

SATAVAHANA UNIVERSITY
U.G. ZOOLOGY (Under CBCS)
B.Sc. Final Year (DSC-1F)
SEMESTER – VI

Immunology and Animal Biotechnology (Theory)

Max. Marks: 80

UNIT – I

- 1.1. Basic concepts of immunology. Cells of immune system Primary and secondary Organs of immune system
- 1.2 Types of Immunity – Innate and acquired
- 1.3. Basic properties of antigens. Structure, function and types of an antibody.
- 1.4. B and T cell epitopes, haptens, adjuvants Antigen-antibody reactions,
- 1.5 Monoclonal antibodies and their production

UNIT – II

- 2.1 Structure and functions of major histo compatibility complex.
- 2.2 Basic properties and functions of Cytokines, Interferons and complement proteins
- 2.3 Humoral and Cell mediated immunity.
- 2.4 Types of hyper sensitivity.
- 2.5 Concepts of autoimmunity and immunodeficiency. Introduction to Vaccines and types of Vaccines

UNIT – III

- 3.1 Concept and Scope of Animal Biotechnology.
- 3.2 Cloning vectors - Plasmids, Cosmids, Lambda bacteriophage, YAC,
- 3.3 Cloning- Cloning methods (Cell, Animal and Gene cloning)
- 3.4 Animal Cell culture - Equipment and materials for animal cell culture
- 3.5 Applications of cell culture techniques

UNIT – IV

- 4.1 Recombinant DNA technology and its applications
- 4.2 Transgenesis – Methods of Transgenesis.
- 4.3 Production of Transgenic animals
- 4.4 Application of Transgenic animals in Biotechnology.
- 4.5 Stem cells –types and their applications

Suggested Readings;

Kindt, T. J., Goldsby, R.A., Osborne, B. A. and Kuby, J (2006). Immunology, VI Edition. W.H. Freeman and Company.

David, M., Jonathan, B., David, R. B. and Ivan R. (2006). Immunology, VII Edition, Mosby, Elsevier Publication.

Abbas, K. Abul and Lechtman H. Andrew (2003.) Cellular and Molecular Immunology. V Edition. Saunders Publication.

Arthur C. Guyton MD, *A Text Book of Medical Physiology*, Eleventh ed., John E. Hall, Harcourt Asia Ltd.

Kuby, *Immunology*, 5th ed, Freeman and Co. New York

Ivan Roitt, *Immunology*, 4th ed, Johanthan Brostoff, Mosby, London.

Delves, P. J., Martin, S. J., Burton, D. R., Roitt, I.M. (2006). XI Edition.

Roitt's Essential Immunology, Blackwell Publishing.



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Immunology and Animal Biotechnology (Practical)

Max. Marks: 25

I. Immunology/Biotechnology experiment

1. Identification of Blood groups
2. