RANCHI WOMEN'S COLLEGE,RANCHI

Courses of study for Zoology Honours

Department of Zoology

Number of papers : 20

(14 Theory papers & 6 Practical Papers)

Full Marks: 1600

(Theory:1200,Practical:400)

Number of Semester : 6

B. Sc. Hons.–Part- I : 400 Marks

(Theory:300,Practical:100)

B. Sc. Hons.–Part-II : 400 Marks

(Theory:300,Practical:100)

B. Sc. Hons.-Part-III : 800 Marks

(Theory:600,Practical:200)

DISTRIBUTION OF MARKS IN ZOOLOGY HONS.

2013

ACADEMIC YEAR	SEMESTER	THEORY PAPER	FULL MARKS			PASS MARKS	DURATION	PRACTICALS		
			MSE	ESE	TOTAL			FULL MARKS	PASS MARKS	DURATION
FIRST YEAR	I	1	15	60	75	34	3 HRS	50	23	3HRS
		2	15	60	75	34	3 HRS			
	II	3	15	60	75	34	3 HRS	50	23	3 HRS
		4	15	60	75	34	3 HRS			

ACADEMIC YEAR	SEMESTER	THEORY PAPER	FULL MARKS			PASS MARKS	DURATION	PRACTICALS		
			MSE	ESE	TOTAL			FULL MARKS	PASS MARKS	DURATION
SECOND YEAR	III	5	15	60	75	34	3 HRS	50	23	3 HRS
		6	15	60	75	34	3 HRS			
	IV	7	15	60	75	34	3 HRS	50	23	3 HRS
		8	15	60	75	34	3 HRS			

ACADEMIC YEAR	SEMESTER	THEORY PAPER	FULL MARKS			PASS MARKS	DURATION	PRACTICAL PAPER	FULL MARKS	PASS MARKS	DURATION
			MSE	ESE	TOTAL						
THIRD YEAR	V	9	20	80	100	45	3 HRS	12	100	45	4HRS
		10	20	80	100	45	3 HRS				
		11	20	80	100	45	3 HRS				
	VI	13	20	80	100	45	3 HRS	16	100	45	4HRS
		14	20	80	100	45	3 HRS				
		15	20	80	100	45	3 HRS				

5.8.13

05/08/13

5/8/13

5-8-13

RANCHI WOMEN'S COLLEGE, RANCHI

Summary for B.Sc. Honours.

To study of invertebrates and vertebrates present in our existing world as being a zoology student and to study their hierarchy position among the animals. To study their structure, function, evolution, genetics and physiology, histology, endocrinological structure and functions in our body to generate energy. How these animals live in such polluted environment how animals can be protected from the pollution and how the environment will be conserved for the sustenance of animal life. By Biostatical study the students of Zoology can provide the a abundance ,density of population of any organisms existing or extinct.

B.SC. PART-I ZOOLOGY HONS.

SEMESTER-I

PAPER-1: FUNCTIONAL ANATOMY OF NON-CHORDATES

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1. Principles of classification, Salient features and classification of non-chordates up to orders. Structural organization in different classes of non chordates.
2. Protozoa : Study of locomotion, osmoregulation, nutrition and reproduction in protozoa.
3. Porifera and Coelenterata : Canal system in Porifera, Corals and coral reefs, Polymorphism in Hydrozoa.
4. Platyhelminthes and Nemathelminthes: Reproduction and Parasitic adaptations in Helminthes.
5. Annelida : Coelom and excretory system.
6. Mollusca : Torsion and Detortion in Gastropoda.
7. Onycophora : Affinities.
8. Arthropoda : Larval forms in Crustacea, Vision in Arthopoda.
9. Echinodermata : water Vascular system and Larval forms.

BOOKS RECOMMENDED

1. Barnes: Invertebrate Zoology (4th ed. 1980, Holt-Saunders)
2. Invertebrate by Pechnic, Tata McGraw Hill
3. Barrington: Invertebrate Structure and Function (1967Nelson)
4. Moore: An introduction to the invertebrartes (2001Cambridge)
5. Ekambaranath Ayar: A manual of Zoology, Part I –Invertebrata, (1973, S. Vishwanathan)
6. Kotpal, Agarwal and Khetrapal: Modern Textbook of Zoology: Invertebrate, (1976, Rastogi)
7. Marshall: Parker and Haswell Textbook of Zoology, Vol. I (7 th ed. 1972, Macmillan)
8. Nigam: Biology of Non-chordates (1985, S. Chand)
9. Jordon and Verma: Invertebrate Zoology (1995, S.Chand)

B.Sc. PART-I ZOOLOGY HONS.

