hours/Week = 42 Hrs.

**MARKS THEORY – 60 + INTERNAL ASSESSMENT -10 = 70**

The students get introduced to the animal kingdom and richness of biodiversity. After studying this semester, they are expected to understand the importance of Biodiversity and its conservation. Also they are expected to know about the invertebrates from protozoa to annelida and their importance to ecosystem.

3 Hrs. /week x 14 = 42 hrs.

<b><u>UNIT I</u></b>  <b>1.1 Biodiversity:</b>  Biodiversity and its importance, causes for depletion, conservation. Systematics - contributions of Carolus Linnaeus, Linnaean hierarchy, binomial nomenclature, concept of species	<b>3 hrs.</b>
<b>1.2 Protista – Protozoa:</b>  General characters & classification up to classes with suitable examples.  Reproduction - fission & conjugation (in paramecium).  Structure of <i>Entamoeba histolytica</i> and disease caused by it, Life cycle, pathogenecity, symptoms & control measures of <i>Plasmodium falciparum</i>	<b>6 hrs.</b>
<b><u>UNIT II</u></b>  <b>Porifera:</b>  General characters & classification up to classes with examples. Sycon: externals and larval forms. (Parenchymula and Amphiblastula). Histology of sponges cell types and functions.  Canal System – Asconoid, syconoid, Leuconoid and Rhagon type and its significance. Economic importance of sponges and sponge culture	<b>5 hrs.</b>

<p><b><u>UNIT III</u></b></p> <p><b>3.1 Cnidaria:</b></p> <p>General characters &amp; classification up to classes with examples.</p> <p>Obelia – externals, structure of zooids (polyp, blastostyle, medusa).</p> <p>Polymorphism with reference to Halistemma, Physalia. Structure of corallite, coral reefs, importance of corals (excluding theories) economic importance of coelenterates and corals</p> <p><b>3.2 Acnidaria:</b></p> <p>Salient features and systematic position of Ctenophora with Pleurobrachia as an example.</p>	<p><b>7 hrs</b></p> <p><b>2hrs</b></p>
<p><b><u>UNIT IV</u></b></p> <p><b>4.1 Platyhelminthes:</b></p> <p>General characters &amp; classification up to classes with examples.</p> <p>Tape worm – externals, scolex in tape worm, structure of mature and gravid proglottid.</p> <p><b>4.2 Aschelminthes:</b></p> <p>General characters with examples. Morphology, transmission, pathogenecity and preventive measures of <i>Ascaris</i>, <i>Ancylostoma</i> and <i>Wucheraria bancrofti</i>.</p>	<p><b>4 hrs</b></p> <p><b>6hrs</b></p>
<p><b><u>UNIT V</u></b></p> <p><b>Annelida:</b></p> <p>General characters and classification up to classes with examples.</p> <p><b>Pheretima:</b> Externals, setae, digestive system, nervous system, and reproductive system. Trochophore larva. Economic importance of annelida. Vermiculture, scope, species of earth worms used, process, composition of vermicompost, vermiwash, earth worm as farmer's friend</p>	<p><b>9 hrs</b></p>

## References

1. Barnes, R.D, (1968) Invertebrate Zoology, W.B. Saunders Co.
2. Barrington E.J.W. ( 1981) Invertebrate Structure and Function, ELBS
3. Borradaile L.A, Potts E.A and Eastham, L.E.S(1964) The Invertebrates, Saunders Ltd.
4. Borradaile L.A.Potts E.A and Kerkut G.A(1977) The Invertebrates, Cambridge Uni.Press
5. Cameron, (1965) Parasites and Parasitism, ELBS Text Book Series
6. Campbell N.A. Mitchell L.G and Reece (1996) Biology; Concepts and Connections, Benjamin / Cummings Publ.Co.Inc.USA
7. Chandler A.C and Read P.C (1961) An introduction to parasitology, John Wiley & Co.
8. Dhami P S & Dhami J.K. (1964) Invertebrate Zoology, S.Chand & Co.
9. Ekambaranatha Ayyar M and Anantakrishnan T.N.(1990) A Manual of Zoology Vol. I Invertebrata ( Part I & II), S.Vishwanathan Pvt.Ltd.
10. Hegner R.W. and Engelmann J.G.(1960) Invertebrate Zoology, Mac Millan Co.
11. Hyman L.H. (1941) The Invertebrates ( Vols. I to VII) McGraw Hill, N.Y.
12. Jordon E L and Verma P.S (1976) Invertebrate Zoology, S.Chand & Co.
13. Kotpal R.L. (1993) Protozoa – Echinodermata ( All volumes), Rastogi Publications.
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15. Mayr E (1980) Principles of Systematic Zoology, Tata-McGraw Hill
16. Parker T.J. and Haswell W.A ( 1972) A text book of Zoology – Vol-I, Mac Millan Press Ltd.
17. Prasad S.N (1980) Life of Invertebrates, Vikas Publishing House.
18. Sedgwick A, (1966) Student's textbook of Zoology, Vol.I & III Central Book Depot, Allahabad .
19. Soper R (1998) Biological Science, Cambridge Univ. Press.
20. Vidyarthi R.D (1984) A textbook of Zoology, S.Chand & Co.

## II SEMESTER

### PAPER II

#### ANIMAL DIVERSITY – II

3 Hours/Week = 42 Hrs.

MARKS THEORY – 60 + INTERNAL ASSESSMENT -10 = 70

After studying this semester the student is expected to know about rest of the invertebrates, basic differences between invertebrates and vertebrates, salient features and broad classification of phylum Chordata and details of a few Protochordates.

<b><u>UNIT I</u></b> <b>1.1 Onychophora:</b> Salient features of Peripatus & systematic position of Onychophora. <b>1.2 Arthropoda:</b> General characters and classification up to classes with examples. Metamorphosis in insects – types, hormonal control of metamorphosis	<b>3 hrs</b>  <b>5 hrs</b>
<b><u>UNIT II</u></b> <b>Economic importance of Arthropoda</b> <b>2.1 Brief account of beneficial and harmful insects</b> <b>Apiculture:</b> Social organization in honey bee, species of honey bee used for apiculture, morphology of honey, structural modifications, bee venom, apitherapy, bees in pollination. Production, composition, medical and nutritional importance of honey <b>2.2 Sericulture :</b> Races of silk worm, mulberry and non mulberry silk worms and their larval host plants, voltinism, renditta value, morphology and life cycle of <i>Bombyx mori</i> , rearing techniques, global and national silk production, Importance of bi-products of sericulture <b>2.3 Prawn culture:</b> Scope and importance different species of prawns cultured. <b>2.4 Pests and Vectors–</b> Insect pests, vectors (four examples each), impact on agriculture and health; pest and vector control – physical and chemical methods; bio-control, integrated pest management.	<b>9 hrs</b>





