NORTH MAHARASHTRA UNIVERSITY, JALGAON

T.Y.B.Sc. (ZOOLOGY SYLLABUS

W.E.FROM JUNE,1994.

PAPER - I SECTION - I

1) Systematic position Habit & habital, External morphology, internal organization and functional anotomy and life cycle of 1) Paramoecium 2) Aurelia 3) Leech.

+ 32

2) Study of structural and functional organization of following groupswith reference to the prescribed topics.

1) Protozoa - Nutrition - 3
2) Porifera - Water canal system - 3
3) Coelenterata - Coral and coral reefs, Polymorphism in Sybnonophera. - 2

- 40

NONCHORDATES-III

PAPER-I SECTION-II

I) Study of the following animals.

1) Scorpion : Systematic position, Habit and habitat, external characters, internal organization, body wall, coelom, exo and endoslieleton, Functional anotomy systems Digestive circulatory, Respiration, excretory, Nervous and sense organs, reproductive,

- 12

2) Lammelidens : Lammelidense : Systematic position, Habitet & habitat; external characters, internal organization - Body was- wall, coelom, musculature, fanclional anotomy systems. 1) Digestive, circulatory, Respiratory, excretory, Nervous sense organs, Reproductive, Development.

- 12

II) Study of structural & functional organization of the following groups with referance to prescribed topics.

1) Arthropoda : Mouth parts in insects, crustacean larvae, - 7
2) Mollusca : Foot, shell, - 4
3) Echinodermata : Larvae - 3
4) Hemichordata : Affinities - 2

- 40

dbs./-

CHORDATE-III

Paper-II Section-I

I) Study of Calotes with reference to following
1) Systematic Position.
2) Habit & Habitat.
3) External character - Types of Scales.
4) Functional Anotomy Systems-
a) Digestive.
b) Respiratory.
c) Circulatory.
d) Excretory.
e) Nervous.
f) Reproductive & Breeding Habits.
g) Eye, Ear & Hyoid Apparatus. 16 Periods.

II) Study of following groups with reference to prescribed topics.
1) Urochordata :- Asexual Reproduction in Doliolium Colony formation in Pyrosoma & Botryllus, Larva, Retrogressive Metamorphosis, Affinities 6 Periodes.
2) Cyclostomata :- General, Primitive & specialized characters, Affinities & Amocoetes larva. 4 Periods.
3) Pisces :- Account of Dipnoi, Scales - Placoid, Cycloid, ctenoid, Ganoid, Fins - Paired & unpaired, Accessory respiratory organ in clarion, Saccobranchus Anabul, Ret. 6 Periodes.
4) Amphileia - Parental care in Pipa, Hyla & Ichthyophis, Neoteny 3 Periods.
5) Reptilia - General characters of Rhychocephalia, Temporal Vacuties, Mesozoic Reptilies. 5 Periodes.

PAPER-II CHORDATE-III SECTION-II

I. Study of Pigeon with reference to the following :-
1) Systematic Position.
2) Habit & Habitat.
3) External Character.
4) Functional Anotomy Systems -
a) Digestive.
b) Respiratory.

cont..3

c) Reproductive.

d) Eye, Ear.

13 Periods.

II. Study of difference groups with reference to the prescribed Topics -

1) Aves - a) Modification of beak of feet with reference to habit & habitat.

b) Areal adaptation.

c) Migration in Birds - Diurnal, Seasonal, Local, Lattitadinal, Altittadinal, course of Migration. 8 Periods

2) Mammals - Specilized characters of the following mammals -

Duck bill a) Platypus.

b) Kangaroo.

c) Bat.

d) Seal

e) Lioris. 5 Periods

III. Study of comparative anotomy with reference to the following topics:-

1) Comparative Histology of Skin of Scoliodon, Frog, Calotes, Pigeon & Rat.

2) Heart :- Structure of Heart of Scoliodon, frog, Calotes, Pigeon, Rat.

3) Aortie Arches - Evolution of aortie arches.

4) Kidneys - Evolution of archinephror, pronephrar , Mesonephros, Metanephros, & Their ducts.

5) Brain - Morphological variations in the region of the brain of scoliodon, Frog, Calotes, Pigeon, & Rat.

14 Periods.

cont..4

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PAPER-3

GENERAL PHYSIOLOGY

SECTION-I

1. Nutrition - (6 Periods)

   1.1 Brief out line of food components w.r.t. Sources of energy, caloric value, etc.

   1.2 Metabolism - a) Carbohydrate, b) Protein, (c) Lipid.

   1.3 Integration of the above three metabolisms.

2. Circulation- (6Periods)

   2.1 Blood coagulation - Theories and factors.

   2.2 Function of Thymus and bone marrow in immune mechanisms.

   2.3 Haemodynamics - a) Valume of blood b) Blood pressure, c) Diameter of blood vessels and how it helps in circulation, d) Electrocardiogram, e) Ionic, chemical thermal and nervous control of heart, f) PCV and ESR brief out line.

3. Respiratory - pigments - properties (2 Periods).

4. Osmoregulation- (3 Periods).

   a) Organs regulating water and Ionic salt balance in the body of aquatic and terestrial animals, b) Modes of excretion.

5. Muscles - (8 Periods).

   5.1 Functional classification.

   5.2 Ultra structure of striated muscle fibre with special refrence to sarcoplasmic reticulum; sliding filament theory of muscle contraction.

   5.3 Neuromuscular junction.

   5.4 Properties of muscle - striated and cardiac muscle. Stimulation - a) Single stimulus, b) Multiple and repeated stimul c) Muscle fatigue.

   5.5 Physical and chemical changes occuring during muscle contraction.

6. Nervous system- (4 Periods).

   6.1 Nerve impulse, origin and its conduction.

   6.2 Synapse, its ultrastructure and properties.

   6.3 Neurotransmitters.

   6.4 Sleep.

cont..5

7. Animal Behaviour (4 Periods).

7.1 Reflex action - a) Conditional reflex, b) Unconditional.

8. Sense Organs-

a) Physiology of vision, b) Physiology of hearing.

SECTION-II (Endocrinology)

1. Introduction- (3 Periods).

Hormones - Mechanism of hormone action, chemical classification, (Chemical structure not expected).

2. Parahormones- (2 Periods).

a) Histamine, b) Kinins, c) 5-HT (Serotonin), d) Bradykinin. e) Prostaglandins.

3. Physiology of Endocrine glands- (8 Periods).

a) Pituitary, b) Thyroid, and Parathyroid, c) Adrenal, d) Pancreas (Islets of langerhans).

4. Feed back mechanism of hormone secretion. (2 Periods).

5. A) Physiology of Reproduction (8 Periods).

a) Reproductive cycle - Oestrous cycle ; Menstrual cycle. b) Pregnancy c) Parturition, d) Lactation,

e) Hormonal control of the above.

B) Role of hormones in Reproduction. 4 Periods)

i) Pituitary hormones, ii) Ovarian hormones. iii) Testicular hormones, iv) Adrenal hormones. v) Placental hormones.

6. Role of Hypothalamus in the regulation of hormone control of endocrine glands. (3 Periods).

7. Neuro endocrine relationships - Neurosecretion in crustaces. (4 Periods).

8. General account of Pheromones. (2 Periods). (Chemical nature is expected but not the chemical structure).

9. Role of hormones in Amphibian metamorphosis. (2 Periods).

REFERENCE BOOKS

1. General and Comperative Physiology : Hoar W.S.
2. Comparative Animal Physiology : Prosser, C.L.& Brown,E.A.
3. A Text Book of General Physiology : Mitechell, P.H.
4. An Introduction to General and Comparative Physiology : Barrington.
5. A Text Book of Physiology and Biochemistry : Bell etal.

