

# SYLLABUS

## DEPARTMENT OF ANIMAL SCIENCE

### M. Sc. PREVIOUS

#### PAPER-I: GENETICS AND ELEMENTARY STATISTICS

##### UNIT-I: Linkage and Crossing Over

Theories of Crossing Over at Chromosomal and Molecular Level. (Chaisma Type or Percocity, Bellings's Theory; White House Model, Holiday Model), Factors affecting the strength of linkage, Measurement Linkage from F2 and Backcross Data. Genetic maps of chromosome, Double Crossing Over, Interference and Coincidence.

##### UNIT -II: Mutation

Types of Mutation- Mutation rate, Base-Substitution (Transition, Transversion) and Frameshift mutation, Mechanism of gene mutation, Induction of Mutation Target Theory, Peroxide formation, UV and Thymine dimers, Incorporation of Base Analogues, Tautomerization and chemical alterations in nucleic acids, Detection of mutation in Drosophila.

##### Polyploidy

Classification, Cytological and genetical methods of identification of haploids (Monoploids and polyploids), Autopolyploids, Allopolyploids, Auto- Allopolyploids Segmental polyploids.

Aneuploidy-Classification, Identification and meiotic behavior of monosomics, Nullisomics, Trisomics and Tetrasomics.

##### UNIT-III: Sex Determination

- i. Chromosomal and Genetic Balance Theories of Sex Determination in Drosophila and Man.
- ii. Single gene control of sex, Hormonal control of sex and Sex Reversal.
- iii. Role of X and Y chromosomes in sex determination.
- iv. Gynandromorphs and Human Sex Anomalies (Klinefelter's and Turner's Syndrome).
- v. Sex Linked Inheritance-Colour Blindness and Haemophilia.

##### UNIT-IV: Multiple alleles

- i. Concept of Multiple alleles-Self incompatibility alleles in Nicotiana, Coat colours in Rodents.
- ii. Blood groups in human-antigen, antibody interaction in the inheritance of A,B,AB and O blood groups.
- iii. H antigen and MNS System, Rh- factor in man.
- iv. Jumping genes in prokaryotes and eukaryotes and their significance.

##### UNIT-V: Genetics of Bacteria and Virus

- i. Conjugation, Transduction and Transformation in bacteria and their significance.
- ii. Plasmid of bacteria and their significance.
- iii. Cytoplasmic inheritance in Mirabilis, Kappa particles in Paramecium, Delayed inheritance in snail casparia in flour moth.
- iv. Estimation of mean, variance, standard error and test of significance, Analysis of variance, Chi square test-Simple application.

### **Books Suggested**

<b>S.No.</b>	<b>Name of Books</b>	<b>Author</b>
01.	Principle of Genetics	Snustad
02.	Genetics	Strickberger
03.	Genetics	Goodenough
04.	Genetics	Weaver and Hedrick
05.	Molecular biology of the gene	Watson <i>et. al.</i>

## **PAPER-II: BIOCHEMISTRY**

### **UNIT-I**

Chemical Bonds: Electrovalent, covalent, Polar covalent, hydrogen bonds, hydrophobic interactions and Vander walls forces.

Some properties of Molecules: Diffusion and Osmosis, Acidity, basicity, pH and buffer action.

### **UNIT-II**

Laws of thermodynamics: First and Second law of thermodynamics, concept of enthalpy and entropy, Entropy in biological systems. High energy molecules.

Carbohydrates: Definition, Classification, physico-chemical properties and biological significance.

### **UNIT-III**

Proteins: General biochemistry of amino acids, Primary, Secondary and Tertiary structure of proteins. Physical properties and biological significance of proteins.

Lipids: Classification and general properties.

Vitamins: Classification, occurrence, general chemistry and significance.

### **UNIT-IV**

Enzymes: Physio- chemical nature of enzymes, elementary consideration of enzyme kinetics. Factors affecting enzyme activity.

Regulation of enzyme synthesis and activity: Induction, repression allosteric regulation, regulation by adenylate energy charge and phosphorylation, -dephosphorylation, isoenzymes.

### **UNIT-V**

Hormones: General biochemistry and mechanism of action.

Coenzymes: General account and mechanism of action of ATP and NADPH.