## References

1. Barnes, R.D, (1968) Invertebrate Zoology, W.B. Saunders Co.
2. Barrington E.J.W. ( 1981) Invertebrate Structure and Function, ELBS
3. Borradaile L.A, Potts E.A and Eastham, L.E.S(1964) The Invertebrates, Saunders Ltd.
4. Borradaile L.A.Potts E.A and Kerkut G.A(1977) The Invertebrates, Cambridge Uni.Press
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6. Campbell N.A. Mitchell L.G and Reece (1996) Biology; Concepts and Connections, Benjamin / Cummings Publ.Co.Inc.USA
7. Chandler A.C and Read P.C (1961) An introduction to parasitology, John Wiley & Co.
8. Dhami P S & Dhami J.K. (1964) Invertebrate Zoology, S.Chand & Co.
9. Ekambaranatha Ayyar M and Anantakrishnan T.N.(1990) A Manual of Zoology Vol. I Invertebrata ( Part I & II), S.Vishwanathan Pvt.Ltd.
10. Hegner R.W. and Engelmann J.G.(1960) Invertebrate Zoology, Mac Millan Co.
11. Hyman L.H. (1941) The Invertebrates ( Vols. I to VII) McGraw Hill, N.Y.
12. Jordon E L and Verma P.S (1976) Invertebrate Zoology, S.Chand & Co.
13. Kotpal R.L. (1993) Protozoa – Echinodermata ( All volumes), Rastogi Publications.
14. Majupuria T.C. (1980) Invertebrate Zoology, R.K.Jain Publ.
15. Mayr E (1980) Principles of Systematic Zoology, Tata-McGraw Hill
16. Parker T.J. and Haswell W.A ( 1972) A text book of Zoology – Vol-I, Mac Millan Press Ltd.
17. Prasad S.N (1980) Life of Invertebrates, Vikas Publishing House.
18. Sedgwick A, (1966) Student's textbook of Zoology, Vol.I & III Central Book Depot, Allahabad .
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10. Vidyarthi R.D (1984) A textbook of Zoology, S.Chand & Co.

**III SEMESTER**  
**PAPER III**  
**ANIMAL DIVERSITY III**

**3 Hours/Week = 42 Hrs.**

**MARKS THEORY – 60 + INTERNAL ASSESSMENT -10 = 70**

After this semester the students are expected to have a thorough knowledge of different groups of vertebrates and their importance, both economic and ecological. Chapter on comparative anatomy will enable them to appreciate the theory of evolution better.

<b><u>UNIT I</u></b>  <b>Pisces:</b>  General characters of Pisces.  Differences between Chondrichthyes and Osteichthyes with examples.  Salient features and discontinuous distribution of Dipnoi.  Parental care in fish - Hippocampus, Tilapia, Syngnathus, Shark, three spined stickle back.  Aquaculture: Scope and economic importance, inland and marine fisheries , culture techniques, food value of fish, food fishes of Karnataka (three marine ,three fresh water )	<b>6 Hrs</b>
<b><u>UNIT II</u></b>  <b>2.1 Amphibia:</b>  General characters and classification of living amphibian orders with examples.  Parental care in Amphibia – Ichthyophis, Salamandra, Alytes, Mid wife toad, Surinam toad, Hyla goldeii  Type study – Frog: Externals, digestive system, respiratory system, circulatory system and urinogenital system. Structure of brain. Importance of frog in ecosystem	<b>6hrs</b>

<p><b>2.2 Reptilia:</b></p> <p>General characters &amp; classification up to orders with distinctive features of living reptiles with examples. Arcades and fossae in the skull.</p> <p>Poisonous and non-poisonous snakes of India, key for the identification of poisonous snakes, poison apparatus, types and importance of snake venom.</p>	<p><b>6hrs</b></p>
<p><b><u>UNIT III</u></b></p> <p><b>Aves:</b></p> <p>General characters and classification up to sub-classes with examples. Morphological, anatomical and physiological flight adaptations in birds.</p> <p>Distinctive features of Archaeornithes and Neornithes (Paleognathae, Impennae and Gnathae).</p> <p>Flightless birds and their discontinuous distribution.</p>	<p><b>5 Hrs.</b></p>
<p><b><u>UNIT IV</u></b></p> <p><b>Mammalia:</b></p> <p>General characters of mammalia and classification upto sub classes with examples.</p> <p>Distinctive features and distribution of Prototheria, affinities with reptilian, mammalia and its unique features. Metatheria distinctive features and its affinities and adaptive radiation.</p> <p>Distinctive features of Perissodactyla, Artiodactyla, Carnivora, Chiroptera, Rodentia, Proboscidae, Cetaceae, and Primata.</p>	<p><b>9 Hrs.</b></p>
<p><b><u>UNIT V</u></b></p> <p><b>Comparative anatomy :</b> Exoskeletal structure – Epidermal Scales, dermal scales, structure of hair, Claws, Nails, Hooves , Horns.</p> <p><b>Circulatory system:</b> Comparative account of heart: Fish (Shark and Dipnoi), Amphibia (Frog), Reptilia (lizard), Aves (Pigeon) and Mammalia (Man).</p> <p>Evolutionary account of aortic arches (general plan): Fish, Amphibia, Reptilia, Aves and Mammalia.</p> <p><b>Urinogenital system:</b> Evolution of kidneys in vertebrates: Pronephros, mesonephros and metanephros.</p>	<p><b>10hrs</b></p>

## References

1. Agarwal V.P & Dalela (1975) Textbook of Vertebrate Zoology, Jai Prakashnath & co.
2. Dharmi P.S & Dharmi J.K. ( 1952) Chordate Zoology, S.Chand & Co.
3. Ekambaranatha Ayyar M and Anantakrishnan T.N.(1990) A Manual of Zoology Vol. II Chordata, S.Vishwanathan Pvt.Ltd.
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13. Young J.Z. (1981) The Life of Vertebrates, Clarendon Press, N.Y.

**IV SEMESTER**  
**PAPER IV**  
**BIOCHEMISTRY and PHYSIOLOGY**

**3 Hours/Week = 42 Hrs.**

**MARKS THEORY – 60 + INTERNAL ASSESSMENT -10 = 70**

The students after this semester will understand about the various biomolecules, their structure , physiological roles and biological importance. Also they are expected to know about the physiology of various metabolic processes.

**BIOCHEMISTRY:**

<b><u>UNIT I</u></b>	
<b>1.1 Carbohydrates:</b>  Definition and classification, Biological importance of common monosaccharides (glucose, fructose, ribose, deoxyribose), disaccharides(sucrose, lactose, maltose) and polysaccharides – homopolysaccharides (starch and glycogen) and heteropolysaccharides ( heparin and hyaluronic acid).	<b>3hrs</b>
<b>1.2 Proteins:</b>  Elementary classification of amino acids. Primary, secondary, Tertiary and quaternary structure of protein with haemoglobin as an example ( all the four structural orders) simple and conjugated proteins, fibrous (keratin) and globular (globulin) proteins, Biological importance of proteins.	<b>3hrs</b>
<b>1.3 Lipids:</b>  Classification and biological importance of phospholipids, neutral lipids and glycolipids. Saturated and unsaturated fatty acids with examples.  Clinical importance of lipids – lipid profile of blood.	<b>3hrs</b>

## UNIT II

## 2.1 Vitamins: Types, sources, and their role, hypovitaminosis, hypervitaminosis and its effects and deficiency diseases.