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6. Muscle Physiology : Carlson.
7. Biochemistry : Dasgupta ; Vol. I and II.
8. Introduction of Physiology : Davson (Vol. I and II)
9. A Text Book of Comparative Endocrinology : Gorbman and Bern.
10. A Text Book of Animal Physiology : Hurkat and Mathur.
11. Animal Body Fluids and Their Regulation : Lock Wood.
12. Marshall's Phys ology of Reproduction : Parkes.
13. Comparative Physiology : Scheer.
14. General Endocrinology : Turner and Bagnera.
15. An Introduction to Animal Physiology : Yapp.
16. Introductory Animal Physiology : Ralph, e.l.
17. Animal Physiology : Adoptation and Environment, Cambridge University Press. : K.Schmidt. Nielson.
18. Nervous System : Edward Arnold. P.N.R. Usherwood.
19. Reproductive Physiology of Vertebrates : A. Van. Tienhoven (1968)
20. Biology of Reproduction : P.J. Hogarth. (1978).

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PAPER-IV SECTION-I

BIO-CHEMISTRY

1. pH and Buffers- (4 Periods).

   1.1 Concept of pH and pK ; pH values of body fluids and Significance. Dissociation of strong electrolytes; ionisation of weak acids and bases. Hendersen Hasselbelch equation.

   1.2 Buffers - definition and concept.
   Buffers in Biological system. Buffers used in Laboratory.

2. Molecular Interactions- (3 Periods).

   2.1 Vander Waal's forces. ( ).

   2.2 Definition and examples of followling chemical bonds- Non covalant and covalant bonds, Hydrogen bonds, Disulfide bond and Glycosidic bond.

3. Carbohydrate- (8 Periods)

   3.1 Classification.

   3.2 Sterioisomerism - Optical isomerism and optical activity.

   3.3 Monosaccharide - Properties - Mutarotation and Oxidation-reduction, Glycoside formation and Ester formation, Structure of Glucose.

   3.4 Disaccharides - Maltose and Lactose.

cont..7

3.5 Polysaccharides - Starch and Glycogen; Cellulose and Chitin. (Structural formulae not expected).

4. Lipids- (6 Periods)

4.1 Classification.

4.2 Fatty acids, Prostaglandins, acyl glycerol and waxes. (Detail chemical structure not expected).

4.3 a) Phospholipids - Lecithin cephalin, plasmalogen, inocitol (occurrance, molecular formule and Biological significance).

b) Sphingo lipids -

c) Glyco lipids -

d) Steroids - General structure and Biological Significance progesterone, Corticosteroid, cortisol, corticosterone, aldesterone, androgenes, Oestrogens.
Terpenoids - mention compounds such as rubber, caratenoids and simple terpeuse.

e) Lipoproteins-

5. PROTEINS. (8 Periods).

5.1 Amino acids - structure of amino acids, essential, non-essential and non protein amino acids.

5.2 Properties of amino acids - Physical properties, reaction of amino group, carboxyl group, R - group (structural and chemical details not expected).

5.3 Structure of proteins - primary, secondary, tertiary and quarternary.

5.4 Fibrous proteins - Keratin, silk and collages.

5.5 Globular proteins - a) Antibodies, blood protein's

b) Hormones - Insulin (sequencing of polypeptides, isolation and purification of protein not expected).

6. Nucleic acids- (5 Periods)

6.1 Purines & pyrimidine.

6.2 Nucleosides and Nucleotides.

6.3 a) RNA - Structure, types and function.

b) DNA - Structure, types and function.
(Wetson - crick model and Biological significance.

c) Nucleotide as co-enzymes.

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7. Enzymes- (4 Periods).

7.1 Classification (outline)

7.2 Properties - Enzyme substrate complex, specificity, effect of of concentration and dilution of enzymes, effect of pH and temp. inhibition and activation.

7.3 Isoenzymes - Co factors, co enzymes. (definition and at least one examples from each group is expected).

REFERENCE BOOKS

1. Outlines of Biochemistry : Conn E.E. and Stumpf P.Y.
2. Introduction to Biological Chemistry : Awapara J.
3. Text Book of Physiology and Biochemistry : Bell GhH., Davidson J.N. and Emslie - Smith D.
4. Modern Topics in Biochemistry : Bennet T.P. and Frieden E.
5. Biochemistry : Cantorow A and Schepartz B.
6. Biochemistry : Lehninger A.L.
7. Biochemistry : Das D.
8. Text - Book of Biochemistry : Magur ~~M~~A & Harrow B.
9. Text - Book of Biochemistry : Rao K.R.
10. Text-Book of Biochemistry : West E.S., Todd W.R., Mason H.S., and Van Bruggen J.T.
11. Biochemistry Vol.I : Dasgupta S.K.
12. Review of Physiological Chemistry : Happer H.A.
13. Biochemistry:Hegde, Diwan and Athawale.

FOR PRACTICALS :

14. Brewer : Experimental Techniques in Biochemistry.
15. Haupt : Elemintary Physiology : Laboratory Guide.
16. Jayaraman etal : Techniques in Biology.
17. Oser B.L. : Hawk's Physiological Chemistry.
18. Plummer D.T. : Practicals in Biochemistry.
19. Wharton : Experiments and Methods in Biochemistry.
20. Witherspoon : The functions of life : A laboratory Guide for Animal Physiology.
21. Hoar M.S. : Laboratory Companion to General Comparative Physiology.

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T.Y.B.Sc. ZOOLOGY PAPER-IVth

SECTION-II MOLECULAR BIOLOGY & GENETICS.

1. DNA as the genetics material - Bocterial transformation transduction and conjugation proof that DNA is the genetic material Plasmids (Griffithis expt. for transformation, Zinder and Leacerberg's expt. for transduction including the life cycle of bacteriophage. Avery's expt. for the proof that the DNA is genetic material, F factor and r factor as examples of plosmids. (6 Periods).

2. DNA structure revision DNA duplication, coding and noncoding sequences (redundant DNA), Concept of chromatin, inducting information about nucleosome and histories, enchromatin and heterochromatin, central dogma, nature of genetic code, concept of codon (5 Periods)

3. Transcription general process transformation transfer from DNA to RNA types of RNAs DNA dipendent RNA polymerases, direction of RNA synthesis, hoterogenous nudear RNA, mRNA, tRNA and rRNA, mRNA processing to remove unwanted regions introns. (5 Periods)

4. Translation ribosomes amino acid activation, polypeptide chain initiation, peptide bond formation chain elongation and ~~terminatie~~ termination, Polysomes. (5 Periods).

5. Concept of gene, Mendelian concept, one gene One enzyme, One gene-gene one protein/Polypeptide and concept of cistron, recon muton and replicon. (4 Periods).

6. Gene regulation LAC Operon - Puffs on polytene chromosome. (3 Periods).

7. Mutation - Gene mutation and mutagenic agents radiation. dyes and Chemicals alkylating agents and their effect on DNA, transversions and transformations. DNA Repair processes, Photorepair, Dark excission. (4 Periods).

8. RNA is genetic material, RNA viruses, General information about RNA tumour viruses, Say Rous Sarcoma and their life cycles, reverse transcriptase Oncogenes. (3 Periods).

9. Human chromosomes and Karyotype preparation, genetic diseax in human population, grouping of human chromosomes according to international convention, some examples of chromosomal abnormalities in human Turner's Down's, Klinetelter's and catery syndrome. (3 Periods).

10. Cell cycle, control of cell division S Phase, M Phase G-1 Phase G-2 Phase. (2 Periods).

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PAPER-V SECTION-I

DEVELOPMENTAL BIOLOGY

1) Gametogenesis.
   a) General outline and its significance.
   b) Spermatogenesis - Emphosis be given also on spermiogenesis.
   c) Orgenesis - Grawth of Oocyte previtellogenesis. & vitellogenesis. (4+1 Periods)

2) Structure of gametes
   a) Ultrastructure of sperm and functions of defferent parts and different types of sperms (ascaris, amphioxus, frog, birds & mammals).
   b) Types of eggs. - Alecithal egg,
      - Lecithal egg - Types according to amount of yolk (Microlecithal & megalecithal)
      Types according to distribution of yolk
      Homolecithal, Heterolecithal - Telolecithal & centrolecithal.
   c) Egg membranes - Primary, secondary & terfiary egg membranes.

(4 Periods) ( ).

3) Fertilization - a definat on of
   a) External & internal fertilization syngamy amphimixis monospermy Polyspermy Physiological & pathological.
   b) Process of fertilization.
      - Atraction and recognition of sperm - role of gamones.
      - Penetration mechanism - formation of fertilization membrane - synkaryosis.
   c) - Significance of fertilization.
   d) Definition and significance of parthenogenesis

(5 Periods)

4) Cleavage - a) Definition properties and significance
   b) Types - Holoblastic - Equal
      - Unequal.
      - Meroblastic - Discoidal
      - Superficial.
   c) Determinate and indeterminate eggs.
   d) Patterns of cleavage - Radial, spiral, Bilateral asymetrical.
   e) Types of blastulae - coeloblastula - equal and

cont..11

unequal, discoblastula and superficial blastula (3 Periods)

5. Development of Amphioxus with reference to the formation of blastula, gastrula, mesoderm, coelom, Nerve chord and notochord. (4 Periods).

6. Development of frog with reference to the formation of blastula, gastrula, mesoderm, coelom, nerve cord and notochord. (4 Periods).

7.a) Development of chick embryo upto 72 hrs. of incubation with reference to.
- blastulation.
- Primitive streak.
- Head process.
- Somites.
- Development of heart.
- Development of brain.
- Development of eligestive system.

b. Extra embryonic membranes in chick.

8. Study of merphogenetic movements fate maps & organizers in frog & chick. (4 Periods).

9. Concept of differentiation and totipotency. (2 Periods).

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T.Y.B.Sc. ZOOLOGY PAPER-V

SECTION-II MICROTECHNIQUE

1. Instruments - Use and maintainance.
   i) Oven.
   ii) Microtome.
   iii) Microtome - Knife and blade holder.
   iv) Sharpening of knife.

2. Collection of material for whole mount i.e. Hydra, Protozoans or any smaller organisms, Fixation of tissues from higher organisms i.e. Rat, Rabbit and Piegon. (2 Periods).

3. Fixation - Theory, precipitation of cell contents with least displacement of cell inclusions and size of material.
   following common fixatives and their concentrations and chemical reactions on cell contents, Alcohol, formaline, Acetic alcohol, cornoy, Bamins fluid, Zenker's Fluid.

cont..12

Specific fixatives and their duration for following cell organells

i) Mitochondria.
ii) Golgi complex.
iii) Endoplasmic reticulum. (4 Periods)

4. Washing

Theory of washing and significance of complete removal of fixatives from the material. (2Periods)

5. Process of Dehydration - Significance of use of graded alcohol/acetone. (2 Periods).

6. Cleaning agents - Xylene, Beuzene, cedarwood oil, clove oil and their merits and demerits. (2 Periods).

7. Embedding

Use of soft (54^0-56^0) and Hard (58^0- 60^0) paraffin wax and its duration. Effect of super heating & its prevention. (2 Periods).

8. Block Preparation

Use of paper trays, metal angles, cavity blocks. Orientation of the tissue in the block according to the of sections required such as Transverse, cross, [illegible] as sagittal, frontal etc. cooling and hardening of the parraffin blocks storing and preservation of paraffin blocks. (3 Periods)

9. Trimming of block and mounting of it on block holder. (1 Periods)

10. Section cutting - Precautions for obtaining good ribbon, faults and their remedies collection of ribbon, spreading and mounting of ribbon on slide and storing of slide. (P4 Periods)

11. Staining

Use of common stains - i) Eosin.
ii) Haematoxyline, significance of mordants process of staining, clearing and mounting (6 Periods).

Specific stains.

i) Vital stains.- Definition, significance, common vital stains - their chemical binding with the cell inclusions, limitation of vital staining.
Use of vital stains on - Amoeba, (4 Periods)
Paramoecium, ciliated epithelium, Testis, ovaries.
ii) Feulgen stain chemical reactions involved (structural details not expected) significance of hydrolysis and staining procedure. (2 Periods)

12. Micrometer scale

Calibration of magnification and measurement of cells from the permenant slide camerilucida its working and use. (3 Periods). ...13

T.Y.B.Sc. ZOOLOGY

PAPER-VIth (Section-I)

OPTIONAL SUBJECT

INLAND FISHERIES.

1) Economic values of Fishes in brief :-

i) Fish as human food. ii) Fish as food of cattles. iii) Fish manure iv) Fish oil v) Fish glue and Ising glass vi) Fish leather vii) Fish Fine viii) Biological control ix) For manufacture of artificial peart x) Industries.

(6 Periods)

2) Construction and maintenance of Fish Farm :-

A) Location of a Fish Farm i) Topography.
ii) Soil type iii) Water supply.

B) Layout of the fish farm i) Hatching pits
ii) Nursery ponds iii) Rearing ponds. iv) Stocking ponds

(5 Periods).

3) Pond maintenance and improvement :-

i) controlling the vegetation ii) Clearing the vegetation iii) Liming iv) Fertilization. v) Fish Food.

(5 Periods).

4) Role of Physico-chemical and biological factors during fish culture.

A) Physical Factors i) Depth ii) Shore conditions. iii) Pressure & Movement of water iv) Temperature v) Turbidity vi) Light.

B) Chemical factors :- i) O_2 ii) CO_2 ii) pH. iv) Total hardness of water v) Dissolved solids.

C) Biological factors :- Animal & Plant communities in various zones of ponds. (5 Periods).

5) Fish culture in fresh water.

A) Growth, maturation & fecundity and breeding habits of somecultivable species i) catla catla. ii) Labeorohita iii) Cirrhina mrigala. iv) Cyprinus carpio v) Tilapia vi) clarias batrachus.

(4 Periods).

6) Fish preservation and processing :-

A) Causes of spoilage of fish.

B) Methods of preservation :- Chilling freezing freeze drying smoking, drying, salting canning & processing.

(5 Periods). ...14

cont..14

7) Common diseases of fish and their cure :-

A) Skin parasites & diseases : i) Fish louse Argulus ii) Anchor warm iii) Fish leech iv) Yellow grubs.

B) Diseases of gills :- i) Twin worm ii) Oxhead worm iii iii) Protozoan parasites. iv) Gill rat.

C) Diseases caused by bacteria and viruses.
i) Tail rat ii) Dropsy.

D) Control of parasites. (8 Periods).

8) Preparation and maintenance of Aquanum.
(2 Periods).

Total 40 Periods.

