

North Maharashtra University, Jalgaon

Syllabus (With Effect from June, 2013)

S.Y.B.Sc. (Zoology) Paper I – Semester I

Non-chordates – II (ZOO-231)

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| Total Marks-60 | Total Period -60 |
|--|-------------------|
| Leech- As an animal type <i>Hirudinaria granulose</i> | |
| Unit-1 | |
| 1.1 Systematic position, Habitat and Habits | P -06 M-04 |
| 1.2 External Characters – | |
| 1.2.1 Shape, Size and Colouration | |
| 1.2.2 Segmentation and Suckers | |
| 1.2.3 Body regions or division | |
| 1.3 Locomotion – Crawling and Swimming | |
| Unit -2 Digestive system | P -10 M-09 |
| 2.1 Alimentary canal and digestive glands | |
| 2.2 Food, feeding and digestion | |
| Unit -3 Haemocoelomic System | P -10 M-07 |
| 3.1 Haemocoelomic fluid | |
| 3.2 Haemocoelomic channels | |
| 3.3 Capillary system | |
| 3.4 Course of circulation | |
| Unit -4 Excretory System | P -06 M-04 |
| 4.1 Testicular nephridia and their types | |
| 4.2 Pre- testicular nephridia | |
| 4.3 Physiology of excretion | |
| Unit -5 Nervous System | P -07 M-07 |
| 5.1 Central nervous system | |
| 5.2 Peripheral nervous system | |
| 5.3 Autonomous nervous system | |
| 5.4 Sense Organs –Free nerve endings, Annular receptors, Segmental receptors and Eyes | |
| Unit -6 Reproductive System | P -06 M-05 |
| 6.1 Male reproductive System | |
| 6.2 Female reproductive system | |
| 6.3 Copulation and Fertilization | |
| 6.4 Cocoon formation and development | |
| Unit -7 Economic importance | P -03 M-04 |
| 7.1 As a Food, Predator, Pest, Transmitter of diseases, Surgical agent etc. | |
| Unit -8 General Topics | P-12 M-16 |
| 8.1 Useful insects-Lac insects, honey bees, silkworms, butterflies (as pollinators), Cantheradin beetles | |
| 8.2 Polymorphism in Siphonophora | |
| 8.3 Shells in Molluscs | |
| 8.4 Larval forms in Echinodermata | |

Reference Books

1. Annelida by R.L.Kotpal, Rastogi Publication.
2. Invertebrate Zoology by E.L.Jorden, S.C.Chand, New Delhi.
3. The invertebrates Hymen L. H. MacGraw Hill.
4. Life of Invertebrates- S.N. Prasad.
5. A Text book of Zoology – R.D.Vidyarthi.
6. Invertebrate Zoology -Dhami and Dhami.
7. The Invertebrates -Barnes R. O., W. B. Saunders & Co.
8. Modern Textbook of Zoology- R.L. Kotpal, Rastogi Publication Meerut. Tenth Edition.
9. Invertebrate Zoology Practical- K. Pande and J.P. Shukla.
10. Invertebrate Zoology Practical- S. M. Lall.
11. A Textbook of Zoology: Invertebrates Vol I, Marshall and William CBS Publishers, New Delhi.

Practical corresponding to Non-Chordates:-

To Study of following with the help of charts/ models/ simulations etc

1. Systematic position and External characters of Leech (*Hirudinaria granulosa*)
2. Digestive system of Leech
3. Male and female reproductive system of Leech
4. Nervous system of Leech.
5. Permanent slides of -Jaws, botryoidal tissue, salivary glands, testicular nephridia of Leech
6. Collection, identification and submission of various types of Molluscan shells
7. Study of Larval forms of Echinoderms
8. Study of useful insects- Pictorial submission of useful insects
9. Field visit to sea shore/ water body

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Syllabus (With Effect from June, 2013)

S.Y.B.Sc. (Zoology) Paper II – Semester I

Mammalian Histology (ZOO-232)

| | | |
|--|-------------|-------------|
| Unit-1 Introduction | P-02 | M-02 |
| 1.1 Definition and history | | |
| 1.2 Techniques of histological study | | |
| 1.3 Application of histology in forensic science | | |
| Unit-2 The tissues | P-17 | M-17 |
| 2.1 Types of tissues | | |
| 2.1.1 Epithelial tissues- structure and function | | |
| a. Simple epithelial- Squamous, cuboidal, columnar and pseudostratified | | |
| b. Compound epithelial- Stratified squamous (keratinizing and non-keratinizing), stratified cuboidal, stratified columnar and transitional | | |
| 2.1.2 Connective tissue- structure and functions. | | |
| a. Connective tissue proper- | | |
| i) Connective tissue cells | | |
| ii) Fibrous connective tissue and ground substances | | |
| iii) Areolar (Loose) connective tissue | | |
| iv) Adipose connective tissue and | | |
| v) Dense connective tissue- Tendon and ligaments | | |
| b. Skeletal connective tissue- | | |
| 1. Cartilage- Hyaline cartilage | | |
| 2. Bone- microscopic structure and bone marrow | | |
| 2.1.3 Muscular tissue- structure and function. | | |
| a. Voluntary muscle- Striated muscle fibre | | |
| b. Involuntary muscles- | | |
| i) Smooth and | | |
| ii) Cardiac muscle fibre | | |
| 2.1.4 Nervous tissue - structure and functions | | |
| a) Structure of nerve cell (neuron) | | |
| b) Types of neurons- uni, bi and multipolar | | |
| c) Medullated and non-medullated nerve fibres | | |
| Unit-3 Histology of Skin | P-03 | M-03 |
| 3.1 Structure and functions of skin | | |
| 3.2 Epidermal derivatives- sweat and sebaceous glands | | |
| Unit-4 Histology of tooth and tongue | P-04 | M-04 |
| 4.1 Histological structure of tooth | | |
| 4.2 Tongue- | | |
| a) Histological structure | | |
| b) Types and functions of papillae | | |
| c) Taste bud- Structure and function | | |
| Unit-5 Histology of alimentary canal and digestive glands | P-12 | M-12 |
| 5.1 Basic histological plan of alimentary canal | | |
| 5.2 Histological structure of oesophagus | | |
| 5.3 Histological structure of stomach | | |
| 5.4 Histological structure of duodenum | | |

| | | |
|--|-------------|-------------|
| 5.5 Histological structure of ileum | | |
| 5.6 Histological structure of rectum | | |
| 5.7 Histological structure of salivary gland (Parotid only) | | |
| 5.8 Histological structure of liver | | |
| 5.9 Histological structure of pancreas- exocrine and endocrine | | |
| Unit-6 Histology of respiratory organs | P-03 | M-04 |
| 6.1 Histology of trachea | | |
| 6.2 Histology of lung | | |
| Unit-7 Histology of blood and blood vessels | P-05 | M-05 |
| 7.1 Blood- composition of blood | | |
| 7.2 Histological structure of artery, vein and capillary | | |
| Unit-8 Histology of excretory system | P-02 | M-03 |
| 8.1 Histology of kidney- | | |
| i) Gross structure of kidney | | |
| ii) Microscopic structure of uriniferous tubule. | | |
| Unit-9 Histology of reproductive system | P-06 | M-06 |
| 9.1 Histology of testis- | | |
| i) Microscopic structure of seminiferous tubules and | | |
| ii) Structure of sperm | | |
| 9.2 Histology of ovary- | | |
| i) Microscopic structure of ovary | | |
| ii) Graafian follicle | | |
| Unit-10 Histology of endocrine glands | P-06 | M-04 |
| 10.1 Structure of thyroid gland | | |
| 10.2 Structure of adrenal gland | | |
| 10.3 Pituitary gland- | | |
| i) Gross structure- sagittal section, | | |
| ii) Hormones of adenohipophysis and neurohipophysis | | |

Total: P = 60, M= 60.

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Reference books

1. Histology by Arthur W. Ham.
2. Histology by Roy O. Greep.
3. An Advance Atlas of Histology by W. H. Freeman.
4. A text book of Histology by William F. Windley.
5. Histology and Genetics by Muzammil Ullah.

Practical corresponding to Mammalian Histology

- P-1. Study of following tissues with help of charts/ models/ permanent slides/ simulations (D)
- Squamous epithelial tissue
 - Cuboidal epithelial tissue
 - Columnar epithelial tissue
 - Ciliated epithelial tissue
 - Areolar connective tissue
 - Blood smear- permanent slide
- P-2. Temporary preparation of following tissues from preserved Rat (E)
- Striated muscle fibre
 - Smooth muscle fibre
 - Medullated nerve fibres
 - Hyaline cartilage.
- P-3. Study of histological permanent slide of mammalian skin
- P-4. Study of following histological permanent slides of buccal organs
- V. S. of tooth
 - V. S. of tongue
 - C. S. of salivary gland (Parotid gland)
- P-5. Study of following histological permanent slides of digestive organs
- T. S. of oesophagus
 - T. S. of stomach
 - T. S. of duodenum
 - T. S. of ileum
 - T. S. of rectum
 - T. S. of pancreas
 - C. S. of liver
- P-6. Study of following histological permanent slides of respiratory organs
- C. S. of trachea
 - C. S. of lung
- P-7. Study of following histological permanent slides of blood vessels
- T. S. of artery
 - T. S. of vein
 - T. S. of capillary
- P-8. Study of following histological permanent slides of excretory and reproductive organs
- L. S. of kidney
 - T. S. of testis
 - L. S. of ovary
- P-9. Study of following histological permanent slides of endocrine glands
- S. S. of pituitary gland
 - T. S. of adrenal gland
 - C. S. of thyroid gland
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Syllabus (With Effect from June, 2013)

S.Y.B.Sc. (Zoology) Paper I – Semester II

Chordates – II (ZOO-241)

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I: RAT – As an animal type – *Rattus rattus*

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|---------------|--|-------------|-------------|
| Unit 1 | Systematic position, Habitat and habits External characters and Sexual dimorphism | P-03 | M-03 |
| Unit 2 | Digestive System 2.1 Alimentary Canal 2.2 Dentition and Dental formula 2.3 Digestive Glands 2.4 Food, feeding and Digestion | P-10 | M-08 |
| Unit 3 | Respiratory System 3.1 Nasal Cavity, Larynx, Trachea, Lungs and Diaphragm 3.2 Mechanism of respiration- Inspiration and expiration | P-04 | M-04 |
| Unit 4 | Circulatory System 4.1 Heart: Structure 4.2 Arterial System 4.3 Venous System 4.4 Mechanism of Circulation | P-12 | M-10 |
| Unit 5 | Excretory System | P-04 | M-04 |
| Unit 6 | Reproductive system 6.1 Male Urinogenital System 6.2 Female Reproductive System | P-07 | M-08 |
| Unit 7 | Nervous System and Sense Organs 7.1 Central nervous system (Brain: Dorsal and Ventral view, Ventricles, Spinal Cord) 7.2 Autonomous nervous system (In brief). Cranial Nerves- Names and Function 7.3 Peripheral nervous system (In brief). 7.4 Sense Organs -Eye, Ear, Tongue, Skin, Nostril (in brief). | P-08 | M-08 |

II: General Topics

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|---------------|--|-------------|-------------|
| Unit 8 | General Topics 8.1 Scales and Fins of Fishes 8.2 Parental Care in Amphibia 8.3 Identification of poisonous and non-poisonous snakes with respect to external characters 8.4 Egg laying mammals | P-12 | M-15 |
|---------------|--|-------------|-------------|

Total Periods-60, Marks-60

Practical- Chordates II

To study the following with help of charts/ models/ diagrams/ specimens etc.

- 1) External characters and sexual dimorphism of Rat (D)
- 2) Digestive System of Rat (D)
- 3) Respiratory System of Rat (D)
- 4) Arterial System and Venous System of Rat (D)
- 5) Male Urinogenital System and Female Reproductive System (D)
- 6) Brain of Rat – Dorsal and Ventral Views (D)
- 7) Temporary mounting of Scales of Fish (Any 3) (E)
- 8) Identification of poisonous and non-poisonous snakes with respect to external characters (D)
- 9) Study of egg laying mammals (D)
- 10) Study of parental care in amphibian (D)
- 11) Study of fins (D)

Reference books

1. Text book of Zoology – Vertebrate- Vol-II. Marshall and Williams, CBS Publishers, New Delhi.
2. Life of Vertebrates- S. N. Prasad, Vikas Publishing House, New Delhi.
3. Modern Text book of Zoology – R. L. Kotpal. Rastogi publication. Meerat.
4. Text book of Zoology – R. D .Vidarthi.
5. Vertebrate Zoology – Dhami and Dhami.
6. A Text book of Chordate Zoology – R. D. Dhalela, Jayprakash- Meerat.
7. Rat- G. R. Kshirsagar, 1975, Rane Publication, Pune.