**3hrs**

## 2.2 Enzymes:

Classification, properties and biological importance of enzymes, mechanism of enzyme action, induced fit theory.

3hrs

## PHYSIOLOGY:

## UNIT III

### 3.1 Homeostasis Concept:

Osmoregulation- water and salt balance, Osmoconformers, Osmoregulators, osmoregulation in shark, marine and freshwater teleosts, terrestrial mammals (Kangaroo rat and Camel). Glucose balance – role of liver and pancreas, diabetes mellitus.

4hrs

### 3.2 Thermoregulation:

Ectotherms, endotherms, heterotherms, poikilotherms and homeotherms. Thermogenesis and its regulation, Adaptive changes in animals for cold and warm environments. A note on aestivation and hibernation.

**3hrs**

## UNIT IV

#### **4.1 Digestion:-**Physiology of digestion in oral cavity, salivary glands, physiology of digestion in stomach, intestine and absorption. Role of hormones in digestion.

**3hrs**

## 4.2 Respiration:

Physiology of respiration – exchange of gases, transport of oxygen, oxygen dissociation curves – Bohr's effect, transport of carbon dioxide – chloride shift, respiratory quotient. Cellular respiration: Glycolysis, Krebs cycle, oxidative phosphorylation, energy budget, energy rich compounds. Respiratory Pigments.

4hrs

<p><b>4.3 Circulation:</b> Open and closed type of circulation, Composition of blood, Structure of human heart, Complete double circulation, Conduction of heart (heart beat, cardiac cycle, pulse, heart sounds), types of hearts:- neurogenic, myogenic. Blood pressure (schematic representation of blood clotting), chemical and nervous regulation of heart.</p>	<p><b>3hrs</b></p>
<p><b><u>UNIT V</u></b></p> <p><b>5.1 Nitrogen Excretion:</b></p> <p>Nitrogen excretion, ammonotelism, ureotelism and uricotelism with examples. Ornithine cycle, Structure of nephron. Physiology of urine formation in man, counter-current multiplier system. Regulation of urine formation.</p> <p><b>5.2 Muscle Contraction:</b></p> <p>Types of muscles, ultra structure of striated muscle fibre, contractile and regulatory proteins, neuro-muscular junction. Mechanism of muscle contraction and relaxation, sliding filament theory.</p> <p><b>5.3 Nervous Co-ordination:</b> Ultrastructure of a multipolar neuron. Morphological types of neurosynapse. Axonic &amp; synaptic transmission of nerve impulse</p>	<p><b>4hrs</b></p> <p><b>3hrs</b></p> <p><b>3hrs</b></p>

## Reference

1. Arora M.P. ( 1989) Animal Physiology, Himalaya Publishing House.
2. Gauba R.K.(1987) An introduction to Histology, Tata McGraw Hill Publ.
3. Hurkat P.C. & Mathur, P.N(1976) A textbook of Animal Physiology, S.Chand & co.
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11. Tortora G.J. and Anagostokos (1990) Principles of Anatomy and Physiology, Harper & Row
12. Lehninger. (2005) Principles of Biochemistry
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14. Lubert Stryer. Biochemistry 4<sup>th</sup> Edition



**PAPER V**  
**CELL BIOLOGY AND IMMUNOLOGY**

**MARKS THEORY – 80 + INTERNAL ASSESSMENT -20 = 100**

<p><b><u>UNIT I</u></b></p> <p><b>The Cell:</b></p> <p><b>1.1</b> Ultra structure of an animal cell.</p> <p><b>1.2 Plasma membrane:</b> Ultra structure – fluid mosaic model, differentiation of cell surface, functions.</p> <p><b>1.3 Endoplasmic reticulum:</b> Ultra structure, types, origin and functions.</p> <p><b>1.4 Golgi complex:</b> Occurrence, morphology, origin and functions.</p>	<p><b>6Hrs</b></p>
<p><b><u>UNIT II</u></b></p> <p><b>2.1 Mitochondria:</b> Morphology, distribution, ultra structure and functions. Mitochondrion as a semi-autonomous organelle.</p> <p><b>Ribosomes:</b> Occurrence, structure, distribution, types, chemical composition, dissociation and reconstitution.</p> <p><b>Lysosomes:</b> Occurrence, structure, enzymes, polymorphism, functions.</p> <p><b>2.2 Nucleus:</b></p> <p>Ultra structure of nucleus, nuclear membrane, nucleoplasm and chromatin fibres.</p> <p>Ultra structure and functions of nucleolus. Classification and structure of DNA and RNA. Watson and Crick model of DNA, replication of DNA. Clover leaf model of tRNA.</p>	<p><b>5hrs</b></p> <p><b>4hrs</b></p>

<p><b><u>UNIT III</u></b></p> <p><b>3.1 Chromosome:</b></p> <p>Chromosome number, types, size. Morphology, karyotype, euchromatin and heterochromatin, types of heterochromatin, Chemical composition, Ultra structure – nucleosome model. Giant chromosomes – Polytene and lampbrush chromosomes. Chromosomal aberrations –numerical &amp; structural deletion, duplication, inversion and translocation.</p> <p><b>3.2 Mitosis:</b> Cell cycle, Mitotic stages, ultra structure of centriole, spindle fibre and its role in chromosome movements. Significance of mitosis, mitotic inhibitors.</p> <p><b>3.3 Cancer Biology:</b></p> <p>Types of cancer, characteristics of cancer cell, oncogenes, tumors. Carcinogenic agents (physical, chemical and biological). Cancer therapy.</p>	<p><b>5hrs</b></p> <p><b>3hrs</b></p> <p><b>3hrs</b></p>
<p><b><u>UNIT IV</u></b></p> <p><b>4.1 Meiosis:</b> Stages of meiosis. Synaptonemal complex, crossing over and chiasma formation, mechanism of crossing over, Significance of meiosis.</p> <p><b>4.2 Gametogenesis:</b> Spermatogenesis – formation of spermatids, spermiogenesis. Oogenesis, comparison between Oogenesis &amp; spermatogenesis.</p> <p><b>4.3 Parthenogenesis:</b></p> <p>Cytology of natural parthenogenesis – arrhenotoky, thelytoky (amictic and apomictic) and cyclical parthenogenesis with examples. Artificial parthenogenesis – Leob's and Bataillon's experiment. Significance of parthenogenesis.</p>	<p><b>4hrs</b></p> <p><b>3hrs</b></p> <p><b>3hrs</b></p>