SEMESTER-I

PAPER-2: BIOCHEMISTRY

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1. Structure and classification of proteins and Amino acids.
2. Structure and classification of Carbohydrates.
3. Structure and classification of Lipids.
4. Metabolism of carbohydrates : Glycolysis, Glycogenesis, Gloconeogenesis, Kerbs cycle, Electron transport chain.
5. Discovery,structure and Function of Vitamins.
6. Enzymes: Nature and Classification.

BOOKS RECOMMENDED

Biochemistry

1. Boyer: Concepts in Biochemistry (3 rd ed. 2006, Brooks/Cole)
2. Lehninger, Nelson & Cox: Principles of Biochemistry(4 th ed, 2007, Worth),
3. Murray et al: Harper's Biochemistry (25th ed. 2000, Appleton & Lange)
4. Stryer: Biochemistry (5th ed. 2001, Freeman)
5. Conn, Stumpf, Bruening & Doi: Principles of Biochemistry (5 th ed. 1987, Wiley

B.SC. PART-I ZOOLOGY HONS.

SEMESTER-I

(Practicals) (20 classes)

Full marks: 50 **Time: 4 Hrs** **Pass Marks: 23**

1. Dissection (major). Any one of the following may be set. (10)

a) Earthworm : Alimentary canal, nervous system, reproductive system.

b) Prawn : Digestive and nervous system

c) Pila : Nervous system

2. Temporary mounting / minor dissection : (6)

Nerve ring and ovary of earthworm, statocyst of prawn ; radula, osphradium and ctenidium of pila.

3. Biochemistry : (6)

a) Extraction of starch from potato and its test.

b) Extraction of Proteins from milk and its test.

c) Extraction of Lipids from mustard and its test.

4. Identification : (16)

Invertebrates slides : (4x2=8)

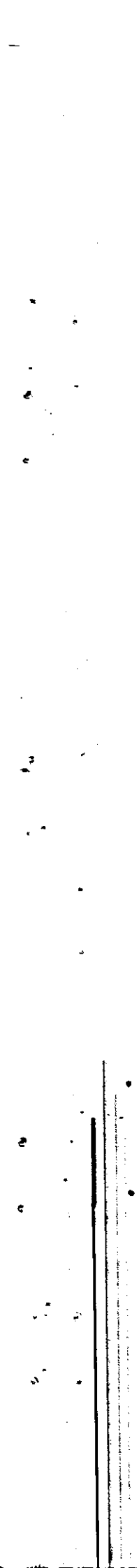
a) Paramecium , Amoeba, Euglena , Vorticella, LS/TS of Sycon, Sponge spicules, Hydra (WM/TS), Obelia colony, Scyphistoma, Sea anemone (TS), slides of Fasciola, Taenia and Ascaris, TS of earthworm through different regions.

b) Museum specimens: (4x2=8)

Aurelia, Sea anemone, Gorgonia, Ascaris (male and female), Spiders, Chiton, Pila, Aplysia, Unio, Mytilus, Octopus, Nautilus, Sea star, Sea urchin, Sea-cucumberand Antedon.

5. Practical Record (6)

6. Viva voce (6)



B.Sc. PART-I ZOOLOGY HONS.

SEMESTER-II

Paper-3 (Cell Biology) (25 classes)
Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Group A. Shall contain multiple choice questions; fill in the blanks and true / false type questions (20 x 1=20).

Full Marks : 60

Full Marks : 15 (MSE)+60(ESE)=75 Time : 3 Hrs. Pass Marks: 34

Instructions to Paper- setter & Examinee

Paper setters shall set questions in three groups.

Group A. Shall contain multiple choice questions; fill in the blanks and true / false type questions (20 x 1=20).

Group B. Shall contain concept based questions. Five questions of two marks each (5 x 2=10).

Group C. Long answer questions. Three questions of ten marks each (3 x 10=30)

Altogether 5 questions have to be answered, where Groups A and Group B shall be compulsory.