REFERENCE BOOKS

1. Fish and fisheries of India - by V.G. Jhingran. Hindustan Publishing corporation (India) Delhi.

2. Inland fishes vol.I and II - by P.K. Talwar and A.G. Jhingran. Oxford and IBM Publishing Co.Pvt.Ltd.

3. Economic Zoology by Vishwapremi K.K. Akashdeep Publishing House 4374/4B Ansari Road, Darya Ganj, New Delhi-110 002.

4. A Text book of fish biology and Indian fisheries by R.P. Parihar, Central Publishing House, Allahabad.

5. An Introduction to fishes by S.S. Khanna, Central Book Depot, Allahabad.

6. Hypophysation of Indian Major carps by Chandar. satish Book Enterprise.

7. The wealth of India (Vol.IV) CSIR, New Delhi-1962.

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Infarction - Causes, types, pathogenesis

(8 Periods)

10. Inflammation - Definition, causes, signs pathogenesis - vascular phenomenon, cellular response Types - Acute, sub acute & chromic. (3 Periods).

11. Repair - Parenchymal regeneration, Repair by connective tissue, primary healing, healing of an open wound, healing of an abscess. (2 Periods).

12. Neoplasia: Tumous - Benign and Malignant (2 Periods)

13. Immunology:- Antigen Antibody, Immunity - Autoimmunity Introduction.
AIDS Causes and Prevention. (3 Periods)

14. Clinical Pathology -

Gastric analysis
Urine examination.
Sputum examination
Cerebrospinal fluid CSF.
Renal function Test | General idea & simple tests.
Liver function Test |
Glucose Tolerence Test.
and diabetis - GTT (3 Periods).

15. Applied Pathology - Biopsy - Frozen specimen
Autopsy post mortom changes.

(3 periods)

16. Experimental Pathology - Expoliative cytology.

(1 Periods)

40 Periods.

REFERENCE BOOKS

1) Text book of Pathology - Dey and Dey.
2) Text book of Pathology - William Boyd.
3) Muir's text book of pathology - Cappel and Anderson.
4) General Pathology - Dr. Bhende and Kelkar.
5) Practical pathology and micro biology - Dey & Dey.
6) AIDS - Prevention & control Dr. Ratan
JAPEE BROTHERS MEDICAL PUBLISHERS.
7) You & Your Health - Dealing with Disears, Vol.II,
By Harold shryock M.D. &
Hubert O. Swartout
(Pacific Press Pub. Association California.

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T.Y.B.Sc.

PAPER-VI SECTION-I

GENERAL PATHOLOGY

1. Introduction to Pathology - Definition, Aim, Scope and basic branches. (1 Periods)

2. Diseases - Definition and causes, Hereditory, Nutritional, Radiation, Bacterial, Fungal, Viral, Aging, Mechanical. (3 Periods)

3. Micro Biology -

Bacterial - Diseases Cholera, Typhoid, Tuberculosis, Leprosy, Syphillis, etc.

Fungal - Infections - condidiasis -

Viral Diseases - Poliomyletis, smalt pose. (2 Periods).

4. Disorders of pigmentation - Melanosis, Lipochromes, and haemoglobin derivatives (struct. not expected) (2 Periods).

5. Disorders of mineral metabolism, calcification. (1 Periods)

6. Necrosis - Definition, causes, changes, types. (2 Periods)

7. Gangrene - Dry, Moist, Gas Gangrene causes. (2 Periods)

8. Haematology - Blood groups (ABO + RH) - Anaemia, Haemorrhagic disorders - Leucaemia introduction. (2 Periods).

9. Circulatory Distarbances - Hyperaemia, venous. congestion - Types, causes, changes & clinical significance

Ischaemia - cause and effects.

Haemorrhage - causes and types.

Tharombosis - Types, clinical significance.

Embolism - Sources, types, effects.

Oedema
Shock | Definition & types.

cont..16

T.Y.B.Sc. SYLLABUS

PAPER-VI SECTION-I
AGRICULTURAL PESTS AND THEIR CONTRO.

1. Introduction to pests - aims and scope.
   a) Defination.
   b) Types of pests : (1) Store grain pests.
      2) Agricultural pests 3) Animal husbandry pests.
      4) Public health vectors.
      5) Structural pests.
      6) Domestic pests. (2 Periods).

2. Types of month parts of insects in relation to the peeding habits.
   a) 1) Biting and chaewing type
      2) Piercing and sucking type.
      3) Sponging type. (3 Periods).
   b) Genatatia and modes of egg Laying.

3. Metamorphosis of insects.
   a) Ametabola.
   b) Metabola.
   c) Hemimetabola.
   d) Holometabola.
   e) Physiological besis of metro phosis. (2 Periods).

4. General cliaractors, feeding and breeding habits of orthoptera, isoptera, Hemiptora Hetoraptera, lepidoptera, coleoptera and Diptera. (6 Periods).

5) Study of the following pests respect. Their out line of life cycle and control.

   1) Grasshoppea - Foliage feeder - Jawar.
   2) Stem bores caterpiller - internal feeder - Jawar.
   3) Pink boll worm (Caterpillor) int feeder - Cottom.
   4) Red cotton bus Sap feeder - Cotton.
   5) Pyrilla - Sap feeder - sugar cane.
   6) Aphid - Sap feeder - Vegetasks.
   7) Fruit fly - internal feeder - cucurbita.
   8) Margo stem borer internal feeder - Mango.
   9) Leaf hopper - sap feeder - Mango.
   10) Fruit borer - Internal feeder - Ber.
   11) Sitophilus - External & internal feeder - Grare.
   12) Pulse beetle - Internal & External feeder-Grare.

(12 Periods).

6) Study of non insect pests with respect to damage and their control.

   1) Rats and Bendicoats.

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2) Crobs.
3) Snaints.
4) Birds.
5) Squirrel. (2 Periods)

7) Pest control.
a) Principals.
b) Measures - 1) Natural.
2) Applied physical mechanical of chemical.
3) Integrated pest control - General concept.
3) Biological - parasites, pathogens, predators.
4) Autocidal - Juvenile hormones, ecdysones, analogs and Pheramones.
5) Integrated Pest control - general concept - (6 Periods)
6) Pesticides - Chemical nature and action.
a) Stomoch poisons - lead arsenate, paris green, cryolite
b) Contact poisons - BHC, DDT, Endosulphon, Malathion, Parathion, Pyrithrum, Nicotin.
c) Systemic poisons - Thimat, Shradan, Matasytox.
d) Famigants - Carbon tetrachloride, Hydroacynic acid, Paradi - chloro benzene ; Ethylene dichloride.

(5 Periods)

7) Hazards of pesticide precautions and antidotes.

(2 Periods).

-x-x-x-x-x-x-x-x-x-x-

cont..19

T.Y.B.Sc. SYLLABUS

ECONOMIC ZOOLOGY I

PAPER-VI (OPTIONAL)

Study of the following topics in relation to their economic importance :

Protozoa : (i) Parasitic protogoa - E. histolytica, Trypanosoma Leishmania and Malarial parasite.

(ii) Soil protozoa - Psentomonas, Englena their role in agriculture.

(2 Periods)

Porifera : Sponge culture and its importance in industry and commerce.. (1 Periods)

Coclenterata : Coralreefs as barriers their industrial and medicinal Uses (1 Periods)

Draty-helminthes : Role of parasitic trematoda liver Hukes cestodes (Tapeworms) (2 Periods).

Aschelminthes : i) Economic importance of schistosoma haematobium, Trichinella spirallis loa loa.
Dracunculus medinensis Hook worms.

ii) Damage by soil nematodes to fruit plants.

Annelida : Economic importance of Earthworms.
i) Worm farming.
ii) Vermi compost.
iii) Natural plonghing (2 Periods)

Arthropoda : i) Prawn fisheries.
ii) Silkworm iii) Honeybecs.
iv) Lac insects.
v) Termites.
vi) Ticks & mites.
vii) Insect vectors viz., Heas Housefly Mosquitoes aedex culex Anopheles.

(4 Periods).

Mollusca : i) Peort industry.
ii) Ornamental value of Mollusca.
iii) Shell industry.
iv) Food Source.
v) Role as intermediate hosts.
(Bionomics not needed)

(2 Periods).

Echinodermata : Harmful role of star fishers in Oyster farming Ornamental value. (1 Periods).

cont..20

CHORDATES

Cyclostomes and Fishes :

i) Parasites & Predators.
ii) Food Value.
iii) As fertilizers.
iv) Fish glue.
v) Oil.
vi) Medicinal uses.
vii) Ornamental uses. (5 Periods)

Amphibia : i) As Biological Control agents.
ii) Food value.
iii) Role as experimental animals for research.
(2 Periods).

Reptiles : i) Role of Snakes as biological control agents.
ii) Antivenom production. (3 Periods)

Aves : i) Poultry birds.
ii) Birds as pests.
iii) Birds as pollinators.
iv) Birds as Biological control agents.
v) Nuisance value in aviation.
(Periods - 5)

Mammals : i) Dairy industry.
ii) Piggery.
iii) Hide, Ivory, wool, Bone industries.
iv) Goatary.
v) Mammalian pests - Pigs, rats, Bandicoots, Squirrels, Bats, Mammals viz.
vi) Role of Guineapigs & Mankey as animals for ~~research~~ research. (8 Periods).

Total 40 Periods.

REFERENCE BOOKS :

1) Economic Zoology -
by Srivastava, Commercial Publication. beruse, New Delhi.
2) Economic Zoology -
By Fred V. Theobald.
3) Economic Zoology -
by Vishwapremi K.K.,
Akashdeep Publishing house, New Delhi.

cont..21

4) Parasitology -
by K.D.Chatarjee.

5) Protogrology -
by Kudo.

6) Oseful & Destructive
Insects by - Metwall & Tennt.

7) Hyman Series -
Common birds - Salim Ali.

8) Indian birds - Salim Ali.

9) Indian Snakes - Dr. Deoras

10) Fishes of India - DRY Fraucis.

11) Zoology phylum series- Kotpal R.L.

12) Life of Mammals - Young.

- X ---------- X-

Paper VI , Section-II- Apiculture (Theory)
Course No.

Chapter -I

Introduction : 1.0 What is Apiculture.
1.2 Brief History of Bee keeping. 2 Periods.

Chapter-II Species of Honey bees, Taxanomy and distribution.

2.1 Wild species of Honey bees and their distribution in the world and their Taxnomy.

2.1(a) - Apis Dorsata.
(b) - Apis Horea.
(c) - Stinglees bees.

2.2 Domesticated species of Honey bee their distribution and Taxonomy.

2.2 (a)- Apis indica.
(b)- Apis mellifera.

3 Periods.

Chapter-III. Colony organization and polymorphism in Honey bees.

3.1 With reference to Apis Indica . Their nest architecture.

3.2 Cast differentiation.

3.3 Division of Work. 2 Periods.

Chapter-IV. Life Cycle of A. Indica.

4.1 Queen.
4.2 Drone.
4.3 Worker.

2 Periods.

Chapter-V. Morphology of A.Indica.

5.1 Queen.
5.2 Drone.
5.3 Worker.

2 Periods.

Chapter-VI. Anatomy - Structure and Functions of different systems of A. indica.

6.1 Digestive system.
6.2 Nervous system and sense organs.
6.3 Reproductive system.
6.4 Glandular system.
6.5 Sting apporatus,

5 Periods.

Chapter-VII. Bee behaviour of A.indica.

7.1 Nesting behaviour .
7.2 Savarming mating and Colony reproduction.
7.3 Absconding.
7.4 Communication.
a) Round Dance.
b) Toril Waging Dance.
c) Massage Dance.
d) DVAV dance.
e) Alarming dance.
7.5 Defence.
7.6 Foraging mectianism.
7.7 Humidity and Temperature control of live.

5 Periods.

Chapter-VIII. Pollination and Honey bees.

8.1 Plant bee relationship.
8.1 a) Nectar and Pollen gathering.
b) Different Honey flow periods.

1 Period.

Chapter-IX. Bee Diseases, Pasts, Parasites and peredators and their control.

9.1 Imp. Diseases.
a) Viral - Sac.brood.

Contd...23

9.1. (b) Fungal - Chalk brood, Stone brood.

(c) Bacterial - American Foul brood and European Foul brood.

(d) Protozoa - Nosema.

9.2 Imp. Pasts.
wax months.

9.3 Parasites.
Acarine disease.

9.4 Predators.
Bortles, Wasps. Martids, Dragonfly, lizzards, Birds, Rats, Bears.

9.5 Paisoning of Honey bees.

9.6 Pesticidal Lazards to Honey bees.

5 Periods.

Chapter X. Bee Products - Chemistry, Parity specifications and uses.

10.1 Honey.
10.2 Wax.
10.3 Veriom.
10.4 Royal Jelly.
10.5 Propolis.

4 Periods.

Chapter XI. Bee Keeping Techniques.

11.1 Bee Keeping equipments.
11.2 Apiary requirement.
11.3 Procurement of Colonies.
11.4 Hiving colonies.
11.5 Routine management.
a) Feeding, b) Cleaning , c) Providing water and shelter.
11.6 Seasonal management of bee colonies.
11.7 Migration of Colonies.
11.8 Division of Colonies.
11.9 Uniting Colonies.
11.10 Queen rearing.
a) Natural , b) Artificial methods.

7 Periods.

Chapter XII. Bee Keeping or Village Industry.

a) Economics of bee Keeping.
b) Scope in India and Maharashtra.
c) Bees in Service of Agriculture and Horticulture.
d) Promotional Schemes - Government and Non Government efforts.

Contd...24

Chapter-XII.....

e) Training courses in bee Keeping.

2 Periods.

Total Periods 40

LIST OF BOOKS :-

1.	Infections Diseases of Bees	:	Bailey L.
2.	World of Honey Bee	:	Butter C.G.
3.	Communication Among Social Bees	:	Lindainar,M.
4.	Destructive and useful Insects	:	Metcalfe, C.L.and Flint.
5.	Bee Keeping in India	:	Sardar Singh.
6.	Anatomy of the Honey bee	:	Snodgrass.
7.	Insects	:	The Year-Book of Agril.
8.	The Principles of Insect physiology.	:	Wigglesworth, V.S.
9.	Bees Their vision,Chemical Senses and language	:	Frisch K.Von.
10.	Hive and Honey bee	:	Govt. Publication.
11.	Behaviour and Social Life of Honey bees.	:	Ribrandi,R.
12.	Diseases of Honey bee	:	R.A.Morse.
13.	ABC and XYZ of Bee Keeping	:	A.I.Root.
14.	Honey Bee	:	Dadden.
15.	Teat Book of Bee Keeping	:	Dr.Deoras Nikam.
16.	Technical Bulletins	:	Central Bee Reasearch Institute ,Pune.
17.	Indian Bee Journal Published by All India Bee Keepers Association Pune.	-	

PAPER-VI , Section-II

SERICULTURE.

I) Introduction:-

a) Meaning & Scope of Sericulture.

b) Brief history of Sericulture with reference to India in general & Maharashtra in particular.

c) Sericulture in Village Industry. (3)

II) Silkworm species : their taxonomy and distribution - Tasar, Muga, Esi & other sps.

a) Brief account of Silk production with wild sps.

b)Domesticated species of silk worms. (3)

i) Bombyn mosi ii) Antheaoria sp. & their taxonomy.

contd...25

III) Life history & embryology of Silkworms:-

Life history & domesticated Silkworm and Embryology of Bombyx mosi. (4)

IV) Morphology of Bombyx mosi/Tasar:-

a) Egg b) Larva c) Pupa & cocoon d) Adult. (3)

v) Internal Anatomy of Bombyx mosi/Tasar Larva:-

a) Digestive system , b) Circulatory system.

c) Respiratory system, d) Nervous system.

e) Sense organs & endocrine glands.

f) Reproductive system, g) Glandular system,

h) Silk glands : Silk gland division, spinnerate silk proteins & their synthesis.

(7)

vi) Moulting :. structure of intergment & cuticle formation & Shedding of cuticle & hormonal control; Diapause.

Vii) Food Plants :- Mulberry

a) Morphology, b) Cultivation,

c) Diseases & their control of Mulberry plant.

d) Harvesting of leaves & their sprage for Silkworm reasing. (4)

Viii) Silkworm reasing :-

a) Objectives of Silkworm reasing

b) Requirements of reasing on small scale & Commercial scale.

c) Varieties of Silkworms to be reased. (2)

IX) Diseases of Silkworm :.

a) Symptoms : Causative agents, incidents, transmission predispasing factor, biochemical changes, sites of infection, Prevention & control measures.

b) Predators:- Dermestid, beetles, Ants, Lizards,birds, rats, squirrels. (3)

Parasitoids : wasps, Uzifly.

X) Reasing house/Reasing rooms & requirements of Reasing appliances :-

a) Reasing stands , b) Ant wells, c) Reasing trays,

d) Paraffin Paper, e) Foam rubber strips,

f) Chopping boards, Knives, nets., g) Magnifiers.,

h) Cleaning nets, i) Mountages (Chandrikas),

j) Thermometers, k) Hygrometers, l) Disinfectants,

m) Sprayers, n) Room Coolers, o) Room heaters,

p) Leaf storage chambers, Baskets, etc. other equipments. (3)

....26

XI) Silkworm reasing Technique:-

a) Management of Silkworm during premoulting and moulting stage & after.

b) Detection & process of 'ripening' of silkworm & their moulting for cocoon construction & spinning of cocoons.

c) Harvesting of cocoon & selection of seed cocoons & their storage. (3)

XII) Post harvest technology :-

Reeding appliances & reeling process (2)

XIII) Marketing & cost Benefit ratio of Silk industry in India in general & Maharashtra in particular. (1)

Total Periods. 40

[redacted]

Paper- VI, Section-II

Public Health and Hygiene.

I. Health:.

1.1 Factors affecting health - Inborn & Environmental

Personal & Community health- Physical, mental & Social.

World Health Organisation/(W.H.O.) & Services (UNICEF,UNDP,F AO & ILO)

(8)

II. Food:-

2.1 Classification- Proteins, carbohydrates, fats, minerals, vitamins, water (Chemical structure are not expected)

2.2 Sources & Difficencey diseases-(Protein & vitamins)

2.3 Preservation Methods & Necessity:

a) Heat., b) Canning, c) Drying & dehydration,

d) Smoking, e) Salting & Pickling. f)Preperaring gams.

g) Cold & Refrigeration, h) Addition of Food presevatives.

2.4 Adulteration Food:-

a) Definition,

b) Adverse Effects of the Following adulterants on human life:-

i) Weshing Soda, ii) Argemone oil, iii)Metanil yellows, iv) coal-tar colour, v) Keshari Dal, vi)sporious drugs.

2.5 Effects of Alcohol, tobacco & drugs.

a) Alcohol with reference to diseases at Individual level; as an etiological factor community health factor.

b) Tobacco with reference to oral hygiene.

c) Drugs - LSD, cocaine, heroine, Brown Sugar.

(8)

III - Houses & Buildings :-

a) Residential:- Criterial & Standards.

b) Community :- a) Schools & Hospitals, standards from point of veiw of public health.

(2)

IV - Air & Ventilation :-

4.1 - Composition of air.

4.2 - Pollutants.

4.3 - Purification of air.

4.4 - Ventilation - Natural & artificial.

(2)

V - Water:-

5.1 - Sources - Rain, upland surface water & ground water.

5.2 - Pollutants of water.

5.3 - Purification of water & Necessity :-

a) Small Scale :- i) Boiling, ii) Chemical disinfection Bleaching Powder, Chlorine, Iodin, Alum, halogen tablets.
iii) Filteration:- Musline Cloth, Feur Clara water filter.

b) Large Scale:- i) Slow sand filters,
ii) Rapid sand filters, iii) chlorination.

(5)

VI - Sanitation :- Brief account of - disposal of human & animal waste (Refuse & Sewage)

(4)

VII - Diseases :-

7.1 Communicable diseases :-

Causative organisms, Symptoms, modes of transmission, prevention & control .

a) Excremental - Typhoid, cholera.

b) Air borne - Enfluenza, chicken pox, Tuberculosis.

c) Arthropod borne - Dengue, Encephatidis, Filariasis

d) Zoonotic - Rabies.

Contd...28

7.1 e) Contact Infections- i) Vineral diseases- Syphilis, gonorrhoea,

ii) Skin diseases - Leprosy.

7.2 - Non - Communicable disease-

General Information about following diseases -

i) Cancer, ii) Coronary heart diseases, Hypertension,

iii) Diabetes, iv) Aids.

7.3 - Occupational diseases- their prevention & Control -

a) Diseases due to-

i) Physical agents - heat, cold, noise,

ii) Chemical agents - Carbon monoxide, Sulpher di-oxide, Silicon dioxide.

iii) Biological agents - Leptospira, authra..

(10)

VIII - Vital Statistics - outline of its methods & their Significance.

(01)

Total Periods : 40

References :-

1. Social & Preventive medicine,
by Park & Park.

2. Social & Preventive medicine,
by Deodhar & Adrannalla.

3. Social & Preventive medicine,
by Mathur.

4. Social & Preventive medicine,
by Bedi.

Paper VI Drosophilla Geneties. Section II

(A) Introduction - i) Advantages in use of Drosophilla in the study of Geneties.

(2)

(B) Study of Drosophilla melanogaster.

i) Life Cycle of Drosophilla melanogaster - Sexual dimorphism.

ii) Preparation of medium for culturing Drosophilla Melanogaster.

iii) Equipments used for handling the files. (4)

Contd..29

(C) Genetical Studies on Drosophilla Melanogaster.

i) Mendelian inheritance- Monohybrid & dihybrid.
ii) Morphology of Chromosome.,iii) Determination of Sex.
iv) Sex linked in heritance., v) Multiple allelic series of eye colour in drosophilla., vi) Cytoplasmic in heritance of sigma factor (Sensitiveity of co_2).

(10)

(D) Phenomenon of Non-disjuction : Drosophilla

i) Study of intersexes.

(03)

(E) Linkage group in Drosophilla -

i) Complexe linkage in male drosophilla.
ii) Mapping of jene on chromosome in drosiphilla (cn - ss - sr)
iii) Genetre or linkage maps.

(F) Puffing/Banding pattern of the Chromosome of saliray land of Drosophilla larvae. (03)

(G) Evidences of Chromosomal abration.

i) Position effect (Bar eye)
ii) 'c' Factor.
iii) Notched margin of wrig.

