

GUJARAT UNIVERSITY
CBCS BASED PROPOSED COURSE
ZOOLOGY

(Effective from June 2011)

SEMESTER – 1

101 (Theory)

**(Mammalian Anatomy, Histology, Physiology, Non Chordate
Animal Diversity, Cell Biology, Genetics, and Animal
Biotechnology (Animal Cell Culture))**

Unit 1 Mammalian Anatomy, Histology & Physiology(The Urinary System)

1. Two Kidneys, two ureters, one urinary bladder, and one urethra.
2. Anatomy and Histology of the kidneys.
 - Overview of kidney functions
 - External Anatomy of the Kidneys
 - Internal Anatomy of the Kidneys.
 - Blood and Nerve Supply of the Kidneys
3. The Nephron
 - Parts of a Nephron
 - Histology of the Nephron and Collecting Duct
4. Renal Physiology
 - Glomerular Filtrations
 - The Filtration Membrane
 - Net Filtration Pressure
 - Tubular Reabsorption
 - Tubular Secretion
 - Hormonal Regulation of Tubular Reabsorption and Tubular Secretion(Name of the Hormones and their function only)
 - Production of the Concentrated Urine.
 - ❖ Counter Current Multiplication
 - ❖ Counter Current Exchange

Unit 2 (A) Continuation of Excretory system (of Unit 1)

1. Characteristics of Normal Urine
2. Summary of Abnormal Constituents of Urine
3. **Clinical Connection:** (Brief introduction)
 - Nephroptosis (Floating Kidney)
 - Kidney Transplant
 - Proteinuria
 - Ketonuria.
 - Glucosuria
 - Jaundice
 - Stone in Kidney
 - Renal failure
 - Cystoscopy
 - Dialysis
4. Urinary Bladder
5. Micturition

Reference books for Mammalian Physiology & Histology and Anatomy:

1. .Principles of Anatomy & Physiology, Tortora and Grabowski, Harper Collins College Pub
2. Animal Physiology. And Related Biochem. H.R.Singh, Shobhan Lal Naginchand & Co. Edu. Pub., Jalandhar.
3. Textbook of Animal Histology. A.K.Berry, Emkay Pub, New Delhi.

(B) Non Chordate Animal Diversity :

Ascaris lumbricoides (The Common Roundworm)-Type study

- Systematic position
- Habits and habitat
- External features
- Body wall
- Pseudocoel
- Digestive system
- Respiration
- Excretory system
- Central nervous system
- Reproductive system
- Life cycle
- Pathogenicity (effect on host)
- Parasitic adaptation

Reference books for Animal Diversity of Nonchordates.

1. Textbook of Invertebrates, R.L. Kotpal, Rastogi publications, Meerut
2. Manual of Zoology, E.K. Ayer, Vol 1 & 2
3. Invertebrate Zoology, Jordan and Verma, S.Chand & Company, Delhi.

Unit III Cytology :

1. Cell Biology and other Biological Sciences.
2. Diversity in Cell shape & size of Eukaryotic cell.
3. Centrifugation
 - Mechanism of Centrifugation (Cell fractionation).
 - Low speed
 - Ultracentrifugation (Differential & Density gradient)
4. Nucleus:
 - Occurrence and Position,
 - Morphology
 - Ultra structure-Nuclear membrane ,Nuclear pores, Origin of Nuclear membrane and Nuclear envelop, Function of Nuclear Membrane and Nuclear pores,Chromatin fibres;Nucleolus, Fine structure of Nucleolus,Chemistry of Nucleolus, Function of Nucleolus
5. Endoplasmic Reticulum
 - Occurance
 - Morphology
 - Ultrastructure
 - Types of Endoplasmic reticulum
 - Origin of Endoplasmic reticulum
 - Functions of Endoplasmic reticulum.
6. Eukaryotic Ribosome
 - Occurance and distribution
 - Method of isolation
 - Types of Ribosome
 - Structure of Ribosome
 - Ultra structure
 - Chemical composition
 - Functions.
7. Mitochondria.
 - Distribution or localization
 - Morphology
 - Structure
 - Chemical composition
 - Functions
 - Mitochondrial DNA
 - Mitochondrial Ribosome

Reference Books for Cell Biology:

1. **Cytology**, P.S.Verma, S.Chand & Co, Ltd., New Delhi
2. **Cell Biology**, C.B.Powar, Himalaya Books Pub.
3. **Essentials of Cytology**, C.B.Powar, Himalaya Books Pub

Unit IV Genetics and Animal Biotechnology (Animal cell culture)