1. Cell theory
2. Cell cycle
3. Structure od Prokaryotic and Eukaryotic cells.
4. Different types of microscopes
5. Structure and function of the following Cell Organelles : Plasma membrane, Golgi complex, Endoplasmic reticulum, Mitochondria, Lysosome, Ribosome and Nucleus.
6. Chromosome : Structure (chromatin fibres, solenoid model), Types
7. Cytoskeleton
8. Cell junctions, cell adhesion & extra- cellular matrix.
9. Biology of cancer (elementary idea).

Books Recommended :

1. Agarwal, V.K. — Cell Biology, S.Chand & Co. Ltd., New Delhi
2. Ayodhya Prasad — Scientific Refresher Course in Zoology Paper – VI Cell Biology, Genetics & Economics Zoology, Scientific Book Company, Patna
3. Cooper — Cell Biology
4. Dalela & Verma — A Textbook of Cytology, Jaiprakash Nath & Co., Meerut
5. De Rpbertis & De Robertis — Cell & Molecular Biology, B.I. Waverly
6. Gasque — Manual of Laboratory Experiments in Cell Biology (Brown)
7. Geise — Cell Physiology
8. Gupta, P.K. — Cytology Genetics & Evolution, Rastogi Publications, New Delhi
9. Prescott, D.M. — Reproduction in Eukaryotic Cells, Academic Press, Pvt. Ltd., New Delhi
10. Rastogi, S.C. — Cell & Molecular Biology, New Age International P.Ltd., New Delhi
11. Singh & Tomar — Cell Biology, Rastogi Publications, Meerut

B.Sc. PART-I ZOOLOGY HONS.

SEMESTER-II

PAPER-4: IMMUNOLOGY & MOLECULAR BIOLOGY

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory. At least one question from each Secttion

Section-A

1. Introduction to immunity **13**

2. Cells and organs of immune system

2.1. Types of immune cells: lymphoid and myeloid

2.2. Primary and secondary lymphoid organs and lymphatic system

3. Humoral immunity

3.1. Antigen

3.2. Immunoglobulins: types, structure and function

3.3. Complement system

4. Cell mediated immunity

4.1. Structural organization of MHC complex

4.2. Functions of T-cells

Section-B

8. Nucleic acids and gene expression 13

8.1. DNA & RNA as genetic material

8.2. DNA structure

8.3. DNA replication in prokaryotes

8.4. RNA structure and Types

8.5. Basic concept of transcription (Prokaryotes)

8.6. Genetic code and basic mechanism of translation (Prokaryotes)

BOOKS RECOMMENDED

1. Abbas et al: Cellular and Molecular Immunology (2001, Saunders)
2. Alberts et al: Molecular Biology of the Cell (5 th ed. 2008, Garland)
3. Kuby: Immunology (2003, Freeman)
4. Roitt and Delvis: Roitt's Essential Immunology (6 th ed. 2006, Blackwell)
5. P.K. Gupta Genetics & Molecular Biology

B.Sc. PART-I ZOOLOGY HONS.

SEMESTER-II

(Practicals) (12 classes)

Full marks: 50 **Time: 4 Hrs.** **Pass Marks: 23**

1. Cell Biology (12)
   a) Squash preparation : Stages of mitosis in onion root tip.
   b) Bar body from buccal epithelium of female human.
   c) Acetocarmine Preparation of the giant Chromosomes from salivary glands of chironomus or Dorsophila larva
   d) Stages of meiosis in testis of grasshopper/ anthers of onion.
2. Chromatography & Microtomy : (8)
   a) Paper Chromatography
   b) Block preparation and section cutting
3. Identification : Slides of mitosis, meiosis and giant chromosomes (12)
4. Practical record (10)
5. Viva voce (8)

B.Sc. PART-II, ZOOLOGY HONS.

SEMESTER-III

PAPER-5 CHORDATES

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 24**

Pass marks – 34

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1. Classification of all classes upto orders with suitable examples
2. Origin and General characters of Chordates
3. Protochordates : Structure and affinities of Hemichordates, Urochordates and Cephalochordates
4. Cyclostomes : Structure and affinity
5. Fishes : Detailed study of Scoliodon,Parental care in fishes , accessory respiratory organs in fishes Dipnoi and their affinities
6. Amphibia : Frog, Origin of Amphibia ,
7. Reptiles :Calotis, Biting and feeding mechanism of Snakes
8. Aves : Columba ,Flight adaptation and migration in birds.
9. Mammal : Prototheria, Metatheria and Dentition in mammals

BOOKS RECOMMENDED

1. Hildebrand: Analysis of Vertebrate Structure (1995,John Wiley)
2. Kotpal: Modern Text Book of Zoology Vertebrates (2003, Rastogi)
3. Nigam: Biology of Chordates (1983, S Chand)
4. Romer & Parsons: The vertebrate Body (6h ed. 1986, Saunders)

5. Walter & Sayles: Biology of the Vertebrates (1959, Macmillan)
6. Young: The Life of Vertebrates (1981 Clarendon)
7. Young: The Life of Mammals (1975 Clarendon)
8. Kardong: Vertebrates
9. Pough: Vertebrates

B.Sc. PART-II, ZOOLOGY HONS.

SEMESTER-III

PAPER-6: PHYSIOLOGY

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 24**

Pass marks: 34 **Total Classes: 26**

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1.Respiratory System

1.1.Structure and Function of Respiratory system

1.2. Mechanism and regulation of breathing

1.3. Transport of oxygen and carbon dioxide

1. Circulatory System

2.1. Structure and Function of Circulatory system

2.2. Buffer system in blood

2.3. Blood groups and blood coagulation

2.4. Cardiac cycle and its regulation and electrocardiogram

2. Digestive System

3.1 Structure and its physiology

3.2. Digestion and absorption of carbohydrates, proteins and fats

3.3. Balanced diet

4. Excretory system

4.1. Structure of Nephron

4.2. Urine formation

5. Nervous System

5.1. Conduction along a nueron

5.2. Synaptic Conduction

5.3. Reflex action

6. Muscular System

6.1. Ultrastructure of skeletal muscle

6.2. Chemistry of muscle contraction

BOOKS RECOMMENDED

1. Ganong: Review of Medical Physiology (22nd ed. 2005, Lange Medical)
2. Guyton and Hall: A text book of Medical Physiology (11th ed. 2006, Saunders).
3. Keele & Neil: Samson Wright's Applied Physiology (13th ed. 1989, Oxford)
4. A.K. Jain Physiology Vol. I & II

B.Sc. PART-II, ZOOLOGY HONS.

SEMESTER-III

(PRACTICALS) (14 classes)

Full marks: 50 **Time: 4 Hrs.** **Pass Marks: 23**

Full Marks : 50 Time : 4 Hrs. Pass Marks: 23

1. Major dissection (12)

a) Scoliodon : Afferent and efferent branchial vessels, and Cranial nerves Vth, VIth, IXth and Xth.

b) Frog : cranial and spinal nerves

c) Columba / Fowl : flight muscles and air sacs (demonstration)

d) Rat / squirrel : neck nerves

2. Minor dissection / temporary mounting (8)

Placoid scales &ampullae of Lorenzini of Scoliodon, scales of bony fishes, pectin & down feathers of bird.

3. Identification (16)

a) Histological slides (vertebrates)

b) Museum specimens

c) Bones : vertebra , limb bones and girdles

4. Practical record (8)

5. Viva voce (6)

B.Sc. PART-II, ZOOLOGY HONS.

SEMESTER-IV

PAPER-7: MAMMALIAN ENDOCRINOLOGY

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1.Concept of Endocrinology

1.1. Histology and function of various endocrine glands

1.2 Pituitary

1.3 Thyroid

1.4. Adrenal

1.5 Islets of Langerhans

1.6. Parathyroid

1.7.Thymus and Gonads

2.Endocrine disorders

2.1. Goiter

2.2. Addison disease, Cushing's disease

2.3. Ostioporosis

2.4. Diabetes

BOOKS RECOMMENDED

Endocrinology

1. Hadley: Endocrinology (5 th ed. 2000, Prentice Hall)
2. Turner and Bagnara: General Endocrinology (6th ed. 1984, Saunders)
3. Endocrinology- M. E. Hadley and J. E. Levine (Pearson)
5. Text book of Endocrinology- Gorman & Wilson
6. Essential Endocrinology- Charles, Book and Marshall
7. Endocrinology (Vol. 1, 2, 3)- L. J. Degroot
8. Vertebrate Endocrinology- Norris
9. Endocrinology and Reproductive Biology- K. V. Shastry

B.Sc. PART-II, ZOOLOGY HONS.