(03)

(H) Study of Mutauts.

i) Mutauts of Drosophilla. (any five prominant - phenotyprial Mutauts)
ii) Geneties of Y Chromosome & Y Chromosome loops.
iii) Mutagenesis., iv) Screening for Mutath.
iv) System for detectin of Mutation in irradiated or/ x -ray exposed flies by balanced lethol system.

(10)

Total Periods - 38

Borse|-

Contd...30

PAPER VI , Section-II

Organic Evolution & Palaeontology:

		Periods
1)	Intro' to the concept of Organic Evolution.	(02)
2)	Various theories Explaning Origin of Life ?	(02)
3)	Evidences in Supports of Evolution.	
	i) Anatomical.	
	ii) Embryological,	
	iii) Physiological,	
	iv) Zoogeografical,	
	v) Genetical,	
	vi) Taxaomical,	
	vii) Palentological.	(05)
4)	Sources of Variation Mutation Recombination, Natural Selection.	(02)
5)	Isolution Mechanism Geografic & Reproductive.	(02)
6)	Process of speciation, Dame, Race & Species.	(01)
7)	Synthetic theory of Evolution, Role off Natural selection, Mutation & Recombination.	(04)

.: PALAEONTOLOGY :-

1) Geological time Scale.
   a) Process of fossilisation Radiometric dating.
   b) Diff eras of geological time scale with particular, emphasis on climate flora & fauna Distinctive features of existing species & nero addition during the eras psendoposile.
   c) Coal ball formation.
   d) Microfossil. Oil exploration. (10)

2) Antiguity of Man.
   a) Primate characteras & classification.
   b) Differntiating characters of Platyrhinae & Catarhinae.
   c) Characterstic features origin & successive stages with reference to geological time scale in regard to -
   i) Ramapithecus, ii) Australopithecus, iii) Homohabils, iv) Homoerectus, v) Homo neandecthalis, vi)Homosapiens. (08)

3) Horse evolution ? (02)

4) Parcellel evolution ? (02)

total periods. 40

List of Books:

1) Introduction to Palaeontology - By Tyagi.
2) Vertebrate Evolution - By Colbest.

Contd..31

List of Books.....

3) Evolution as a process - By Dedeson.
4) Vertebrate & Palaeartology - By A.S. Romor.
5) Evolution - By Savage.
6) Organic Evolution - By Lull.

T.Y.B.Sc. ZOOLOGY PAPER VI Sec. II

AVIAN BIOLOGY

Periods

1) Introduction- Definition, scope and in brief origin classification (up to orders) with examples. (2)

2) Types of birds according to their habitals with suitable examples.-Terrestrial, aquate, waders, oceanic, shore, Busin and tree, grassland, mountain, avatic etc., (2)

3) External morphology & sparrow or pigeon showing different parts. (2)

4) Types of beaks and feet on the basis of their food and bahital. (2)

5) Feathers of birds- Origin, structure, types, location on bodes, feather tracts, colour and colour phases, mounting Breeding plumages. (4)

6) Flight of birds- definition, types such as rapid wing beat flight, glyding, hovering, soaring, undulating with suitable examples. (3)

7) Sense organs of birds and its significsnce in survival- eye ear, smell organ , tectile taste, infra sound detectors etc., (4)

8) Types of birds on the basis of food habits with suitable examples. Insects, eaters, fruit eaters, plant eaters, seed eaters, flesh eaters, scavangers, honeycomb wax eaters. (2)

9) Migration of birds - local birds, local migratory and long distantce migrations. Definition of migration, causes, orientation, navigation energy source, Migratory routes. (5)

10) Reproduction - breeding seasons, mating dances or behaviour, bird songs paliring, copulation Nest construction, egg laying, incubation, polygyny and polyandry suitable examples. (6)

11) Nestling study - Precocial, altrucial, parental care nestling period, food of nestlings, sanitation of nests, nestling behaviour towards parents, nestling competition.(4)

12) Bird watching - Definition, scope, use of binoculors, maintaining bird watching diary, banding and its significance, bird watching as a hobby. (4)

13) Economic importance of birds - Pollnation, seed dispersal, poultry, quailary, cage bird, avairy , bird quano, etc., birds destructing crops.

(12)

LIST OF REFERENCES FOR - AVIAN BIOLOGY.

1) Ornithology - laboratory and field by Olin sewall Pettingel (Jr) - Surjeet Publication.

2) Animal Migration, navigation and homing edited by K. Schmidt - koenig and keeton springer verlag N.Y.

3) The birds - By R.L.Kotpal

4) Compact handbook of birds of India and Pakistan - Salim Ali and Ripley, Oxford University Press,Bombay.

5) Collins handguide of the birds of Indian subconfinent by Martin woodcock.

6) Nesting birds - eggs and fledlings by winwood, Reade and itorking, London Blandford press.

7) Encyclopaedia of birds ed. by perrins and Middleton, George Allen and unwin London, sydney.

PAPER VII PRACTICAL I

Practical - 1-

Nonchordates.

1) Study of external, morphology. cross- section and spicules of sycon and study of gemmules . (E)

2) Study of ext. characters, Tentacalocyst, planula, scyphistoma and ephyra of Aurdia. ((D)

3) Study of external characters & cross sections of planaria. (D)

4) Study of ext. characters, & digestive systems reproductive system, Nervous syt system and mounting of book lungs of scorbion (E)

5) Study of ext. characters and dissections of Lamellidens so as to observe, gills, pericardium and heart, & digestive and Nervous system. (E)

6) Study of ext. characters and dissections of leech so as to expose- Digestive system, Reproductive and Nervous system.

...33,

Mountings - Jaws, solivary glands, Botryoidal tissue, Nephridium. Cross sections passing through pharyny, crop.

II) Study of the follwoing animals with reference to morphology, zoological significance and economic importance if any. (D)

A) Protozoa : Amoebe, Euglena, Arcella, foraminifera, Actinosphaerium, Cryptomonas, Volvoy, Ceratium, Noctiluca, Trypanosoma, Gliardia, Monocystis, Gregarina, Plansmodium, opalina, Nyctother us, stentor , styalonekia, vorticella, A cinata (any five)

B) Porifera : Euplectella, Hyalonema, spongilla Euspongia - (any two)

C) Coelenterate: Hydra, obelia, millepora, physalia, valella Porpita, Zoanthus, Alcyanaria, Pennatula, gorgonia. Various types of corals, pleurobranchia. Beroe. (One from each class.)

D) Platyhelminthes : Triclad, Polyclad, Fasciola Schistosomum, Polystomum, Tetrarhynchus, Taenia. (One from each class)

E) Nematoda : Ancylostoma, Trichinella, wochereria,

Annelida : Aphrodite, Nereis, chactopterus,

F) Arenicola, Tubicolous worm, Rhynchobdallid Heteronercis, (One from each class)

G) Arthropoda : Branchipus, A pus, Daphnia, Cypris, Cyclops, Argulus, lepar, Balanus, mysis, oniscus, Gammerus, Prawn, Lobster, Hippa, Crab, Squilla, millipede, Centepede, Scutigera lepisma, Grasshopper, Praying mantis, Termite, Booklice, Draganfly, Bee, ant, Butterfly, Housefly, filea, limulus, spider, Tick, mite, (any two from each class)

4) Mollusca : Chiton, Turbo, Patella, Cypraea, Conus, Aplysia, Pteroped, Planorbis, slug, mytilus oyster, Recten, Teredo, Solen, Sepia octopus, Nautilus. (any one from each class)

I) Echinodermata : Brittle, Star, Seaorchin, Sea cucumber, crinoid, sealily,

III) Study four to visit coastal area, Sanctury, Zoo etc.