<p><b><u>UNIT V</u>    Immunology:</b></p> <p>Natural and artificial immunity, Humoral and cell mediated immunity, structure of immunoglobulins and types; B-lymphocytes and the immune response – precipitation of soluble antigens, agglutination, complement fixation, clonal selection theory, immunological memory, auto-immune diseases – Scleroderma purpura, Systemic Lupus erythematosus (SLE), Rheumatoid arthritis (RA); major histocompatibility complexes – MHC antigen, T-lymphocytes and the immune response.</p>	<p><b>6 Hrs</b></p>
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## References

1. Burke J D (1970) Cell Biology, Scientific Book Agency, Calcutta
2. De Roberts EDP, and De Roberts EMF, Jr.(1996) Cell and Molecular Biology, Holt W.B.Saunders International.
3. Feirfelder.F (1997) Essentials of Molecular Biology, Narosa Publ. New Delhi
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18. White MJD (1963) The Chromosomes, Methuen & Co., London

**PAPER VI**  
**DEVELOPMENTAL BIOLOGY AND ENDOCRINOLOGY**

**3 Hours/Week = 42 Hrs**

**MARKS THEORY – 80 + INTERNAL ASSESSMENT -20 = 100**

After studying this semester the student is expected to have a thorough knowledge about the various steps of ontogenetic development and related concepts. Also an understanding of events of human reproduction, structure and secretions of human endocrine system, modern trends of reproduction etc., is expected to be the outcome.

<b><u>UNIT I</u></b>  <b>1.1 Structure of egg:</b>  Types of eggs – based on quantity and distribution of yolk with examples. Egg membranes.  <b>1.2 Fertilization:</b>  Details of the process with reference to sea urchin – approach of gametes, gamones and its role, activation, penetration, reaction of the egg and amphimixis, monospermy and polyspermy (physiological and pathological), significance of fertilization.	<b>2hrs</b>       <b>4hrs</b>
<b><u>UNIT II</u></b>  <b>2.1 Cleavage and development:</b>  Types of cleavage – holoblastic, meroblastic, radial, spiral and superficial types with examples. Planes of cleavage – meridional, vertical, equatorial and latitudinal.  Comparative account of development of Amphioxus, frog, chick and rabbit upto gastrulation. Concepts of organizer. Experiment of Spemann and Mangold, differentiation : process and importance. Morphogens and their role in development	<b>6hrs</b>       <b>3hrs</b>

<p><b><u>UNIT III</u></b></p> <p><b>3.1 Foetal Membranes:</b></p> <p>Development, structure and functions of amnion, chorion, yolk sac and allantois.</p> <p><b>3.2 Placenta:</b></p> <p>Histological and morphological classification with examples, Placental hormones. Significance of placenta.</p>	<p><b>3hrs</b></p> <p><b>4hrs</b></p>
<p><b><u>UNIT IV :</u></b></p> <p><b>Human development :</b></p> <p><b>4.1</b> Structure of mature spermatozoan, Graafian follicle, and ovulation. Brief account of stages of human development</p> <p><b>4.2</b> Modern trends in reproduction: artificial insemination, sperm and egg banks, ET, GIFT, ICSI, cloning, stem cells and its applications. Advantages and disadvantages , social issues</p> <p><b>4.3</b> Sexually transmitted diseases: types, symptoms, control measures of Gonorrhea, Syphilis and AIDS.</p>	<p><b>3hrs</b></p> <p><b>3hrs</b></p> <p><b>2hrs</b></p>
<p><b><u>UNIT V</u></b></p> <p><b>Human Endocrine System:</b></p> <p><b>5.1</b> Anatomical structure and hormones of pituitary, thyroid, parathyroid, adrenals and pineal glands – their physiological roles and conditions resulting due to hypo and hyper secretion. Neurohormones – hypothalamic releasing and inhibiting factors and their actions</p>	<p><b>7hrs</b></p>

<b>Hormonal Control of Reproduction:</b>  <b>5.2</b> Human menstrual cycle, Role of hormones in menstrual cycle. Role of male (testosterone) and female gonadal hormones (estrogen and progesterone) in reproduction. Brief account of early onset of puberty v/s food and life style in both sexes.	<b>3hrs</b>
<b>Family Planning:</b>  <b>5.3</b> Population explosion – meaning and causes, Need for birth control in India, Contraceptive strategies – rhythm method, pills, diaphragm, IUD, condoms, coitus interruptus. Sterilization.	<b>2hrs</b>

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1. Balinsky B.I. (1981) An introduction to Embryology, W.B.Saunders Co.
2. Barth L.G (1966) Embryology, Holt Rinehart & Winston.
3. Berril N.J. and Karp G ( 1978) Development, Tata Mc. GRaw Hill Publ. Co.
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13. Turner C.D & Gangara J.T (1971) General Endocrinology, W.B.Saunders Co.
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15. Verma P.S.Agarwal V.K. & Tyagi B.S (1985) Chrodote Embryology, S.Chand & co.

**VI SEMESTER**  
**PAPER VII**  
**GENETICS AND EVOLUTION**

**3 Hours/Week = 42 Hrs.**

**MARKS THEORY – 80 + INTERNAL ASSESSMENT -20 = 100**

After this semester the students are expected to know about the role of genes and environment in inheritance, different gene interaction. Patterns, genes in sex determinations, mutation Etc; also thorough knowledge of the process of evolution from genetic perspective and various evidences for evolutionary process is imbibed by the students.

<p><b><u>UNIT I</u></b></p> <p><b>1.1 Nature and Nurture:</b> Definition. Experiments on <i>Potentilla glandulosa</i>, Himalayan albino rabbit human twins. Definition of norm of reaction, genetic homeostasis, phenocopy, penetrance and expressivity with examples – Huntington's chorea, PTC.</p> <p>1.2 Mendel's laws, Mono and dihybrid crosses. Incomplete dominance – flower colour inheritance in <i>Mirabilis jalapa</i>.</p> <p>Cytoplasmic (maternal) inheritance – shell coiling in <i>Limnaea</i>.</p>	<p><b>6hrs</b></p>
<p><b><u>UNIT II</u></b></p> <p><b>Interaction of genes:</b></p> <p>Supplementary factors – 9:3:3:1 – comb pattern in fowls.</p> <p>Dominant epistasis – 13:3 – plumage colour in Leghorn and Wyandotte.</p> <p>Complementary factors – 9:7 – flower colour in sweet peas.</p> <p>Multiple factors / polygenic inheritance – skin colour in man.</p> <p>Lethal genes – yellow coat colour in mice.</p> <p><b>Multiple Alleles:</b> Inheritance of ABO blood groups in Man, Rh factor, Erythroblastosis foetalis, amniocentesis, Pleiotropism with examples</p>	<p><b>7hrs</b></p>

<p><b><u>UNIT III</u></b></p> <p><b>Linkage and sex determination:</b></p> <p><b>3.1 Linkage and crossing over:</b> Coupling and repulsion, complete and incomplete linkage in <i>Drosophila</i> (grey body and vestigial wing). Significance of crossing over.</p> <p><b>3.2 Genetic maps of chromosomes:</b> Construction of chromosome maps, two point and three point test cross in <i>Drosophila</i> (sc ec cv), ymf.</p> <p><b>3.3 Sex Linked inheritance:</b> Sex linked inheritance in <i>Drosophila</i>, man, &amp; bird. Haemophilia and colour blindness in man. Y-linked genes.</p> <p><b>3.4 Sex determination:</b> Chromosomal basis of sex determination. Non disjunction – primary and secondary. Genic balance theory. Gynandromorphs and intersexes in <i>Drosophila</i>. Environmental effect (Bonellia) and hormonal effects (Free Martin in cattle) on determination of sex. Human sex anomalies XO, XXY.</p>	<p><b>3hrs</b></p> <p><b>2hrs</b></p> <p><b>2hrs</b></p> <p><b>3hrs</b></p>
<p><b><u>UNIT IV</u></b></p> <p><b>4.1 Gene mutation:</b></p> <p>Kinds of mutation, classification - Point mutation and gross mutation. Gross mutation- classification according to origin – spontaneous and induced mutation, classification according to direction and magnitude of Phenotypic effect. Spontaneous mutation-<i>Oenothera lamarckiana</i>, induced mutation-physical mutagens, chemical mutagens. Muller's CIB technique, disorders due to mutant genes-brachydactyly, sickle cell anemia, thalassemia, inborn errors of metabolism-PKU, AKU, &amp; albinism.</p> <p><b>Eugeneics :</b> positive and negative , Euthenics, Euphenics. Recombinate DNA technology and its applications. Jumping genes Barbara McClintock's work on maize , control of gene expression : Lac operon</p>	<p><b>4hrs</b></p> <p><b>4hrs</b></p>



<p><b><u>UNIT V</u>    Organic Evolution &amp; Population Genetics:</b></p> <p><b>5.1 Evidences for organic evolution:</b> Indirect evidences from comparative anatomy, connecting links (Archeopteryx) homology (vertebrate forelimb skeleton), analogy (wings of insect and bird), vestigial organs (human examples), physiology and biochemistry – enzyme, excretory product analysis and embryological evidences.</p> <p>Direct evidences from palaeontology – nature and types of fossils. Brief account of Brontosaurus, Stegosaurus, Geological timescale.</p> <p><b>5.2</b> Mendelian population, gene pool and gene frequency. Hardy-Weinberg law – genetic equilibrium, destabilizing forces of genetic equilibrium- random genetic drift, natural selection, meiotic drive, mutation, migration, founder principle, bottle neck phenomenon</p>	<p><b>4hrs</b></p> <p><b>3hrs</b></p>
<p><b>5.3 Speciation:</b></p> <p>Definition, types – instantaneous – through mutation, chromosomal aberrations and through polyploidy.</p> <p>Gradual speciation – allopatric and sympatric speciation.</p> <p>Isolation: types –geographical and reproductive isolations, role of isolating mechanism in speciation</p>	<p><b>4hrs</b></p>

## References

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2. Brown T.A (1995) Genetics: A molecular approach, Chapman and Hall, USA
3. Carter G.S (1960) Animal Evolution, Sedgwick and Jackson Ltd.
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6. Singleton, W.R (1967) Elementary Genetics, East West Press, New Delhi.
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8. Strickberger, M.W. (1995) Genetics, Mac Millan Co.
9. Watson J.D et.al ( 1992) Recombinant DNA, W.H.Freeman and Co.
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## PAPER VIII

### ENVIRONMENTAL BIOLOGY & ETHOLOGY

3 Hours/Week = 42 Hrs.

MARKS THEORY – 80 + INTERNAL ASSESSMENT -20 = 100

After this semester the students will have a deep understanding about complexity of ecosystem, impact of environment on living beings xenobiotics and pesticides, their effects on organisms, wildlife and their depletion, man-animal conflicts etc;. They are also expected to have knowledge of different kinds of animal behaviors.

<b><u>UNIT I</u></b>	
<b>Introduction</b> -to ecology, definition, Autecology, synecology, scope of ecology.	<b>3hrs</b>
<b>1.1 Environment:</b> Different components: Atmosphere (air)-structure of atmosphere, composition of air, Hydrosphere (water)- importance of water, life supporting properties of water. Lithosphere –soil formation (pedogenesis); soil types & soil profile.	
<b>1.2 Levels of studying Ecology:</b>	
<b>Population ecology:</b> Definition of population, distribution, density, natality, mortality and age distribution.	<b>9hrs</b>
<b>Community ecology:</b> Definition of community, animal association-interspecific- positive interactions (mutualism, commensalism, protooperation), negative interactions (parasitism, predation and competition) with relevant, examples, Gause's principle.	
<b>Ecosystem:</b> Impact of human activities on the environment (pollution, urbanization, desertification) Limiting factors, Liebig-Blackman's law limiting factors, Shelford's law of tolerance. Ecological pyramids, food chains, food web, ecotone and edge effect survivorship curves, ecological succession: primary and secondary succession	

<p><b><u>UNIT II</u></b></p> <p><b>2.1 Biogeochemical cycles:</b> – Definition, importance; carbon cycle , Nitrogen and Phosphorus cycles, effective utilization of renewable nonrenewable natural resources, patents GATT, Sustainable development. Global environmental issues: green house effect, ozone thinning, nuclear winter.</p> <p><b>2.2 Ecotoxicology</b>– Scope, toxicity of pesticides-organochlorides-DDT, organophosphates (malathion), heavy, metals (mercury,), plants (partherium). Impact of xenobiotics, - bioaccumulation and biomagnifications, resistance development mosquitoes. LD50, LD100, Bioassay and its importance, EIA.</p>	<p><b>4hrs</b></p> <p><b>5hrs</b></p>
<p><b><u>UNIT III</u></b></p> <p><b>Wild life management:</b> Indian wild life, causes for depletion, conservation strategies: <i>exsitu</i> and <i>in situ</i>, conservation, NGOs in conservation of wild life. Wildlife protection act, red data book, ecological status of a species (rare, vulnerable, endangered, threatened, extinct data insufficient data unknown ).Human wild life conflict.</p>	<p><b>4hrs</b></p>
<p><b><u>UNIT IV</u></b></p> <p><b>Ethology:</b></p> <p>Types of animal behaviour -innate and learned behaviours with examples.</p> <p>Migration in fish (catadromous and anadromous with suitable examples). Migration in birds : preparation for migration and its importance.</p> <p><b>Biological Clock:</b> Circadian, circalunar and circannual rhythms with an example for each. Role of pineal and hypothalamus in rhythms.</p>	<p><b>8hrs</b></p>
<p><b><u>UNIT V</u></b></p> <p>Colouration and mimicry: A general account, warning, protective, aggressive colouration. Batesian and Mullarian mimicry.</p> <p>Bioluminisence in animals: occurrence , physiological bases and its importance.</p>	<p><b>9hrs</b></p>

