

ST. XAVIER'S COLLEGE (AUTONOMOUS), AHMEDABAD
ZOOLOGY SYLLABUS
Semester I

CORE Paper: ZO 1501 (Theory) BASICS OF ZOOLOGY - I
(HUMAN PHYSIOLOGY, ANIMAL DIVERSITY (nonchordates), CYTOLOGY, GENETICS, ANIMAL BIOTECHNOLOGY)

Course Code: ZO 1501

No. of Credits: 04

Learning Hours: 60 hrs

Unit 1: Human Physiology – The Urinary System:

Introduction, Anatomy: V. S. of a kidney, The Nephron, Ultrastructure of a nephron, Juxtaglomerular apparatus, Renal Physiology: Physiology of urine formation, Glomerular filtration/Ultrafiltration, Tubular reabsorption, Tubular secretion, Counter-current Multiplier Mechanism, Physical characteristics of normal urine, Volume, appearance, turbidity, odour, pH, specific gravity.

Chemical composition of normal urine: water, electrolytes, urea, uric acid, creatinine. physical characteristics of abnormal urine: appearance, odour, specific gravity, pH, blood and tissue cells, casts

Abnormal constituents of urine. Protein, carbohydrates, Fat, Ketonebodies, RBC and WBC, Bilirubin, Urobilinogen, Acetone, Pus, Urinary calculi, Microbes

Unit 2 Animal Diversity (Nonchordates) – Type study & General topics:

General structure & morphology with functional anatomy of the following animal: Protozoa Type –Amoeba proteus: Systematic position, Habits & Habitat Structure, Locomotion, Nutrition, Reproduction. General topics: Protozoa: Nucleus, Modes of asexual reproduction (Binary fission, Multiple fission, Plasmotomy, Budding/Germination), Porifera: Economic importance, Modes of asexual reproduction in sponges (Budding, Fission, Reduction bodies, Gemmules)

Unit 3 Cytology:

Microscopes: Structure & working of the following student's light microscopes: Simple light microscope, Monocular Compound light microscope, Diversity in Eukaryotic cell - shape & size, Ultrastructure of a typical animal cell, Nucleus, Introduction, Occurrence and position, Ultrastructure and general functions, Endoplasmic Reticulum (ER), Introduction and Occurrence, Morphology (Cisternae, Vesicles, Tubules), Types of ER (rough and smooth), General functions.

Unit IV Genetics And Animal Biotechnology:

Genetics: Brief introduction to Gene, Mendelism& Laws of Heredity, Incomplete Dominance (e.g. Andalusian fowl, Mirabilis jalapa), Co-dominance (e.g. Roan cattle), Multiple alleles (e.g. ABO blood groups in humans, Coat colour in rabbit), Polygenic inheritance (e.g. skin colour in humans), Lethal genes (e.g. Yellow colour coat in mice, Thalassaemia)

Animal Biotechnology:, Introduction & definition, Some essential equipments for setting up a tissue culture laboratory:, Glasswares/Plasticwares– Test tubes, Flasks, Bottles, Pipettes, Petri dishes, etc., Autoclaves, pH meter, Incubators, LAH, Water bath.

Reference books:

1. Principles of Anatomy & Physiology, Tortora and Gabrowski, Harper Collins College Pub.
2. Animal Physiology and Related Biochemistry, H. R. Singh, Shobhan Lal Naginchand & Co. Edu. Pub., Jalandhar.
3. Textbook of Animal Physiology, A. K. Berry, Emkay Pub., New Delhi.
4. Textbook of Invertebrates, R. L. Kotpal, Rastogi Publications, Meerut.
5. Manual of Zoology, Vol. 1 & 2, E. K. Ayyer.
6. Invertebrate Zoology, Jordan and Verma, S. Chand & Company, Delhi.
7. Cytology, P. S. Verma, S. Chand & Co. Ltd., New Delhi.
8. Cell Biology, C. B. Powar, Himalaya Pub. House.
9. Cell and Mol. Biol., E.D.P. DeRobertis and E.M.F. DeRobertis, Holt-Saunders, Japan.
10. Genetics, P. K. Gupta, Rastogi Publications, Meerut.
11. Genetics, V. B. Rastogi, Kedarnath Ramnath, Meerut.
12. Genetics Vol. 1, C. B. Powar, Himalaya Pub. House.
13. Elements of Biotechnology, P. K. Gupta, Rastogi Publications, Meerut.
14. Culture of Animal Cells-A Manual of Basic Techniques, R. Ian Freshney,
a. 5th Ed., A. John Wiley & Sons Inc. Pub.

Course Code: ZO 1502L (Basics of Zoology Practicals - I)

No. of Credits: 03

Learning Hours: 60 hrs

Human Urine Analysis: Physical analysis: Colour appearance, odour, deposits if any, Chemical analysis: Detection of abnormal constituents in urine: Sugar, Proteins, Bile salts. Determination of: pH, specific gravity, Ketones (Rothera's test), Urea (using soyabean powder) and Creatinine (Jaffe's test). microscopic analysis: Detection of presence of: Pus cells, RBC, Bacteria.

Human Urinary System: Study by permanent slides/charts of: V.S. of kidney., Renal corpuscle., T.S. through Juxtaglomerular apparatus, Counter current multiplier mechanism.

Amoeba: Study by permanent slides/charts of: W.M. of Amoeba, Binary fission,

Nonchordates: Study by charts of: Protozoa: Modes of asexual reproduction (as per theory syllabus), Porifera: Modes of asexual reproduction,

Cytology: Study of by charts/models of: Simple light microscope and Monocular Compound light microscope. Diversity in eukaryotic cell-shape & size, Ultrastructure of: Typical animal cell, Nucleus, Endoplasmic Reticulum

Genetics: Study by charts of: Monohybrid cross, Dihybrid cross, Incomplete Dominance (e.g. Andalusian fowl, *Mirabilis jalapa*), Co-dominance (e.g. Roan cattle), Multiple alleles (e.g. ABO blood groups in humans, Coat colour in rabbit), Polygenic inheritance (e.g. skin colour in humans), Lethal genes (e.g. Yellow colour coat in mice, Thalassaemia), Study of genetic problems

Animal Biotechnology: Autoclave, Calibration of pH meter (only demonstration), Determination of pH of various types of samples using pH paper strips, Incubators, Laminar airflow hood, Water bath

Semester II

PAPER – ZO 2501 (Theory)

BASICS OF ZOOLOGY - II

(HUMAN PHYSIOLOGY, ANIMAL DIVERSITY (nonchordates), ORGANIC EVOLUTION, CYTOLOGY, GENETICS, ANIMAL BIOTECHNOLOGY)

No. of Credits: 04

Learning Hours: 60 hrs

Unit I Human Blood Physiology:

Composition of blood: **Blood Plasma**, Water, Dissolved solids: Blood proteins, Supplies for the cells, Cellular products, Cellular waste-products, Dissolved gases. **Blood Cells:** RB Structure, Total count, Functions, Haemoglobin, Effect of isotonic, hypotonic and hypertonic solutions, Development & Life history, Factors affecting Erythropoiesis, Anaemia: General symptoms, Types: Nutritional, Pernicious, Haemorrhagic, Haemolytic, Aplastic and Sick cell, WBC - Structure, Total count, Functions, Classification (brief note for each WBC), Development & Life history A very brief concept of Leukemia Platelets: Structure, Total count, Functions, Development & Life history, Blood coagulation: Brief introduction and significance Factors involved in blood clotting, Intrinsic & Extrinsic pathways of blood coagulation Basic concept of Intravascular blood clotting, Blood grouping/typing: Classification of blood groups: ABO grouping system, Rh system

Unit II

Animal Diversity (Nonchordates) – Type study: General structure & morphology with functional anatomy of the following animal: Coelenterata: Type – Hydra: Classification, Habit & Habitat, Morphology, Histology, Locomotion, Nutrition and Reproductive organs & Reproduction.

Organic Evolution: Introduction, Origin of Life, Chemical evolution & Spontaneous origin of life, Oparin's theory of Coacervate droplets Miller's experiment, Protoid microspheres, Theories of Organic Evolution, Lamarckism, Darwinism

Unit III Cytology:

Structure & working of the TEM & SEM.

Centrifugation: Introduction, Low speed centrifugation, Ultracentrifugation, Eukaryotic Ribosomes, Introduction and Occurrence Types of Ribosomes (70S, 80S), Structure, Ultrastructure and general functions, Mitochondria, Introduction and Occurrence, Morphology - Shape, Size, Number, Ultrastructure and general functions, Mitochondrial DNA, Mitochondrial Ribosome, Golgi complex: Introduction and Occurrence, Morphology/Ultrastructure and general functions.

Unit IV Genetics and Animal Biotechnology:

Genetics: Complementary genes (e.g. Pea plant – Purple & White flowers), Epistasis – Dominant (e.g. Dog), Recessive (e.g. Mice), Sex-linked inheritance, X-linked (dominant) e.g. enamel of tooth), X-linked (recessive) (e.g. colour blindness in man, eye-colour in Drosophila), Y-linked (Holandric genes), Sex-influenced inheritance, - Baldness in man

Animal Biotechnology: Fields/Applications of Animal Biotechnology. Some important requirements for cell & tissue culture (maxi. 5-7 sentences each): pH, CO₂ and Bicarbonate, Buffer, O₂, Temperature, Balanced Salt Solution (BSS), Antibiotics, Serum, Gas phase, Media (Natural/Defined, Liquid/Solid)

Reference book:

1. Principles of Anatomy & Physiology, Tortora and Gabrowski, Harper Collins College Pub.
2. Animal Physiology and Related Biochemistry, H. R. Singh, Shobhan Lal Naginchand & Co. Edu.Pub., Jalandhar.
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4. Textbook of Invertebrates, R. L. Kotpal, Rastogi Publications, Meerut.
5. Invertebrate Zoology, Jordan and Verma, S. Chand & Company, Delhi.
6. Organic Evolution. B. Rastogi, KedarnathRamnath Publications, Meerut.
7. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology, P. S. Verma & V. K. Agarwal, S. Chand & Company, Delhi.
8. Cytology, P. S. Verma, S. Chand & Co. Ltd., New Delhi.
9. Cell Biology, C. B. Powar, Himalaya Books Pub.
10. Cell and Mol. Biol., E.D.P. DeRobertis and E.M.F. DeRobertis, Holt-Saunders, Japan.
11. Genetics, P. K. Gupta, Rastogi Publications, Meerut.
12. Genetics, V. B. Rastogi, KedarnathRamnath, Meerut.
13. Elements of Biotechnology, P. K. Gupta, Rastogi Publications, Meerut.
14. Culture of Animal Cells-A Manual of Basic Techniques, R. Ian Freshney, 5th Ed., A. John Wiley & Sons Inc. Pub.

Course Code: ZO 2502L

No. of Credits: 03

Learning Hours: 60 hrs

1. Human Blood Physiology:

- a) Method of separation of plasma from blood.
- b) Method of separation of serum from blood.
- c) Preparation of a blood smear to identify various WBCs, using only Leishman stain.
- d) Determination of ABO blood groups.
- e) Demonstrate the effect of isotonic, hypotonic and hypertonic salines on RBCs.

2. Hydra:

Study by permanent slides:

- a) W.M. of Hydra
- b) W.M. of Hydra with gonads
- c) T.S. of Hydra
- d) L.S. of Hydra
- e) T.S. passing through testis
- f) T.S. passing through ovary
- g) Nematocyst.

3. Organic Evolution:

Study by charts:

- a) Miller's experiment
- b) Coacervates
- c) Proteinoid microspheres
- d) Lamarckism
- e) Darwinism

4. Cytology:

Study by charts:

- a) TEM and SEM.
- b) Low speed centrifuge.
- c) Ultrastructures of Eukaryotic Ribosome, Mitochondrion, Golgi complex.

5. Genetics:

A. Study by charts:

- a) Complementary genes (e.g. Pea plant – Purple & White flowers)
- b) Epistasis – Dominant (e.g. Dog)
Recessive (e.g. Mice)
- c) Sex-linked inheritance:

X-linked (dominant) e.g. enamel of tooth)

X-linked (recessive) (e.g. colour blindness in man, eye-colour in Drosophila)

Y-linked (Holandric genes)

- d) Sex-influenced inheritance:

Baldness in man

B. Study of genetic problems (as per APPENDIX)