### **Books Suggested**

<b>S.No.</b>	<b>Name of Books</b>	<b>Author</b>	<b>Publisher</b>
01.	Haper's Biochemistry (24 <sup>th</sup> Edn.)	R.K. Murray <i>et. al.</i>	Prentice Hall
02.	Biochemistry	L. Stryer	W. H. Freeman
03.	Principles of Biochemistry	Lehinger	
04.	Biochemistry	Zubey	
05.	Biochemistry	Devlin	

## **PAPER-III: MICROBIOLOGY AND IMMUNOLOGY**

### **UNIT-I: Microbial Diversity and Immunology**

- i. Types of microbes- Prokaryotes vs Eukaryotes, Basic concept of prokaryotes and Ultrastructure of bacterial cell wall.
- ii. Non cellular microbes- Characteristics, structural composition of virion and their types (animal viruses), isolation and characterization of bacteriophages and their significance.
- iii. Introduction to the immune system- Resistance and immunity, cellular vs. humeral immunity.
- iv. Barriers against infection: Immunological capability of host, applications of immunology.

### **UNIT-II: Environmental Microbiology**

- i. Aquatic microbiology- Waste water contaminants (sewage and industrial) and their treatment (Primary, Secondary, Tertiary treatment), BOD and COD.
- ii. Potable water- Microbial examination, criteria of potable water and purification.
- iii. Culture media- Natural and synthetic media; Isolation and culture of bacteria and fungi and their identification, Bacterial enumeration Techniques (VCC, SPC, TCC, MPN etc.).
- iv. Soil Microbiology- Soil microbes and their role in Biodegradation of hemicellulose, cellulose, chitin, lignin, Xenobiotics and Recalcitrant.

### **UNIT-III: Microbial Biotechnology**

- i. Microbial control (Aseptic techniques)- Physical (Tyndalization, Pasteurization etc.) and chemical control of microbes.
- ii. Food microbiology- Food preservation (Chemical and Pasteurization), Food spoilage (intrinsic and extrinsic factors) and Food poisoning- types and consequences.
- iii. Industrial microbiology- Major microbial food products – Antibiotics and Enzymes.
- iv. SCP- Production and harvesting of single cell protein (SCP)- Yeast, edible mushroom and other useful microbes and advantages of SCP.

### **UNIT-IV: Reagents of immunity**

- i. Antigens, antigenic determinants, haptens, adjuvants and antigenicity.
- ii. Theories of antibody formation.
- iii. Structure and classification of Immunoglobulins and their properties.
- iv. Immunoglobulins synthesis at molecular level, assembly, intracellular transport and secretion of immunoglobulins.

### **UNIT-V: Antigen and antibody interaction & AIDS**

#### **A. *In vitro* reactions**

- i. Phagocytosis
- ii. Precipitation and agglutination
- iii. Biological activities of complement fixation and cytotoxicity

#### **B. *In vivo* reactions**

- i. Hypersensitivity-classification and mechanism
- ii. Tissue transplantation-graft vs host reaction, tissue typing, immunology of rejection, immune suppression, organ transplants and selective transplantation.
- iii. Autoimmunity.

#### **C. AIDS-HIV virus, transmission, mechanism of destruction of T4 cells, diagnosis and control measures.**

## **BOOKS SUGGESTED**

### **Microbiology**

<b>S. No.</b>	<b>Name of Books</b>	<b>Author</b>
01.	Microbiology	Prescott, L. M.
02.	Microbiology	Pelczar, M.J.
03.	General Microbiology	Stanier, R. Y.
04.	Food Microbiology	Adams and Moss
05.	Industrial Microbiology	Casida

### **Immunology**

<b>S. No.</b>	<b>Name of Books</b>	<b>Author</b>
01.	Immunology	Bellanti, J.A.
02.	Immunology and Serology	Carpenter, P. L.
03.	Immunology	Weir, D.M.
04.	Essential Immunology	Riott, I. M.
05.	Immunology	Sethy,N.

## **PAPER-IV: EMBRYOLOGY**

### **UNIT-I: Gametogenesis and Fertilization**

- i. Spermatogenesis and oogenesis in general and detailed structure of mammalian ovum and sperm.
- ii. Mechanism of fertilization, changes in the organization of egg cytoplasm caused by fertilization, Molecular events during fertilization.