<p>Communication in animals: Auditory communications in gryllid insects, pheromones and their importance in communication.</p> <p>Adaptations in animals: primary and secondary adaptation ,aquatic( shark , whale , crocodile), volant (bat, draco) arboreal (chameleon, monkey), desert (camel)</p> <p><b>Zoogeography</b>– Zoographical realms and their characteristic fauna. Detailed account of physical features and fauna of oriental realm Wallace’s line.</p>	
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## References

1. Alcock J ( 1984) Animal Behaviour; An Evolutionary Approach. Sinauer Associates
2. Chapman.E(1988) Ecology: Principles and applications, Cambridge Univ.Press.
3. Giese, A.C. (1979) Cell Physiology, W.B.Saunders Co.N.Y.
4. Hubbs C.L.(1958) Zoogeography, Washington
5. Kotpal R.L. (1991) The Birds, Rastogi Publications.
6. Krebs J.R. and N.B.Davies (1993) An introduction to Behavioural Ecology, Backwell Scientific Publishing Co.
7. Kumar H.D (1986) Modern Concepts of Ecology, Vikas Publishing House.
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13. Singh H.R. (1989) Introduction to Animal Ecology & Environmental Biology, S.Chand & Co.
14. Trivedi P.R. and Gurudeep Raj ( 1992) Environmental Biology.

# **PRACTICALS**

Importance should be given to student participation in the observation of identifying morphological characters/conduction of experiments. Students should complete the record work before the next practical class, and it has to be signed by the teacher and later submission should be entered in their record. Students who are absent for a particular practical class can be allowed to complete the record only when they make the observation in the next practical class, failing which, such records remain incomplete. Students should submit the certified practical record and filed report, if any at the time of the practical examination. They will not be allowed to take the Practical Examination without the certified record and filed report. When a student submits his record sheets, it should be valued for 10 marks by the concerned teacher on the same day. The marks scored by each student should be added together at the end of the Semester and then divided by the total number of classes held. The marks thus scored will form the marks for Internal Assessment. Wherever there is submission/field report, they also shall form part of Internal Assessment along with class records.

## **SEMESTER-I**

**3 Hours/Week = 42 Hrs**

**MARKS THEORY – 20 + INTERNAL ASSESSMENT -10 = 30**

### **PRACTICAL – I**

**14x3=42 Hrs.**

1. Study of permanent slides: Amoeba, Entamoeba, polystomella,
2. Euglena, Paramecium, Balantidium, Vorticella
3. Preparation of Protozoan culture – Hay infusion
4. Observation of the Protozoan culture
5. Porifera: Sycon, Spongilla, Euspongia,
6. Sponge gemmule(marine & F.W), spicules.(monaxon)
7. Cnidaria: Hydra, Obelia, Physalia, Aurelia, Sertularia
8. Ephyra larva, Metridium Gorgonia, Pennatulula, Campanularia.
9. Madrepora, Fungia, Favia
10. Helminthes: Planaria, Scolex of tape worm
11. T.S of Taenia, T.S of Liver fluke, T.S Ascaris ( male & female)

12. Annelida: Pheretima, Chaetopterus, Aphrodite, Sabella
13. Nereies, T.S of Nereies(parapodium) T.S Leech.
14. Taenia, Live fluke, Ascaris, Leech ( parasitic adaption)

### **SCHEME OF PRACTICAL EXAMINATION**

**Time: 3 Hrs**

**Max.Marks: 20**

1. Identify with reasons, any one of the protozoan in the culture provided  
Write the procedure for preparing the protozoan culture 5x1=5
2. Identify with reasons the specimen / slides A, B, C 3x3= 9
3. Identify with reasons slide /specimen D & E (D- specimen for parasitic  
Adaptation, E – T.S of any specimen studied). 3x2= 6

### **SCHEME OF VALUATION FOR PRACTICAL I**

1. Procedure – 2, labeled diagram – 1, Identification – 1, reasons – 1
2. Identification-  $\frac{1}{2}$  , classification up to order –  $\frac{1}{2}$ , labeled diagram – 1, reasons – 1
3. Identification -1, adaptations – 2

## **II SEMESTER**

**3 Hours/Week = 42 Hrs**

**MARKS THEORY – 20 + INTERNAL ASSESSMENT -10 = 30**

### **Record + Taxonomic study report**

#### **PRACTICAL II**

1. Arthropoda: Penaeus, Saculina on crab, Butterfly, Silk moth, grass hopper, Praying mantis.
2. Scolopendra, Spirostreptus, Palamnaeus, Aranea, Limulus, Nauplius, Zoeae, Mysis.
3. Mounting of legs and wings of honey bee. Morphology and life cycle of B.mori. Identification of cocoons (mulberry and non mulberry)
- 4,5,6. Taxonomic study of insects up to orders giving key for identification, selecting any five locally available common examples and recording them.
7. Mouthparts of insects (slides) Cockroach, Mosquito, Honey bee, House fly, Butterfly.
8. Mollusca: Dentallium, Xancus, Haliotis, Unio, Cypraea, Cuttle bone, Nautilus, Pila, Murex (only shell study)
9. Aplysia, Chiton, Octopus, Sepia, Mytilus Ostrea, Slug, Glochidium larva., Echinodermata: Astropecten, Ophiothrix, Salmacis.
10. Holothuria, Antedon, Pedicellaria of Sea urchin. bipinnaria, pluteus larva.
11. Hemichordata – Balanoglossus, T.S of proboscis, T.S of collar.
12. Balanoglossus – T.S through branchio – genital region. Tornaria larva.
13. Urochordata – Ascidia
14. Cephalochordata – Amphioxus, T.S through pharynx, T.S through intestine.
15. Cyclostomata: Petromyzon, Ammocoetes larva, Myxine.

## **SCHEME OF PRACTICAL EXAMINATION**

**Time: 3 Hrs**

**Max.Marks: 20**

1. Identify and assign the given insect up to order, preparing the key 4x1=4
2. Identify the given spot B (T.S of any slide studied/larva),C (shell) 3x2=6
3. Identify the spot D ( mouth parts) & E (Apiculture and Sericulture) and comment 3x2=6
4. Identify and comment with suitable reasons spots F (specimen) 4x1=4

## **SCHEME OF VALUATION FROM PRACTICAL II**

1. Identification – 1, preparation of the key – 3
2. Identification - 1 Diagram – 2
3. Identification – 1, Diagram - 1, Comment – 1
4. Identification and Classification – 1, Reasons – 1½, Diagram 1½,



**III SEMESTER**  
**3 Hours/Week = 42 Hrs**  
**MARKS THEORY – 20 + INTERNAL ASSESSMENT -10 = 30**

**PRACTICAL III**

1. Pisces: Scoliodon, Zygaena, Pristis, Narcin, Trygon.
2. Echeneis, Hippocampus, Anguilla, Sygnathus, Protopterus.
3. Accessory respiratory organs – Clarias, Ophiocephalus, Saccobranhus.
4. Food fish of Karnataka – 3 Marine, 3 Fresh water
5. Permanent slide preparation – placoid, cycloid, ctenoid scales.
6. Amphibia – Rana, Salamandra, Axolotl, Ichthyophis, Hyla, Necturus.
7. Reptilia: Varanus, Chelone, Naja naja, Viper, Bungarus, Enhydrina,
8. Aves: (based on beak and feet modification) Kingfisher, Parakeet, Woodpecker, Crow, Owl, duck, hen, kite.
9. Structure of a quill feather.
10. Mammalia: Rabbit, Rat, Bat, Loris
11. Types of teeth and their identification and dental formulae in Cat, Dog Elephant, Horse, Monkey, Man.
12. Osteology: Vertebrae of Shark, Frog (atlas, pro, amphi, acoelous, urostyle), Turtle-carapace & plastron. Pigeon – heterocoelous, xiphiacanth, Rabbit – atlas, axis, thoracic vertebra
13. Osteology: Pectoral girdles and forelimb skeletons (Frog, Pigeon, Rabbit).
14. Osteology Pelvic girdles and hind limb skeletons (Frog, Pigeon and Rabbit).
15. Bird watching, preparation and submission of checklist of birds in the campus/ nearby places.

## **SCHEME OF PRACTICAL EXAMINATION**

**Time : 3 Hrs**

**Max.Marks: 20**

1. Mount, identify the given fish scale (cycloid, ctenoid) 3x1=3
2. Identify with reasons the specimens A,B & C 3x3=9  
  
A (accessory respiratory organ), B (bird-beak/feet modification),  
  
C (any specimen)
3. Identify and comment on spot D (D- Mammalian teeth) and (E appendicular skeleton/ Axial) 2x2=4
4. Identify and comment on spot F (from practical 3 & 4) 4x1=4

## **SCHEME OF VALUATION FOR PRACTICAL III**

1. Mounting – 2, Identification – 1
2. Identification – 1, diagram – 1, comment – 1
3. Identification – 1, comment – 2
4. Identification and classification – 1, Diagram 1½, comment – 1½

## **IV SEMESTER**

**3 Hours/Week = 42 Hrs**

**MARKS THEORY – 20 + INTERNAL ASSESSMENT -10 = 30**

### **PRACTICAL – IV:**

1. Qualitative tests to detect carbohydrates in the given test samples – Molisch's test, Iodine test, Fehling's test and Picric acid test.
2. Qualitative tests to detect proteins in the given test samples – Biuret test, Ninhydrin test, Million's test and Xanthoproteic test.
3. Qualitative tests to detect lipids in the given test samples – Acrolein test, Salkowasky test.
4. Salivary amylase activity on starch.
5. Dehydrogenase activity in milk.
6. Detection of nitrogenous excretory wastes in the given samples.  
Ammonia – Nessler's reagent test, Urea – Urease test and Uric Acid – folin's reagent test.
7. Detection of abnormal excretion of glucose, albumin and creatinine in human urine. Glucose – Benedict's test, albumin – Heller's ring test, Creatinine – Jaffe's test.
8. Blood typing – A, B, AB, O and Rh factors in given human blood samples using antisera. .
9. Preparation of haematin crystals in human blood
10. Preparation and staining of human blood smear & differentiating of WBC (Leishmann stain).
11. Osmotic relations in earthworm with reference to weight changes. (demonstration)
12. & 13. Identification of the sources of different fat soluble and water soluble vitamins – their role and deficiency diseases – (Sources have to be specified, avoiding overlapping ones).

## **SCHEME OF PRACTICAL EXAMINATION**

**Time : 3 Hrs**

**Max.**

**Marks :20**

1. Demonstrate the presence or absence of proteins/carbohydrates/ lipids conducting two tests. Show the results and write the procedure (by lots from Pr.1 to 3).

**5 marks**

2. Physiology experiment (by lots from Pr. 6 – 10)(conduct two experiments)

**6+6 marks**

3. Comment on the vitamin present, its role and deficiency diseases of Spot A (Pr.13&14)

**3marks**

### **SCHEME OF VALUATION FOR PRACTICAL IV**

1. Procedure – 2 and experiment & result – 3
2. Procedure – 2, result and performance - 4
3. Vitamin identification – 1, Physiological role – 1 and deficiency diseases - 1

## **V SEMESTER**

**MARKS THEORY – 40 + INTERNAL ASSESSMENT -10 = 50**

**PRACTICAL – V:**

**2Hrs/Weeks 14 = 28 Hrs**

1. Micrometry: Use of ocular and stage micrometers to measure cell & nuclear dimensions.
2. Study of permanent slides of onion root tip to study stages of mitosis.
3. Squash preparation of onion root tip to study stages of mitosis.
4. & 5. Study of permanent slides of grasshopper testis to study various stages of meiosis.
5. Squash preparation of grasshopper testis or pollen grain to study stages of meiosis.
6. Study of permanent slide of salivary gland chromosomes of *Drosophila*.
7. Study of permanent slide / karyotype and ideogram of Rat and Man.
8. & 9. Preparation of karyotype from the given metaphase plate of *Drosophila* / Grasshopper.
10. & 11. Isolation of DNA from animal / plant tissues (Mulberry leaf / Coconut endosperm)- demonstration.
12. Estimation of RNA by Orcinol method/ Estimation of DNA.

## **SCHEME OF PRACTICAL EXAMINATION**

Time : 3 Hrs

Max. Marks: 40

1. Make a temporary squash preparation of the given material and demonstrate a stage of cell division. Write the procedure and comment on the stage with a diagram (Onion root tip). **8**
2. Estimate the DNA / estimate the RNA from the given sample and write the procedure(by lots) **10**
3. Prepare the karyotype of the given metaphase plate of Grasshopper / Drosophila or identify and comment on the karyotype given (rat or man) **4**
4. Measure the cell and nuclear diameter of the given material in the slide and report. **6**
5. Identify with reasons the slides A to D (from mitosis, meiosis & Salivary gland chromosome any order.). **4 x 3 = 12**

## **SCHEME OF VALUATION FROM PRACTICAL V**

1. Procedure – 2, preparation – 4 and report – 2
2. Procedure – 4, Preparation – 6
3. Karyotype arrangement – 3, neatness /identification – 1,
4. Procedure - 4, report – 2
5. Identification 1, diagram – 1 and reasons – 1

## **PRACTICAL – VI**

**MARKS THEORY – 40 + INTERNAL ASSESSMENT -10 = 50**

**2 Hrs / Week x 14 = 28Hrs**

1. Study of different types of eggs – Graafian follicle, Egg of insect, frog, hen. Study of Grasshopper's, Frog's and mammalian sperms.
2. Frog: cleavage stages, blastula (section), gastrula ( yolk plug stage) and neurula (sections).
3. Chick embryo: 18 hrs and 24 hrs (WM and sections)
4. Chick embryo : 36 hrs and 48 hrs (WM)
5. Study of development in Hen's egg – window technique(only demonstration)
6. Developmental studies in Drosophila – egg, larva and pupa.
7. Indian population data: based on census record & Plotting a graph to show growth rate
8. Identification of various family planning methods and their principles- condom, oral pill & copper-T.
9. Study of Permanent slides of mammalian endocrine glands – thyroid, adrenal, pancreas.
10. & 11. Study of Permanent histology slides of the following organs of mammal (Rat / Rabbit/Sheep): Stomach Intestine, liver, kidney, testes and ovary.
- 12 & 13. Preparation of permanent histology slides of 5 organs – Stomach Intestine, liver, pancreas, kidney, testis / ovary of a mammal (Rat/Rabbit/Sheep) and submission.
14. Gross structure of placenta- man, sheep/goat, rat (V.S of placenta).