BIOCHEMISTRY PRACTICALS

Paper VII Practical -1

Compulsory exercises (E)

1. Identification of carbohydrates - a) Thymol test, b) Iodine test, c) Phosphoric acid test, d) Benedict's test, e) cupric acetate test, f) Phenyl hydrazine reaction, g) Solubility test. (Mixture is not expected)
2. Isolation of casein from milk.
3. Isolation of Starch from Potato.
4. Isolation of DNA and RNA from liver.
5. Tests for amino acids.
6. Factors affecting enzymatic reactions - Any suitable enzymatic reaction to demonstrate - effect of heat, alkali, acid, alcohol inhibition and activators.

Optional exercises -

1. Isolation of L. cystine from their hydrolysate.
2. Preparation of egg albumin.
3. Isolation of haemoglobin.
4. Isolation of Thrombin.
5. Isolation of fibrinogen.
6. Detection of amino acids by circular/ ascending paper chromatography.

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Paper VII Practical - 1.

Practicle in Molecular Biology & Genetics

(Any three experiments from Majar and any three experiments from Minor.)

Major Experiment

i) Preparation & DNA paper model and study & structure & DNA.

ii) Electrophoroses & DNA fragment (Gel/Paper) electrophoroses preparation.

iii) Genetics crosses (Mono hybrid, dihybrid) using Drosophila Two expts

iV) Genetics crosses (Monohybrid, dihybrid) using Drosophila. Two expts

v) Mounting of Salivary gland Chromosome from Chironomesome/ Drosophilla larrae

vi) Induction of puff in Polytene Chrimosome of Drosophilla melanogaster.

vii) Demanstration of Meioser using testes of gran hopper/ or any suitable material.

viii) Preparation and study of human karyotype from Chromosome spread photographics.

Minor experiment

i) Gene frequency analysis in human population - A.B.O blood/ P T C tasting.

ii) Temporary preparation of Barr bodies from buco - epithelial cells of man.

iii) Study of human pedigree will respect to same human heredetay charactar.

v) Methyl green - pyronin staining for DNA & RNA in Tissue section/ protozon cells.

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* 8 Hand book of Practicles in Genetics by Goswami - Himalaya Publication.

Paper VIII Practical - 2

Chordate III

Practicals

I. Study of Calotes

1) External Character
2) Dissections -
   a) Digestive system
   b) Arterial System
   c) Venous system
   d) Reproductive system
   e) Brain.

Moanting of Peoten, Scales & Hyoid Apparattir.

II. Study of External Characters & dissection of Ligeon(D)

Degestive system.
Excretory system.
Urinogenital system
Various kinds of feathers.

III. A) urochordata - (Any 3 Specimen)

Simple ascidian, Doliolium, Pyrosoma, Salpa, Oikopleura, Appendicularia .

B) Cyclostomata - Petromyzon, Myxine.

c) Gnathostomata - (Any Six)

Hammer Headed shark, Electric ray, saw fish, Labeo, Cat fish, rel, Ophiocoeloas, Pomfret, Carp, Gobius, Anabus, Clarias, rhocoetas, Sole, Dombay duck, sardine, Catla, Mrigal, Long fish, Sucker fish, Hippocampus.

D) Amphilia :- (Any Six)

Ichthyophis, Pipa, Bufo, Hyla, Rana, Rhacophorus, Cryptobranchus, Salemender, Proteus, Necturus, Sizen.

E) Reptilia - (Any six)

Turtle, Chamelion, Jecko, Sea Snake, Cobra, Viper, Rat Snake, Python, Krait, Bangarus, Green Snake, Crocodile Varanus.

F) Aves - (Any 4 of diff types of beaks & feets)

Duck, Kite, Parrot, Wood pecker, Sparrow, Crow, Sun bird, Vulture, Egret, King fisher, Tailar bird,

G) Mammalia :- (Any four)

Platypus, Shrew, Rat, Scaly, Ant-eater, Loris, Rabbit, Spiny ant eater.

IV) Comparative Histology of skin of Scoliodon, frog, Calotes, Pigeon, Rat or Rabbit.

V) Comparative Study of Heart of Scoliodon, frog, Calotes, Ligeon, Rat or Rabbit,

VI) Comparative Study of Brain of Scoliodon, frog, Calotes, Ligeon, Rat or Rabbit.

VII) Compulsory Visit to -

a) Aguarium Zoo & Musieum.
b) Coastal Region/klild life sancturay, National park.
c) Krishi Vidyapeet.
d) Research Laboratories of biological importance.
e) Report should be included in the journal as a seperate practical.

Paper VIII Practical - 2

Practicals in Developmental Biology

1. a. Study of sperms.
   b. Study of different types of egge.
2. Study of different stages of blastulation and gastrulation in Amphioxus and frog.
3. a. Study of whole mounts of chicks -
   - 16 hrs of incubation (Primitive streak stage)
   - 18 hrs " "

- 24 hrs of incubation
- 33 hrs " "
- 48 " " "
- 72 " " "

b. Study of sections of chick embryo to study primitive streak, heart, brain.

4. Preparation and submission of a whole mount of the stage of chick embryo.

Practicals -

Microtechnique

1. Preparation fo stained permanent microscopic slides of whole mounts 5 - slides and of histological sections 5 - slides.
2. use of micrometer.
3. use of camera lucida.

Paper IX

Practical 3

PRACTICALS : General Physiology and Endocrinology

Major Experiments :

1. (E) Total Count of R.B.C.
2. (E) Total Count of W.B.C.
3. (E) Study of muscle contraction by nerve muscle preparation of frog with Kymograph.
4. (E) Determination of R.Q. with the help of any suitable animal.
5. (E) Effect of accelerators and inhibitors on the heart beat with the help of Kymograph.
6. (E) Quantitative estimation of blood sugar level, before and after insulin treatment.

Minor Experiments :

7. (E) Detection of blood groups ABO and Rh factor.
8. (E) Diffusion through intestinal wall with any suitable animal and a confirmetory test.
9. (D) Detection of haematocrit value and ESR.
10. (E) Measurement of human blood pressure.
11. (D) Dissection of Rat partaining to endocrine glands.
12. (E) Eye stalk ablation to show the effect on body colouration on Prawns / Crabs.

13.(E) Effect of background on chromatophores in Prawn / Crebs.

14.(E) Study of oestrous cycle in any suitable mammal.

Paper IX

Practicla - 3

Practicals in Inland fisheries

1. Study of different types of scales. (E)
2. Study of different types of fins. (D)
3. Study of maintenance of Aquarium in laboratory. (D)
4. Principle Fresh water cultivable fishes and their economic. (D)
   importance.
   1) Catla catla
   2) Labeo rohita
   3) Cirrhina mrigala
   4) Cyprinus carpio
   5) Exotic carps
   6) Clarias batrachus
   7) Tilapia mossambica
5. Fecundity of any local fish - (E)
6. Analysis of gut contents - (E)
7. Visit to fish farm-

Paper IX

Practical- 3

General Pathology

Practicals

E. i) Abnormal Constituents of urine.
   ii) Estimation of haemoglobin.
   iii) Serum albumen/ globulin.
   iv) Sputum Examination.
   v) Semen Analysis - normal and abnormal count / bull.
   vi) Co-agulation fests -

Any 3.

D. i) Human ESR/ESR and PCV from the blood of any suitable animal.
   ii) Blood platelet count.
   iii) Stool Examination -