### **UNIT-II: Cleavage**

- i. Pattern and types of cleavage, Biochemical changes during cleavage, Mechanism of cleavage, Role of egg cortex, Morphogenetic gradients in egg cytoplasm.
- ii. Cell differentiation: Gene and molecular basis of cell differentiation.

### **UNIT-III: Gastrulation**

- i. Fate maps and process of gastrulation.
- ii. Formation of primary organ rudiments in Amphibia (Frog) and Bird (Chick).
- iii. Gene activity during gastrulation.

### **UNIT-IV: Organizer Concept**

- i. Primary organizer, Embryonic induction and Morphogenetic movements.
- ii. Formation of extra embryonic membranes.

### **UNIT-V: Morphogenesis**

- i. Evolution of Viviparity.
- ii. Implantation, Placentation in mammal.
- iii. Morphogenesis: development of brain, eyes and heart in mammals.

### **BOOKS SUGGESTED**

<b>S. No.</b>	<b>Name of Books</b>	<b>Author</b>
01.	Developmental Biology	Gilbert, S.F.
02.	Introduction to Embryology	Balinsky, B.I.
03.	Morphogenesis of Vertebrates	Torrey, T.W.
04.	Foundation of Chick Embryology	Patten
05.	Embryology	Verma, P.S.

# PAPER-V: AQUACULTURE AND FISHERIES

## Unit-I: Aquafarm and its Management

- i. Introduction- Purpose, importance and advantages of aquaculture, biology and taxonomy of cultureable species of fishes.
- ii. Pond- Concept of developmental fish ponds (Nursery, Rearing and Stocking ponds) and their management, Role of various physio-chemical factors in fish culture.
- iii. Fertilization of ponds & Fish feed- Use and management of Plankton (Zoo and Phyto) and other live fish feed (Rotifers and Azolla), culture and basic concepts of artificial feed.
- iv. Fishing methods- Basic methods of fish harvesting, Different types of craft and gears used in Aquaculture.

## UNIT-II: Seed Production Technology

- i. Fish Breeding- Induced breeding (Hypophysation), Factors affecting breeding and use of steroids and other chemicals for breeding.
- ii. Breeding Techniques- Selection of breeders, breeding devices and hatching techniques.
- iii. Fish hatchery- Concept of development Fish hatchery and Types – circular and Bangala Bandh.
- iv. Hybridization and basic principle and their significance and Transgenic Fish.

## UNIT –III: Shell Fish Culture

- i. Pearl culture – Pearl forming species- Oyster – Oyster (*Pinctada fucata*) and Mussel (*Lamnidence marginalis*), natural and artificial pearl formation and its importance.
- ii. Prawn & shrimp culture – Life cycles (Breeding, Eye stalk ablation, Hatching, Larval development) and culture of freshwater prawn (*Macrobrachium rosemberghii*) and Marine prawn (*Penaeus indicus or monodon*).
- iii. Amphibians (*Rana tigrina*) Culture – Natural and induced breeding, hatching and larval development and commercial importance of frog.
- iv. Fish Aquaria – Different types of aquaria and fishes and their management.
- v.

## UNIT –IV: Fisheries

- i. Mariculture- Culturable species of finfish & shellfish, Procurement of their seed, culture and constraints of mariculture.
- ii. Marine Capture Fisheries – Fisheries of important marine fishes – Sardine, Indian mackerel, Bombay duck, Pomfret, mullet, shell fishes & small groups of fishes and Deep sea fisheries.
- iii. Cold Water Fisheries- Fisheries of exotic and Indigenous cold water fishes; Mahseer and Trout Fisheries and their importance.
- iv. Lagoons (Chilka and Pulicat), and Reservoir fisheries.
- v.