SEMESTER-IV

PAPER-8: DEVELOPMENTAL BIOLOGY

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1. Gametogenesis

1.1. Spermatogenesis

1.2. Oogenesis

2. Mechanism of fertilization

3.Types of animal eggs

4. Cleavage, gastrulation and fate map

5. Extra-embryonic membranes in chick

6. Development and function of placenta in mammals

7. Reproductive cycles in mammals and their hormonal regulation

7.1. Estrous

7.2. Menstrual cycle

7.3.Totipotency

7.4Embryonic stem cells

BOOKS RECOMMENDED

Developmental Biology

1. Alberts et al.: Molecular Biology of the Cell,(5 th ed. 2008, Garland)

2. Balinsky: An Introduction to Embryology (1981,CBS)

3. Gilbert: Developmental Biology (8 th ed. 2006, Sinauer)

4. Wolpert: Principles of Development (3rd ed. 2007, Oxford)

B.Sc. PART-II, ZOOLOGY HONS.

SEMESTER-IV

(PRACTICALS)

Full marks: 50 **Time: 4 Hrs.** **Pass Marks: 23**

1. Dissection (12)
   Rat / Squirrel: Reproductive system and endocrine glands.
2. Comment upon adaptation : Serial homology, homology and analogy, Mouth parts of insects, adaptive modifications in the feet and beak of birds (8)
3. Identification of Endocrine slides of : (8x2=16)
   Pituitary , adrenal, thyroid, thymus, testis , ovary, pancreas etc.
4. Practical record (8)
5. Viva voce (6)

B.Sc. PART-III, ZOOLOGY HONS.

SEMESTER-V

PAPER-9: EVOLUTION

Full Marks: 80

Full marks: ~~15~~ 20 (MSE) +~~80~~ 80 (ESE) = 100 Time: 3 Hrs. **Pass 36**

Marks: 34

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of ~~two~~ three marks each (5x~~2~~3=1~~0~~5)

Group-C: Long answer questions. Three questions of ~~ten~~ fifteen marks each (3x1~~0~~5=~~30~~45)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1.Origin of life on earth

2. Theories of organic evolution

2.1. Lamarckism

2.2. Darwinism

2.3. Modern Synthetic theory

3.Hardy Weinberg law

4. Micro and Macroevolution.

5.Concept of Species and Speciation

6. Isolation and mechanism

7. Evolution of man

8. Mimicry

Books Recommended

Evolution

1. Moody: Introduction to Evolution (1978, Kalyani).
2. Savage: Evolution (1963, Holt, Reinhart and Winston)
3. Rastogi: Organic Evolution (1988, Kedarnath & Ramnath)
4. Strickberger: Evolution (2004, Jones & Bartlett)

B.Sc. PART-III, ZOOLOGY HONS.

SEMESTER-V

PAPER-10: ENVIRONMENTAL BIOLOGY

Full Marks: 100

Full marks: 20(MSE) +80(ESE) = 100 **Time: 3 Hrs.** **Pass Marks:** 36

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of ~~two~~ three marks each (5x3=15)

Group-C: Long answer questions. Three questions of ~~ten~~ fifteen marks each (3x15=~~30~~ 45

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1.General concepts

1.1.Aim and scope of ecology

1.2. Concept of ecosystems

1.3. Energy flow in ecosystem

1.4. Food chain and food web

1.5. Principles of adaptation to external factor(Light,Temperature and carbon dioxide)

1.6. Concepts of limiting factor

1.7. Biogeochemical cycle- Water cycle and carbon cycle

2. Populations and communities

2.1. Population characteristics: density, natality, mortality and growth curve

2.2. Intraspecific and interspecific interactions

2.3. Nature, structure and attributes of biological communities

2.4. Succession

3. Pollution

3.1. Sources and impact of environmental pollutants– air, water and soil

3.2 Control strategies of pollution

3.3. Global environmental changes – greenhouse gases and their effects

3.5 Anthropogenic activity & environment.

4. Natural resources

4.1. Soil, water, mineral resources and their conservation

4.2. Biodiversity – benefits, hotspots, threats and conservation

BOOKS RECOMMENDED

1. Cunningham and Cunningham: Environmental Science (2003, McGraw Hill)
2. Odum: Fundamental of Ecology (1971, Saunders)
3. Raven, Berg and Jhonson: Environment (1993, Saunders)
4. Ricklefs: Ecology (1990, Freeman)
5. Sharma: Ecology and Environment (2003, Rastogi)
6. Turk and Turk: Environmental Science (1998, Saunders)

B.Sc. PART-III, ZOOLOGY HONS.

