No. 5-38/2005 (PLS) – HPU (Acad.)
Himachal Pradesh University
"Academic Branch"

Date: Shimla-5, the 20th December, 2005.

To

1. All the Principals of the college affiliated to/maintained by H.P. University (RUNNING B.Sc COURSES IN COLLEGES)

2. The Dean, faculty of Life Science, H.P. University, Shimla-5.

3. The Chairman, Deptt of Bio-Sciences, (Convenor EOS UG) H.P. University, Shimla-5.

4. The Controller of Examination H.P. University, Shimla-5. With 2 spare copies.

5. The DR/AR (Exam) H.P. University, Shimla-5 With 2 spare copies.

6. The DR/AR(Evaluation/Re-Evaluation) H.P. University, Shimla-5

7. The AR(Conduct) H.P. University, Shimla-5 With 2 spare copies.

8. The AR (Secy) H.P. University, Shimla-5, With 5 spare copies.

9. The Librarian, Main University Library ICDEOL Library, H.P. University, Shimla-5, With 2 spare copies.

10. The Section Officers (B.Sc-I, II and III) Examination Branch, With 2 spare copies to each of them.

11. The Incharge, Inquiry Section, H.P. University, Shimla-5, With 2 spare copies.

Sir/Madam

It has been pointed out by some of the Principals that section 'C8' and 'P' of B.Sc IIInd year Zoology, paper V (Chordata-II) were printed in continuation of syllabus of B.Sc III year, paper VII (Bio-Chemistry) after section 'B'. The matter has been examined in consultation with the Chairman Deptt of Bio-Science.
Who is also Chairman, of Board of Studies (UG) in Zoology and accordingly corrected/certified copy of syllabus being enclosed for further necessary action and record. This has the approval of the Hon'ble Vice-Chancellor.

Yours faithfully,

[Signature]

P&DO/Incharge (Acad.)
H.P. University, Shimla-5.

[Signature]

P&DO/Incharge (Acad.)
H.P. University, Shimla-5.
B.Sc Part-I (Zoology)

Paper-I
(Invertebrates-I)

Time-3 hours

Max. marks-50.

Note:- Total nine questions to be set. Five questions to be attempted. All questions carry equal marks.

1st question is compulsory having 10 parts of objective/short answer type questions of 1 mark each, covering whole syllabus.

Eight questions to be set, four each from section-A and B. Each question preferably having 2-3 parts. Students will attempt two questions from each section.

(Section-A)

1 Introduction to Non-Chordata—General Characters and comparison with chordates.

2 Protozoa—Study of Amoeba, Euglena, Plasmodium and Paramecium w.r.t.

Locomotion, nutrition and reproduction.

Parasitic protozoans of man w.r.t diagnostic characters, mode of infection

diseases caused. (Entamoeba, Giardia, Trypanosoma and Leishmania).

—Classification of phylum into classes.

—Origin of Metazoa.

Porifera—Study of Sycon w.r.t. structure, reproduction and development.

—Classification of phylum into classes.

—Canal system and skeleton in Porifera.

(Section-B)

4 Cnidaria—Study of Obelia and Aurelia w.r.t. structure and reproduction.

—Classification of phylum into classes.

—Polymorphism and coral reefs.

5 Ctenophora—Salient features of Ctenophora and comparison with Cnidariana.

B.Sc Part-II

Paper-II
(Invertebrates-II)

Time-3 hours

Max. marks-50.

Note:- Total nine questions to be set. Five questions to be attempted. All questions carry equal marks.

1st question is compulsory having 10 parts of objective/short answer type questions of 1 mark each, covering whole syllabus.

Eight questions to be set, four each from section-A and B. Each question preferably having 2-3 parts. Students will attempt two questions from each section.

(Section-A)

1 Platyhelminthes—Study of Fasciola and Taenia w.r.t. structure, reproduction, life cycle and parasitic adaptations.
3. **Nematoda**
   - Study of Ascaris w.r.t. structure, reproduction and life cycle.
   - Classification of phylum upto classes.
   - Parasitic nematodes of man w.r.t. diagnostic characters, mode of infection and diseases caused. (Ankylostoma, Enterobius and Wuchereria).
   - (Brief account of Plant nematodes).

   **(Section – B)**

3. **Annelida** – Study of Naresis, Pherephima and Hirudinaria w.r.t. structure and reproduction.
   - Classification of phylum upto classes.
   - Coelom and excretory system.
   - Metamerism and its significance.
   - Trophiophore larva and its significance.
   - Filter feeding in Polychaetes.
   - Blood vascular system and its evolution.
   - Wormculture.

**B.Sc Part-I**

**Paper-III**

*(Invertebrates-III)*

Time-3 hours

Max. marks-50.

Note: Total nine questions to be set. Five questions to be attempted. All questions carry equal marks.

1st question is compulsory having 10 parts of objective/short answer type questions of 1 mark each, covering whole syllabus.

Eight questions to be set, four each from section-A and B. Each question preferably having 2-3 parts. Students will attempt two questions from each section.

**(Section-A)**

1. **Arthropoda** – Study of prawn, cockroach and scorpion w.r.t. structure and reproduction.
   - Classification of phylum upto classes.
   - Comparative account of respiration in Arthropods.
   - Crustacean Larvae. Mouth parts in insects.
   - Social life in insects.
   - Economic importance of insects.
   - Zoological importance of Perna and Limulus.

**(Section – B)**

2. **Mollusca** – Study of Pila and Unio w.r.t. structure and reproduction.
   - Classification of phylum upto classes.
   - Torsion and detorsion in Gastropoda.
   - Foot in Mollusca.
   - Pearl formation.
3. Echinodermata: Study of starfish (Asterias) w.r.t. structure, locomotion, mode of feeding and reproduction.
   - Classification of phylum into classes.
   - Water vascular system in starfish.
   - Echinoderm larvae and their significance with emphasis on Diplocrura.
   - Phylogenetic position of Echinodermata.

**B.Sc Part-II**  
**Paper-IV**  
**(Chordata-I)**

**Time-3 hours**  
**Max. marks-50.**

**Note:**  
1. Total nine questions to be set. Five questions to be attempted. All questions carry equal marks.
2. 1st question is compulsory having 10 parts of objective/short answer type questions of 1 mark each, covering whole syllabus.
3. Two questions to be set from each section. Each question preferably having 2-3 parts. Students will attempt one question from each section.

**Section-A**
- Origin of Chordates.
- General characters and classification of chordates up to orders.

**Section-B**
- Detailed study of following animals:
  - Balanoglossus, Herdmanin and Amphioxus.

**Section-C**
- Detailed study of following animals:
  - Petromyzon, Scophodon and Frog.

**Section-D**
- Detailed study of following animals:
  - Uromastix, Pigeon and Rat.

**B.Sc Part-II**  
**Paper-V**  
**(Chordata-II)**

**Time-3 hours**  
**Max. marks-50.**

**Note:**  
1. Total nine questions to be set. Five questions to be attempted. All questions carry equal marks.
2. 1st question is compulsory having 10 parts of objective/short answer type questions of 1 mark each, covering whole syllabus.
3. Two questions to be set from each section, each question preferably having 2-3 parts. Students will attempt one question from each section.
(Section-A)

Functional Anatomy of following systems in Chordates:

1. Integumentary system – Structure, functions and development of its derivatives.

2. Skeletal system – Types of skull, vertebral column, visceral arches, jaw suspension in vertebrates.

3. Digestive system –
   --Alimentary canal and its associated glands.
   --Dentition in vertebrates.
   --Structure of stomach in cattle.

(Section-B)

Functional Anatomy of following systems in Chordates:

4. Circulatory system –
   --Evolution of heart and aortic arches.
   --Lymphatic system.

5. Respiratory system –
   --Respiratory organs and their evolution.
   --Accessory respiratory organs.


(Section-C)

Functional Anatomy of following systems in Chordates:

7. Nervous system –
   --Evolution of cerebral hemispheres and cerebellum.
   --Major parts of brain in different vertebrate classes, functional basis of their development.
   --The different cell types constituting brain parts – neuron, neuroglia, neurosecretory and axons, white and grey matter, ganglia formation.

8. Sense organs – Structure and function of–
   --Olfactory organs.
   --Ear.
   --Eye.
   --Pressure receptors.

(Section-D)

B.Sc Part-II
General Zoology
Paper-VI

Time-3 hours Max. marks-50.

Note:- Total ten questions to be set. Five questions to be attempted. All questions carry equal marks.

1st question is compulsory having 10 parts of objective/short answer type questions of 1 mark each, covering whole syllabus.

Three questions to be set from each section. Each question preferably having 2-3 parts. Students will attempt at least one question from each section.

(Section-A)
Cell Biology

1. Cell theory, diversity of cell size and shape.
2. Structure of Prokaryotic cells.
3. Cell adhesion and cell junctions.
4. Ultrastructure of a typical animal cell with structure and functions of cell organelles.
5. Cellular energy transactions - role of mitochondria.

(Section-B)
Developmental Biology


(Section-C)
Evolution

1. A brief account of Zoo-geographical regions.
2. Fossil types and their formation.
3. Types of evolution - parallel, convergent and divergent.
4. Sources and nature of variations.
5. Natural selection.
6. Isolatory mechanisms and their role in evolution.
B.Sc. Part-III
Paper-VII
(Biochemistry)

Time: 3 hours  Max. marks: 50.

Note: Total nine questions to be set. Five questions to be attempted. All questions carry equal marks.

1. 1st question is compulsory having 10 parts of objective/short answer type questions of 1 mark each, covering whole syllabus.

EIGHT QUESTIONS TO BE SET, FOUR EACH FROM SECTION A AND B. EACH QUESTION PREFERABLY HAVING 2-3 PARTS. STUDENTS WILL ATTEMPT TWO QUESTIONS FROM EACH SECTION.

SECTION A

1. Elementary idea of analytical and separation techniques: ultracentrifugation, electrophoresis and chromatography.

2. Chemical nature of protoplasm, chemistry of carbohydrates, proteins, lipids and nucleic acids.

3. Enzymes and coenzymes – Definition, nature, function, specificity and classification of enzymes. Enzymes action.


SECTION B

5. High energy compounds – Phosphagens, phosphate bonding, formation of ATP, energy release oxidation mechanism.

6. Intermediary Metabolism

(i) Carbohydrates – Glycogen synthesis, Glycogenolysis and Gluconeogenesis.

1. Glycolysis [The Embden – Meyerhof’s Pathway].

2. Hexose monophosphate pathway [Shunt].

3. Tricarboxylic acid cycle.

4. Role of dicarboxylic acid shuttle.

(ii) Lipids

1. β-oxidation of fatty acids.

2. Fate of glycerol.

3. Ketosis, Ketone bodies.

(iii) Proteins

1. Amino acids, peptide linkage.

2. Deamination, transamination.

3. Ornithine cycle.

4. Inter-relationship of metabolic pathways.
B.Sc Part-III (General)

Paper-VIII

(Mammalian Physiology)

Time-3 hours

Max. marks-50.

Note:- Total nine questions to be set. Five questions to be attempted. All questions carry equal marks.
1st question is compulsory having 10 parts of objective/short answer type questions of 1 mark each, covering whole syllabus.
Eight questions to be set, four each from section-A and B. Each question preferably having 2-3 parts. Students will attempt two questions from each section.

(Section-A)

1 Nutrition, digestion and absorption:
   -- Nutritional requirements, composition, function and regulation of salivary, gastric, pancreatic, hepatic and intestinal juices.
   -- Mechanism of absorption.
2 Blood:
   -- Composition and function of blood and lymph.
   -- Haemopoesis.
   -- Blood group, RH factor.
   -- Blood coagulation.
   -- Structure and function of haemoglobin.
3 Heart:- Structure, origin and conduction of heart-beat, the pacemaker system, cardiac cycle, blood pressure, capillary pressure, electrocardiogram an elementary idea.
4 Respiration:- Mechanism and control of breathing, transport of \( \text{O}_2 \) and \( \text{CO}_2 \).
   -- Oxygen dissociation curves of haemoglobin and myoglobin.
   -- Bohr’s effect, chloride shift.

(Section-B)

5 Excretion:- Nitrogenous wastes[Ammonotelism, ureotelism, uricotelism], urine formation, water balance.
6 Muscles:- Types of muscles[striated, non-striated, cardiac], structure of skeletal muscle cell, myofibrillar proteins, mechanical basis of muscle contraction, energy relation[energy sources, heat dissipation and work. Muscle fatigue.
7 Nervous system:- Structure of neuron, nature, origin and propagation of nerve impulse, synaptic functions, myoneural junctions.
8 Endocrines:- Detailed structure of pituitary glands, nature and functions of pituitary hormones, feedback relationship with other endocrines.
9 Reproduction:- Gonadal hormones, oestrous cycle, corpus luteum, parturition, lactation.
Medical Zoology:- Brief account of Arthropods as direct agents of disease or discomfort. Arthropods as vectors of human diseases.
-- Malaria, Filaria, and Plague.
-- Brief account of diseases caused by:-
  (i) Pathogenic Protozoa - Entamoeba, Trypanosoma, Leishmania, Giardia, Trichomonas, and Plasmodium.
  (ii) Pathogenic Helminthes - Fasciolopsis, Schistosoma, Echinococcus, Ancistrostoma, Trichinella, Wuchereria, Dracunculus, and Oxyuris.
-- Epidemic diseases such as typhoid, cholera, and smallpox, their occurrence and eradication programmes.
-- Brief introduction to human defence mechanisms. Antigens and antibodies, lymphoid tissue, Allergies and AIDS.

Genetics - Cloning and genetic engineering.
Environmental Biology - Concept of ecosystem and introduction to laws of limiting factors, Energy flow in ecosystem, Food chain, Environmental pollution and green house effect.
-- Definition of Toxicity, classification of Toxicants, toxic agents and their modes of action.
-- Brief account of Apiculture, Sericulture, Lac-culture and Pisciculture.
-- Important wild life sanctuaries, national parks and reserves.