## SCHEME OF PRACTIAL EXAMINATION

**Time: 3 Hrs**

**Max. Marks 40**

1. Prepare a line graph / bar graph / histogram using the population data given.

3

(Practical 7)

2. Identify with reasons the slide A to C(Pr 1 to 4) 3 x 3 = 9
3. Identify with reasons D, E and F ( Pr.6,8, &14) 3 x 3 = 9
4. Identify and comment on G ,H and I(Pr.9,10 to 11) 3 x 3 = 9
5. Stain, mount and identify with reasons the paraffin section provided 10

**Students have to submit minimum of 5 histology slides at the time of examination.**

## SCHEME OF VALUATION FOR PRACTICAL V

3 marks

1. Identification – 1, diagram – 1, and reasons – 1
2. Identification – 1, diagram – 1 and reasons – 1
3. Identification – 1, diagram – 1, and reasons – 1
4. Preparation – 8, Identification – 1, reasons – 1

## **VI SEMESTER**

**MARKS THEORY – 40 + INTERNAL ASSESSMENT -10 = 50**

Records genetic problems

### **PRACTICAL – VII:**

**2 Hrs / Week x 14 = 28Hrs**

**1. Genetic problems:**

Monohybrid inheritance – 1 plant and 1 animal (Drosophila) examples. Dihybrid inheritance – 1 plant and 1 animal (Drosophila) example.

**2. Complementary genes – Flower colour in Sweet pea.**

Supplementary genes – Comb pattern in Fowls

Epistatic (inhibitory) genes – Plumage colour in Fowls

Multiple genes – Skin colour in Man.

**3. Multiple alleles – ABO blood group in Humans (2 problems)**

Sex- linked inheritance in Drosophila (2) and in humans (2)

**4. Chromosomal abnormalities in Humans – Turner's, Klienfelter's and Down's Syndrome (Chromosomal complements and photos)**

**5. Construction of 3 point test cross linkage map ( 2 problems)**

**6. General morphology of Drosophila and mounting of sex comb and wing.**

**7. & 8. Identification of wild ( male & female) and different types of mutants in Drosophila – white eye, bar eye, sepia eye, vestigial wing and yellow body.**

**9. Neurospora – tetrad analysis**

**10. Calculation of Allele frequency- tongue rolling, attached ear lobes in humans, ABO blood groups in human.**

**11. & 12. Homologous and Analogous organs – serial homology – appendages of Prawn, structural homology – forelimb and hind limb skeleton of vertebrates. Analogy – wing of insect, bat, bird.**

**13. & 14. Connecting links and fossils – peripatus (picture), Archaeopteryx (model), Lung fish (specimen). Fossils – Brontosaurus, Stegosaurus, Trilobite (models).**

## **SCHEME OF PRACTICAL EXAMINATION**

**Time : 3 Hrs**

**Max.Marks:40**

1. Genetic problems – syndromes (2+1) **4 x 3 = 12**  
From practicals 1, 2, 3 and 4.
2. Construct the linkage map from data provided./ Practical 5, Neurospora Practical 9 **4**
3. Mounting of first thoracic leg (mentioning the absence or presence of sex comb) wing in Drosophila **4**
4. Identify with reasons spot A and B (mutants / wild flies) **4x2=8**
5. Identify and comment on B & C (From practicals 11 &12) **4x2=8**
6. Identify and comment on spot D (connecting link, fossil) practicals 13 & 14 **4**

## **SCHEME OF VALUATION**

- 1 Genetic problem/ syndrome -3
- 2 Linkage map / Neurospora -4
- 3 Mounting – 3, Comment - 1
- 4 Identification – 1, comment – 2, diagram – 1
- 5 Identification – 1, comment 3
- 6 Identification – 1, comment - 3

## **PRACTICAL – VIII**

**MARKS THEORY – 40 + INTERNAL ASSESSMENT -10 = 50**

Records + field report 5+5

2 Hrs / Week x 14 = 28Hrs

Visit to nearby water bodies- polluted & clear to study the physical parameters such as colours temperature, pH, turbidity, conductivity. (submission of a report.)

1. 1. Estimation of dissolved oxygen in two water samples.BOD (Biological oxygen demand)-demonstration.
2. Estimation of dissolved carbon dioxide in two water samples
3. Estimation of chloride content in two water samples
4. Estimation of hardness in two water samples.
5. TDS
6. Water holding capacity of different types of soil.
7. Animal associations: Mutualism – Termite & Trichonympha.

Commensalism – Echeneis & Shark, Proto co-operation – Hermit crab & Sea anemone

Animal associations: Parasitism – Head louse, Bed bug, Female mosquito, Ticks & mites.Predation – Snake and Frog.

8. Estimation of amount of copper in the given sample (ecotoxicology)
9. Estimation of total protein in the given sample.
10. LD 50 and LD100 values (Demonstration)

11. Coloration Chamaeleon, leaf insect, Hippocampus

Mimicry- geometrid caterpillar butterfly and fire salamander

12 & 13 Adaptations – (Morphological and Ecological peculiarities)

Gryllotalpa, Hermit crab, Leaf insect, Periopthalmus, Angler fish, Cypsilurus, Turtle, Duck, Corocodile, mantis, Phrynosoma, Ichthyophis, Bat,Owl, Bird and Draco

14. Visit to Zoo / Wild life sanctuary /National Park to study ecology and behavior of animals an submission of a report.

## **SCHEME OF PRACTICAL EXAMINATION**

**Time: 3 Hrs**

**Max.Marks: 40**

- |  |        |
|--|--------|
| 1. Estimate the dissolved oxygen / carbon dioxide/chloride/hardness in the given Sample(by lots) | 9      |
| 2. Estimate the copper/protein in the given sample. (by lots)                                    | 9      |
| 3. Conduct experiment A and Report (from 5& 6)   | 6      |
| 4. Identify and comment on the animal association in A & B                                       | 4x2=8  |
| 5. Identify and comment on morphological and ecological peculiarities of spot D and E            | 4x2 =8 |

## **SCHEME OF VALUATION**

1. Procedure + Principle – 4, result – 5
2. Procedure + Principle – 4, result – 5
- 3 Procedure + Principle - 3 + result –3
4. Identification & diagram – 2, comment -2
5. Identification diagram - 2, comment -2