## UNIT- V: Fish Pathology

- i. Bacterial Fish Disease – Basic principles, Types- Bacterial gill disease, Bacterial Kidney Disease, BHS, Columnaris, Cold water, Fin and Tail rot, Furunculosis, Ulcer disease- Diagnosis, Prophylactic and Therapeutic aspects.
- ii. Fungal Fish Diseases – Different types of fungal disease – Saprolegniasis, Dermatomycosis, their characteristics, transmission, diagnosis, prophylactic and therapeutic aspects and EUS.
- iii. Viral Fish Diseases – Basic principles, Types – Infectious Pancreatic Necrosis (IPN), Infectious Haematopoietic Necrosis (IHN), Viral Haemorrhagic Septicaemia (VHS), Spring viraemia of carp and catfish viral diseases, their prophylactic and therapeutic measures.
- iv. Phage therapy in aquaculture, its present and future prospects.

## BOOKS SUGGESTED

S. No.	Name of Books	Author
01.	Hand Book of Fisheries and Aquaculture	ICAR Publication
02.	Aquaculture	Pillai, T.V.R.
03.	Freshwater Aquaculture	Rath, R.K.
04.	Microbial fish Diseases	Inglish
05.	Fish Pathology	Roberts, R.J.
06.	Induced carp breeding	Chander, S. L.
07.	An Introduction to Fishes	Khanna, S.S.
08.	Fish Biotechnology	Ranga, M. M.



# **PAPER – VI: ENDOCRINOLOGY**

## **UNIT – I**

- a) Scope of Endocrinology.
- b) Brief survey of endocrine glands in vertebrates.
- c) General characters and mechanism of hormone action.

## **UNIT – II**

- a) Structure and function of Hypothalamo- hypophysial system in mammals.
- b) Structure and function of Adenohypophysis in mammals.
- c) Structure and function of Neurohypophysis in mammals.

## **UNIT- III**

- a) Structure and function of adrenal gland (cortex and medulla) in mammals.
- b) Structure and function of Thyroid gland in mammals.
- c) Structure and function of Parathyroid gland in mammals.

## **UNIT – IV**

- a) Structure and function of Pancreatic islets in mammals.
- b) Structure and function of Testis in mammals.
- c) Structure and function of Ovary in mammals.

## **UNIT – V**

- a) Thyroid and amphibian metamorphosis.
- b) Endocrine control of colour changes in poikilotherm.
- c) Endocrine control of osmoregulation in fish.
- d) Hormones of Reproduction in Insects.

## **BOOKS SUGGESTED**

<b>S.No.</b>	<b>Name of Books</b>	<b>Author</b>	<b>Publishers</b>
01.	Endocrinology	Mac E Hadley	Prentice Hall
02.	General Endocrinology	Turner & Bagmara	W.B. Saunders
03.	Endocrinology	Chester Jones	
04.	Endocrine Physiology	C.R. Martin	Oxford University
05.	Text Book of Endocrinology	Williams	W B Saunders
06.	Physiology of Reproduction	Knobil et. al.	
07.	Reprodcutive Endocrinology	Yeh et. al.	

**M. Sc. FINAL**  
**PAPER – VII: CELL AND MOLECULAR BIOLOGY**

**UNIT - I**

Structure, organization & function of membrane system; Glycoconjugates and proteins in membrane system. Ion transport; Na K ATPase, Mitochondria, Molecular basis of ATP Synthesis.

**UNIT – II**

The law of DNA constancy and C-value paradox; cot curves: classes of DNA (Palindromes, High repetitive, Middle repetitive, unique Sequences); structure and organization of chromatin; chromosomal banding, banding techniques and sister chromatid differentiation.

**UNIT – III**

**Gene:-** Modern concept of Gene, fine structure of Gene.

**DNA :-** Evidence of DNA as genetic material, DNA structure Eukaryotic genome organization (coding and non-coding sequences, Satellite DNA); DNA damage and repair, DNA replication, Forms of DNA (A,B, Z DNA)

**UNIT – IV**

**RNA :-** Structure of transfer, ribosomal and messenger RNA, Molecular mechanism of transcription in Prokaryotes and eukaryotes Reverse transcription post transcriptional modifications (capping, polyadenylation, splicing of introns and exons), and processing of RNA.

**UNIT –V**

**Genetic Code :-** Properties of Genetic code. Deciphering of Codon, Anticodon.

**Protein Synthesis :-** Molecular mechanism of protein synthesis, post-translational modification of Protein, Regulation of gene expression in pro and eukaryotes Attenuation and antitermination, Operon concept.

<b>S. No.</b>	<b>Name of Books</b>	<b>Author</b>	<b>Publishes</b>
01.	Molecular Cell Biology	Darnell et. al.	St Brooks WH
02.	Molecular Biology of the cell	Alberts et. al.	Gard and pub.
03.	Cell and Molecular Biology	Karp	John Wiley & Sons
04.	Genes	Levine	Wiley
05.	Molecular Biology of the Gene	Watson	Benyman
06.	Cell and Molecular Biology	DeRobertis	Saunders

# **PAPER – VIII: BIOTECHNOLOGY AND INSTRUMENTATION**

## **UNIT- I GENE TECHNOLOGY**

- i. Recombinant DNA, Construction of Recombinant DNA, Gene cloning, cloning vectors (Plasmids, Bacteriophages, Cosmids, Plant and Animal viruses).
- ii. Gene transfer using vectorless systems.
- iii. Isolation of genes, synthesis of genes.
- iv. Sequencing of Nucleic Acid (Maxam Gilbert, Sanger's method)
- v. Basics of Southern, Northern, and South- Western blotting techniques.
- vi. Transgenic Plants and Transgenic animals.

## **UNIT-II: ENZYM BIOTECHNOLOGY**

- i. Uses of enzymes.
- ii. Isolation and purification of enzymes (Extraction, centrifugation, dialysis, chromatography and electrophoretic separation).

## **UNIT-III: ENZYME IMMOBILIZATION**

- i. Adsorption, covalent binding, cross binding and entrapping methods.
- ii. Application of immobilized enzymes.
- iii. General account of Biotechnology in agriculture in medicine.

## **UNIT-IV: ANIMAL CELL CULTURE**

- i. Culture techniques of cells- Disaggregation of cells, cell viability and preparation of substrate.
- ii. Primary cell culture, Sub culture and cell lines- Characteristics of cell line and their maintenance, kinetics of cell growth and applications of cell line.
- iii. Culture media – Type of media (Serum, Serum free and chemically defined media)
- iv. Tissue and Organ culture – Different methods of tissue and organ culture.
- v. Embryo – culture and transfer in farm animals.

### **Biochemical Techniques**

- i. Theory and applications of chromatography.
- ii. Theory and applications of spectrophotometer.
- iii. Theory and applications of electrophoresis.
- iv. Theory and applications of tracer techniques (autoradiography).

## **UNIT –V: INSTRUMENTATION**

- i. Structure, principles and applications of microscopes (Optical, Phase- contrast and Electron).
- ii. Structure, principles and applications of Atomic absorption Spectrometer.
- iii. Structure, principles and applications of Mass Spectrometer.
- iv. Structure, principles and applications of ESR Spectrometer.
- v. Structure, principles and applications of X-ray Diffraction

<b>S.No.</b>	<b>Name of Books</b>	<b>Author</b>	<b>Publisher</b>
01.	Modern Biotechnology	Primrose, S.B.	Blackwell Scientific Pub., London, England
02.	Biotechnology	John P. Smith	
03.	Genetic Engineering Principles and Practice	Sandhya Mitra	Macmillan India Ltd.
04.	Elements of Biotechnology	Gupta, P.K.	Rastogi & Company Meerut
05.	Animal Cell Culture	Fresheny, R. I.	
06.	Practical Biochemistry	Wilson, Kand walker, J	
07.	Analysis of Biological Molecules	Geoffrey, W.H.P.	
08.	Instrumental methods of Analysis Willard		
09.	Principles of Instrumental Analysis Skoog & West		

# **PAPER – IX: ENVIRONMENTAL BIOLOGY AND WILD LIFE**

## **UNIT- I: Concept of Ecosystem**

- i. Concept of Ecology, Environmental Biology & Environmental Science, scope and practical applications.
- ii. Biological control of Geo – chemical environment, The Gaia Hypothesis and its cybernetic nature.
- iii. Concept of energy flow and bio energetic (productivity, food-web, food chain, trophic levels and energy quality).
- iv. The energetic of scale, law of diminishing returns and concept of carrying capacity.

## **UNIT- II: Population Dynamics**

- i. Basic concept of population rates, growth forms.
- ii. Density – dependent and density independent control.
- iii. Population structure distribution Aggregation, Isolation and Territoriality.
- iv. Energy partitioning and r-and-K-selection.

## **UNIT- III: Community Interactions**

- i. Basic structure and organization of various communities and their interactions.
- ii. Inter species interaction (competition, co-existence, predation, parasitism and allelopathy) and positive interactions (commensalisms, mutualism and proto co-operation).
- iii. Concept of ecological niche.
- iv. Species Diversity.

## **UNIT- IV: Development of Ecosystem**

- i. Strategies and concepts of ecological climax.
- ii. Evaluation of biosphere, nature selection and co- evaluation.
- iii. Pollutions of air, water and soil and strategies for their control.
- iv. Environmental policies of India.

## **UNIT- V: Wild life**

- i. Wild life depletion- cause and nature and threatened species of animals.
- ii. Wild life programme in India and wild life acts in India.
- iii. Wild life projects – Projects tiger, Asian elephant project, white winged wood duck project and Conservation of Rhinos.
- iv. Parks- brief description of National parks and Sanctuaries.

<b>S. No.</b>	<b>Name of Books</b>	<b>Author</b>
01.	Fundamental of Ecology	E.P. Odum
02.	Basic Ecology	E.P. Odum
03.	Concept of Ecology	Kormondy E.J.
04.	Ecology Methods	T.R.E. Southwood
05.	Ecology	S. Charles Kendeigh
06.	Wild Animals in Central India	Brander, A.A.

# PAPER – X: ANIMAL PHYSIOLOGY

## UNIT- I

**Digestive System:-** Detailed structure of Gastro intestinal tract, associated digestive glands and their secretions, Digestive enzymes and regulations of their secretion in mammals. Mechanism of digestion and absorption of different food materials.

## UNIT – II

**Respiratory System:-** Different respiratory organs, Mechanism of breathing and its regulation in mammals, Respiratory pigments, Metabolic pathways- Glycolysis, TCA Cycle, Oxidative phosphorylation.

## UNIT – III

**Blood Vascular System :-** Various components of circulatory system, Blood, Composition and function of blood, Blood volume, Blood coagulation, Haematopoiesis, Blood pressure, Blood groups, Transport of O<sub>2</sub> and Co<sub>2</sub>, Oxygen regulation in mammals, Physiological types of hearts, Cardiac cycle and its regulation.

## UNIT – IV

**Nervous System:** - Structure of a typical neuron, Conduction of nerve impulse, Resting potential, Synaptic transmission and Neurotransmitters.

**Muscular System:-** Ultra structure and chemical composition of skeletal muscle, Mechanism of muscle contraction, Energy supply and heat production during muscle contraction.

## UNIT –V

**Excretory System:-** Different excretory products, Structure of kidney and a nephron, formation of urine and its regulation and excretion, Acid-base balance, Homeostasis.

S. No.	Name of Books	Author
01.	Human Physiology	C.C. Chatterjee (Vol. I & II)
02.	Human Physiology	Hymen
03.	A text book of General Physiology	Davson. H.
04.	Principles of Animal Physiology	Wood. D W
05.	Text book of Physiology & Biochemistry	Bell, Davidson & Scarborough

# **PAPER – XI: GENERAL AND APPLIED ENTOMOLOGY**

## **UNIT- I**

- a. Brief classification of Insects up to order level with characters and examples of each order.
- b. Integumentary system including morphology of Insect's integument and its function.
- c. Digestive System: Morphology, physiology and nutritional needs of insects.
- d. Respiratory System: Morphology and physiology of respiratory organs.

## **UNIT – II**

- a. Circulatory System: Morphology and physiology of different types of circulatory organs.
- b. Excretory System: Morphology of different excretory organs and their functions.
- c. Nervous System: Its structure and different sense organs of insects.
- d. Sound and light producing organs in insects.

## **UNIT – III**

- a. Insects World: Insects pests, Beneficial insects, Apiculture, Sericulture and Lac Insect culture.
- b. Common pests of sugarcane crop in India – their biology and control.
- c. Common pests of paddy and their biology and control.
- d. Common pests of vegetables and oil seed crops in India.
- e. Common pests of cotton their biology and control.
- f. Common pests of stored grains and their control.

## **UNIT – IV**

- a. Pest's Control: Possible measures-Physical, Biological, Chemical techniques.
- b. Biological control of Insects Pests, Integrated Pest Management (IPM).
- c. Chemical Control of Pests: i. Common Insecticides: Chlorinated Hydrocarbons, Phostoxins, Botanicals and other inorganic chemicals.  
ii. Different fungiments and their mode of actions, Deterrents.  
iii. Modes of action of toxicants: respiratory poisons, Nerve poisons.  
iv. Chemical nature of toxicants.

## **UNIT – V**

- a. Pest control by other means: Semi-chemicals: Attractants, Repellants. Antifeedants, Hormones & their analogues.
- b. Pesticide Application Equipments: Machines and tools used in pest control.

<b>S. No.</b>	<b>Name of Books</b>	<b>Author</b>
01.	The Insects	R F Chapman
02.	Hand book of economic entomology	T.V. R. Ayyar
03.	Indian insect life	H. Maxwell Lebroy
04.	An introduction to entomology	J. H. Comstock
05.	Insect pest control	Kumar
06.	Imm's General text book of entomology Vol. I, II	O.N.Richard
07.	The Principles of insect physiology	V. B. Wiggles

# PAPER – XII: ANIMAL PARASITOLOGY AND PATHOLOGY

## UNIT- I: General Parasitology

1. Concept of parasitism, types of parasites & hosts.
2. Hyperparasitism in the animal kingdom.
3. Host parasite interactions-effects of parasites on hosts.
4. Parasite adaptations- adaptations to transmission and infectiousness.

## UNIT – II: Protozoology

1. Amoebiasis: A. Taxonomy, morphology and life cycle of
  - a. *Entamoeba histolytica*
  - b. *Entamoeba coli*B. Diagnosis, pathogenesis, prevention and control of the above parasites.
2. Trypanosomiasis A. Taxonomy, morphology and life cycle of
  - a. *Trypanosoma gambiense*
  - b. South American Trypanosomiasis (Chagas disease).B. Diagnosis, pathogenesis, prevention and control of African trypanosomiasis.
3. Giardiasis: A. Taxonomy, morphology and life cycle of
  - a. *Giardia lamblia*B. Diagnosis, pathogenesis, prevention and control of the above parasite.
4. Malaria A. Taxonomy, morphology and life cycle of
  - a. *Plasmodium*
  - b. Fever cycle in Malaria.
  - c. Diagnosis, pathogenesis, prevention and control of Malaria.

## UNIT – III: HELMINTHOLOGY

- A. Taxonomy, morphology, life cycle, pathogenesis & control of
  1. *Ancylostoma duodenale*
  2. *Wuchereria bancrofti*
  3. *Schistosoma mansoni*
  4. *Diphyllobothrium latum*



## UNIT – IV: ARTHROPODS AND HOST PARASITE RELATIONSHIPS

1. Morphology and life cycle of human lice. Skin reactions to *Pediculus* and diseases transmitted by human louse.
2. Mosquitoes as carriers of parasitic disease:  
Biology of culicids and their role as pathogen transmitters.
3. Host specificity amongst parasites – Terminology and integration.
4. Introduction to culture techniques – terminology, advantages and basic problems involved in *in vitro* culture.

## UNIT – V: GENERAL PATHOLOGY

1. Introduction to Pathology – health and disease.
2. Causes of disease: Exogenous and endogeneous agents.
3. Clinical methods for the diagnosis of diseases.
4. Benign and Malignant tumours. Terminology, classification and causes of Cancer. Characteristic features of malignancy.
- 5.

<b>S.No.</b>	<b>Name of Books</b>	<b>Author</b>	<b>Publisher</b>
01.	General Parasitology	V.A. Dogial	Oliver & Boyd
02.	Introduction to Animal Parasitology	J. D. Smith	Camb. Univ. Press
03.	General Parasitology	T. C. Cheng	Academic Press
04.	An Introduction to the study of Disease	W. Boyd & H. Shelden	K.M. Varghese Company.
05.	Introduction to Parasitology	Sharma & Ratnu	S. Chand & Company
06.	Methods of Cultivating Parasites <i>in Vitro</i>	A.E.R. Taylor & J. R. Baker	Academic Press