SEMESTER-~~VI~~ V

PAPER-11: GENETICS

Full Marks: 80

Full marks: 20(MSE) +80 (ESE) = 100 **Time: 3 Hrs.** **Pass Marks:** 36

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of ~~two~~ three marks each (5x3=15)

Group-C: Long answer questions. Three questions of ~~ten~~ fifteen marks each (3x15=45

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

1. Elements of heredity and variation

1.1. Mendel inheritance and laws of heredity

1.2. Principles of segregation and independent assortment and their chromosomal basis

2.1. Dominance relationships (complete dominance, incomplete dominance and co-dominance

2.2. Multiple allelism

2.3. Lethal alleles

2.4. Pleiotropy

2.5. Epistasis

3. Linkage

3.1. Linkage and crossing over

4. Sex chromosomes and sex-linkage

4.1. Sex chromosome systems : XX/XO, XX/XY, ZZ/ZW and haploidy/diploidy types

4.2. Sex Linkage

5. Human Genetics

5.1.Mutation and Chromosomal aberration

5.2.Gene mutation (cystic fibrosis)

5.3. Chromosomal and Single Gene Disorders (autosomal and sex)

5.4. Genetic counseling

BOOKS RECOMMENDED

Genetics

1. Brooker: Genetics : Analysis and Principles (1999, Addison-Wesley,)
2. Gardner et al: Principles of Genetics (1991, John Wiley)
3. Griffith et al: An Introduction to Genetic Analysis (2005, Freeman)
4. Hartl & Jones: Essential Genetics: A Genomic Perspective (2002, Jones & Bartlet)
5. Russell: Genetics (2002, Benjamin Cummings)
6. Snustad & Simmons: Principles of Genetics (2006, John Wiley)
7. Lewin: Genes IX (2008, Jones & Bartlett)

B.Sc. PART-III, ZOOLOGY HONS

SEMESTER-V

Paper -12 (Practicals) (12 classes)

Full marks: 100 **Time: 6 Hrs.** **Pass Marks:45**

1. Environmental Biology: (24)
   a) Determination of Oxygen in a water sample (Wrinkler's Method).
   b) Determination of pH of a water or soil sample using a pH meter/ pH paper
   c) Qualitative analysis of plankton.
2. Haematology (16)
   a) Determination of blood groups.
   b) Measurement of ESR, Haemoglobin, RBC, WBC, clotting and bleeding time.
   c) Preparation of blood film & identification of blood cells
3. Identification (32)
4. Plankton net, sechi disk, plankton counter, quadrat, Haemometer, Haemocytometer, pH meter,
5. Practical record (16)
6. Viva (12)

B.Sc. PART-III, ZOOLOGY HONS.

SEMESTER-VI

PAPER-13: MICROBIOLOGY

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall bc compulsory

1. Introduction

2. Microbial diversity

2.1. Viruses

2.2. Archaea

2.3. Bacteria

3. Host-parasite relationship

3.1. Beneficial and harmful interactions of microbes with human

3.2. Virulance factors and toxins

4. Applied microbiology

4.1. Useful microbial products: antibiotics, aminoacids, bioinsecticides and biopolymers

4.2. Biodegradation

BOOKS RECOMMENDED

1. Madigan and Martinko: Brock Biology of Microorganisms (2006, Prentice Hall)

2. Prescott, Harley and Klein: Microbiology (1999, McGraw)

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SEMESTER-VI

PAPER-14: BIOSTATISTICS & ANIMAL BEHAVIOR

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory. Answer at least one question from each section.

Section-A

1. **Nature and scope of Statistics in biological science:**

1.1 Measurement scales, primary and secondary data, Methods of Collection of primary data, methods of data representation, text, tabular, diagrammatic and graphical representation.

2. **Measures of central tendency and their properties**

3.1 Mean

3.2. Median

3.3. Mode

3. **Standard Deviation**

Section-B

4. 1.Concepts and patterns of behaviour
5. 2. Instinct and learning
6. 3. Innate behaviour
7. 4. Learned behaviour and types of learning

8. 5. Social Organization of Honey Bee

BOOKS RECOMMENDED

1. Biostatistics: Principles and Practice – B.Antonisamy, S. Christopher, and P. P. Samuel (Tata MaGraw-Hill Edition)
2. Biostatistics by Khan and Khanam, McGraw Hill
3. Biostatistics by Mishra & Mishra

Animal Behaviour

1. Drickamer & Vessey : Animal Behaviour – concepts, processes and methods (2 nd ed. 1986, Wadsworth,)
2. Freeland: Problems in Practical Advanced Level Biology (1985, Hodder & Stoughton,)
3. Goodenough et al.: Perspectives on Animal Behaviour (1993, Wiley)
4. Grier: Biology of Animal Behaviour (1984, Mosby)
5. Lorenz: The Foundation of Ethology (1981, Springer)
6. Manning & Dawkins: An Introduction to Animal Behaviour (5th ed. 1998, Cambridge).
7. Mcfarland : Animal Behaviour, Psychology, Ethology and Evolution (1985, Pitman).
8. Slater: An Introduction to Ethology (1985, Cambridge).

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SEMESTER-VI

PAPER-15: ELECTIVE PAPER

Full Marks: 60

Full marks: 15 (MSE) + 60 (ESE) = 75 **Time: 3 Hrs.** **Pass Marks: 34**

Total Classes: 26

Instruction to Paper Setter & Examinee

Paper setter shall set questions in three groups:

Group-A: Shall contain multiple choice questions; fill in the blanks and true/false type questions (20 x 1=20)

Group-B: Shall contain concept based questions. Five questions of two marks each (5x2=10)

Group-C: Long answer questions. Three questions of ten marks each (3x10=30)

Altogether 5 questions have to be answered, where Group A and B shall be compulsory

(A) BIOTECHNOLOGY

1. Basic concepts in Genetic Engineering/Recombinant DNA Technology

2. Enzymes involved in RDT

2.1. Restriction Enzymes

2.2. DNA Ligase

3. Cloning vehicles:

3.1. Plasmid vectors (pBR322 & pUC)

3.2. Lambda Phage vectors

4. Basic concept of Gene Library

4.1. Genomic Library

4.2. C-DNA Library

5. **Selection of Recombinant clones**
6. **Application of RDT**

BOOKS RECOMMENDED

1. Gene cloning by T.A.Brown
2. Introduction to Biotechnology- W. J. thieman and M.A. Palladino. (Pearson)
3. Biotechnology by Glick & Pasternak

(B) BIOTECHNIQUES

1. Principles and uses of analytical instruments

1.1. pH meter

1.2. UV-visible spectrophotometer

1.3. Centrifuges (clinical, high-speed and ultra-centrifuge)

2. Microtomy and Microscopy

2.1. Tissue preparation

2.1.1. Fixation

2.1.2. Block preparation

2.1.3. Microtomy (paraffin and frozen tissue sectioning)

2.2. Types of Microscopes

2.2.1. Bright field

2.2.2. Dark-field

2.2.3. Phase contrast

2.2.4. Fluorescence

2.2.5. Confocal

2.2.6. Scanning and transmission electron microscopes

3. Cell and tissue culture techniques

3.1. Culture media

3.2. Sterilization : room, media and glasswares

3.3. Types of animal cell culture

3.4. Cryopreservation

4. Separation techniques

4.1. Chromatography

4.2. Electrophoresis

BOOKS RECOMMENDED

1. Boyer: Modern Experimental Biochemistry (1993, Benjamin-Cummings,)
2. Pearse: Histochemistry - Theoretical and applied, Volume I-III (1980-1993, Churchill-
1. Livingstones)
2. Plummer: An Introduction to Practical Biochemistry (1989, McGraw Hill)
3. Wilson & Walker: Experimental Biochemistry (2006, Cambridge)
4. Molecular and cell biology – W.D. Stansfield, J. S. colome and R. J. Cano. (Tata
5. MaGraw-Hill Edition)
3. Bioinformatics - (Tata MaGraw-Hill Edition)
4. Introduction to Biotechnology- W. J. thieman and M.A. Palladino. (Pearson)
5. Molecular Biology of the gene – J. D. Watson et al. (Pearson)
6. Advanced Molecular Biology- Twyman
7. Genes IX – B. Lewin
8. Molecular Biology and Biotechnology- R. A. Meyers