North Maharashtra University, Jalgaon
Syllabus (With Effect from June, 2013)
S.Y.BSc (Zoology) Paper II – Semester II
Mammalian Physiology (ZOO-242)

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|--|-------------|-------------|
| 1. Thermoregulation and control | P-04 | M-04 |
| 1.1 Definition | | |
| 1.2 Poikilotherms and homeotherms | | |
| 1.3 Role of hypothalamus in thermoregulation | | |
| 2. Digestion | P-09 | M-10 |
| 2.1 Definition | | |
| 2.2 Buccal digestion – salivary secretion and digestion | | |
| 2.3 Gastric digestion – gastric secretion and digestion | | |
| 2.4 Intestinal digestion – pancreatic secretion, bile juice and digestion in small intestine | | |
| 2.5 Digestion and absorption in large intestine | | |
| 2.6 Definitions of Ulcer, Constipation, Colitis and Cirrhosis | | |
| 3. Respiration | P-09 | M-08 |
| 3.1 Definition | | |
| 3.2 Ventilation – Inspiration and expiration | | |
| 3.3 Transport of gases, chloride shift and Bohr's effect | | |
| 3.4 Properties and functions of respiratory pigments (Haemoglobin and Myoglobin) | | |
| 3.5 Respiratory quotient and its significance | | |
| 3.6 Definitions of Acidosis, Alkalosis, Asphyxia, Hypoxia, Anoxia and Cyanosis | | |
| 4. Circulation | P-09 | M-08 |
| 4.1 Neurogenic and myogenic heart | | |
| 4.2 Cardiac cycle, Systole, Diastole, Double circulation | | |
| 4.3 Pace maker and its role | | |
| 4.4 Heart beats, chemical and hormonal control | | |

4.5 Definitions of ECG, Blood pressure, Erythropoiesis, Leucopoiesis, Leukaemia, Angina pectoris, Angiography, Angioplasty and Heart attacks

- 5. Excretion** **P-05** **M-08**
- 5.1 Physiology of urine formation: ultra-filtration, selective re-absorption and tubular secretion, counter current multiplier theory,
- 5.2 Composition of normal urine
- 5.3 Kidney failure, Artificial kidney, Gout, Nephritis
- 6. Nerve Physiology** **P-05** **M-05**
- 6.1 Neurotransmitters and Synapse
- 6.2 Origin and conduction of nerve impulses
- 6.3 Definitions of - C.T. Scan, EEG and Epilepsy
- 7. Muscle Physiology** **P-05** **M-05**
- 7.1 Simple muscle twitch, summation, tetanus and muscle fatigue
- 7.2 Rigour mortis
- 7.3 Neuromuscular junction
- 8. Reproduction** **P-09** **M-08**
- 8.1 Role of sex hormones in reproduction
- 8.2 Reproductive cycle – oestrous and menstrual cycle
- 8.3 Definitions of Puberty, Ovulation, Menarche, Pregnancy, Parturition, Lactation and Menopause
- 9. Endocrine glands** **P-05** **M-04**
- 9.1 Endocrine glands- their hormonal secretion and functions
(Pituitary gland, Thyroid gland, Adrenal gland and Pancreas)
- 9.2 Feedback mechanism- positive and negative

Total Periods-60, Marks-60

Reference Books

1. General and Comparative Physiology- W.S. Hoar.
2. Comparative Animal Physiology- C. L. Prosser & Brown.
3. Animal physiology-Nagabhushnum R., Sarojini R., Kodarkar.
4. A text book of General Physiology- P. H. Mistehell.
5. Introduction to Physiology- Davson (I&II).
6. Animal Physiology-Verma, Agarwal & Tyagi.
7. Animal physiology-Mohan Arora.
8. Animal Physiology- A. K. Berry.
9. A text book of Animal Physiology- K.A. Goel and K.V. Shastri.
10. A text book of Practical Physiology- V.G.Ranade.
11. Experimental Physiology- S.C. Rastogi.
12. Physiology-Guyton and Hall.
13. Text book of Practical Physiology- G. K. Pal and Pravati Pal.
14. Anatomy and physiology- A.T. Gary and K.T. Patton.
15. Endocrinology: Hormones and Human Health by Dr Prakash S. Lohar, MJP Publishers, Chennai.

Practicals corresponding to ZOO 222

Major experiments

1. Study of digestion of starch by salivary amylase
2. To determine R.Q. of any suitable animal
3. Measurement of blood pressure and heart beat under normal and stress condition
4. Total count of RBC/WBC/Differential count from blood sample
5. Estimation of Hb% from blood sample
6. Detection of Normal constituents of urine (Urea, Uric acid, Ammonia and Creatine) and abnormal constituents of urine (Glucose, Ketone bodies, Bile salts, protein)

Minor experiments

1. Preparation of Haemin crystals
2. Effect of isotonic, hypotonic and hypertonic solutions on blood cells (RBCs)
3. Detection of blood groups
4. Estimation of bleeding and clotting time in Man/Rat by capillary method
5. Demonstration of stages of oestrous cycle in Rat with the help of slides/pictures
6. Study of endocrine glands of dissected rat with the help of chart or model

Note: Any four experiments from each major and minor must be conducted.