(A) Genetics

1. Introduction to Gene
2. Introduction to Mendelian laws of Heredity.
3. Incomplete dominance (e.g. *Mirabilis jalapa*)
4. Co-dominance (e.g. Roan cattle)
5. Multiple alleles
 - e.g.
 - ABO blood groups in humans,
 - Rh Factor-Erythroblastosis foetalis)
7. Polygenic inheritance (e.g. skin colour in humans)
8. Lethal genes (e.g. Yellow coat colour in mice, Thalesemia)

Referance Book for Genetics

1. **Genetics**, P.K.Gupta, Rastogi Publications, Meerut.
- 2 **Genetics**, V.B.Rastogi, Kedarnath Ramnath, Meerut

(B) Animal Biotechnology:

1. Brief Introduction & Definition.
2. Fields of Animal Biotechnology.
3. Some Lab. facilities needed for setting up a tissue culture laboratory –
 - Glass wares
 - Autoclaves
 - pHmeter.

Reference books:

1. **Elements of Biotechnology**, P.K.Gupta.Rastogi pub, Meerut
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102 (Practicals)

1. Analysis of Urine

- **Physical analysis**
 - Color, appearance, odour, deposits if any
- **Chemical analysis**
 - Sugar
 - Protein
 - Bile pigments (Bilirubin)
 - p^H
 - Specific gravity
 - Ketones
 - Urea
 - Creatinine
- **Microscopies**
 - Pus cells
 - R.B.Cs.
 - Bacteria
- **Histology of excretory system : (Charts / photograph of)**
 - Frontal section of right kidney.
 - Renal corpuscle (internal view)
 - Juxtamedullary nephron and vascular supply

2. Study of *Ascaris lumbricoides*

- *Ascaris* (W.M.)
- T.S. through pharynx and excretory pore
- *Ascaris* egg (Entire egg and egg in section)
- T.S. through mature male
- T.S. through mature female

3. Cytology:

Charts / photographs of

- Mitochondria.
- Nucleus.
- Ribosomes.
- Endoplasmic reticulum.

3 **Genetics:**

a) Study of genetics through charts (example as per theory syllabus) :

- Monohybrid cross
- Dihybrid cross
- Incomplete dominance
- Co-dominance
- Multiple alleles
- Polygenic inheritance
- Lethal genes

b) Solve the given genetics problems (as per Appendix)

Appendix

GENETICS PROBLEMS

- 1 Red fruit (R) is dominant to yellow (r) and tallness (T) is dominant over short in plants. What phenotypic and genotypic ratio would result if one of the parent plants is red homozygous & tall homozygous and other is red heterozygous & tall heterozygous?

Solution:

Phenotype=All equal

Genotype=RRTT, RRTt, RrTT, RrTt.

- 2 In rabbits, black skin (B) is dominated over brown skin (b) and short hair (S) is dominated over long hair (s). If homozygous black-short haired male is crossed with a homozygous brown-long haired female, what will be the genotypes and phenotypes of F₁ and F₂ offspring?

Solution :

F₁=BbSs=all black-short haired

F₂=9:3:3:1

3. In four o'clock plants, red colour of flowers (R) is incompletely dominant over white (r), the heterozygous having pink flower colour. What will be the offsprings in a cross between plants of red flowers and pink flowers?

Solution :

Red : Pink = 1 : 1

4. A roan bull is bred to three cows. Cow A has the same genotype as the roan bull. Cow B is red and cow C is white. What proportions of roan cows are expected in the offsprings of any one group of cows?

Solution :

Roan bull X Roan cow = 1red: 2roan: 1white

Roan bull X Red cow = 1red: 1roan

Roan bull X White cow = 1roan: 1white

5. A couple preparing for marriage both have blood group AB. They ask you what type of blood group their children may have. What would you tell them and how would you explain your conclusions?

Solution:

Blood group of children can be A, AB or B

6. A man has blood group A and his wife has blood group B. They have four children, all having different blood groups i.e. A, B, AB and O. Is it possible? How?

Solution:

Yes, it is possible. Heterozygous parents.

7. In man, the difference in skin colour between whites and negroes is due to two pairs of factors, AABB is “black” and aabb is ‘white’. Any three of the colour producing factors produce dark skin, any two medium and any one light colour. What will be the skin colour of the offspring from a mating of white with black and from a mating of two F₁ individuals?

Solution:

Parents genotype = aabb X AABB

F₁ offspring skin colour = medium F₂=1:4:6:4:1

(black:dark:medium:light :white)

4 Animal biotechnology:

- Study of methods for sterilization of glassware.
- Calibration of pH meter.
- Preparing of various reagents.(Methy blue,eosin)
- Detection of pH of various sample waters.

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