© APPLIED ZOOLOGY

1. Aquaculture :

1.1.Resource in India,

1.2.Induced breeding and seed production of carps,

1.3.Polyculture of fin fish and exotic fish (Methods, problem and precautions),

2. Sericulture :

2.1.Types of silk, species of silk moth (scientific names),

2.2.Silkworms and their host plants, mulberry silk worm culture,

2.3.Extraction and reeling of silk,

2.4.Natural enemies and diseases of silkworm and their control.

3.. Apiculture :

3.1. Agriculture technique, bee products and their uses,

3.2. Natural enemies and diseases of honey bee and their control,

4.. Lac culture:

4.1. Lac insect (Scientific name), composition of lac, strains of lac insect,

4.2. Cultivation of lac host plants (in brief) processing of lac and uses of lac

5.. Animal husbandry :

5.1 Common dairy breeds (cow), techniques of dairy management (in brief),

6. Poultry breeds (fowl):

6.1. Types of breeds, rearing methods,

6.2 Diseases – types pathogens, symptoms, and control measures

BOOKS RECOMMENDED

1. Pest Control- H. F. Vasn Emden

2. Applied Entomology- P. G. Fenemore, A Prakash

3. Freshwater Aquaculture- Santhanam et al.

4. Aquaculture- T. V. R. Pilley

5. Animal Husbendary- G. C. Banerjee

6. Sericulture & Silk Industry- D. C. Sarkar

7. Lac Culture- N. Ghorai

8. Bee keeping in India- ICAR

9. Economic Zoology- Shukla Upadhyay

10.Livestock & Poultry Production- Singh and Moore

11.Insect Pest of crop- S. Pradhan

(d) MEDICAL ZOOLOGY

1. Brief introduction to Pathogenic microbes

1.1. Viruses

1.2. Rickettesia

1.3. Spirochaetes

1.4. Bacteria

2. Brief account of life history and pathogenecity of:

2.1 Entamoeba

2.2. Leishmania

2.3. Plasmodium

2.4. Schistosoma

2.5. Wuchereria

3. Brief account of Arthropod directed diseases and discomfort:

3.1. Entomophobia

3.2. Dermatosis

3.3Mylasis

3.4 Allergy

3.5 Venom

4. Histopathological changes in organs in relation to diseases such as:

4.1. Liver Cirrhosis

4.2. Nephrosis

4.3. Tumor

4.4. Cancer

5. Epidemic diseases, their occurrence and eradication:

5.1. Typhoid

5.2. Cholera

6. Elementary idea of drug therapy and drug resistance

BOOKS RECOMMENDED

1. K.D.Chatterjee- Medical Parasitology
2. Cheng, T.C. General Parasitology
3. Kettle, D.S. Medical Veterinary Entomolgy

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SEMESTER-VI

Paper-16 (Practical) (10 classes)

Full Marks : 100 Time : 6 Hrs. Pass Marks: 45

1. Slide preparation of chick embryo of different hours---- Marks (24)
2. Projects :---------- -(16)

a) Field work to understand basic Ecological Principles.

b) Analysis of producers and consumers in a field community.

c) Estimation of productivity in a pond ecosystem.

d) Estimation of population density using the quadrant method.

e) Construction of a familial pedigree for a particular trait with the help of a questionnaire.

f) Observation of Drosophila (wild and mutants).

g) Observation of live gametes under microscope.

h) Observation of development of the fertilized egg of frog.

i) Preparation of a program for use in biological informatics.

3. Identification :----------

-(32)

a) Frog embryology----------

(6x2=12)

Fertilized egg, morula stage, blastula stage, gastrula stage & tadpole stage.

b) Chick embryology:---------- -(6x2=12)

Different hours stages.

c) Study of various equipments related to the above course :---------- -(4x2=8)

Incubator, pH meter, water bath, chromatograph, dark and light bottles, plankton net, counting cell.

4. Practical record---------- (16)
5. Viva---------- (12)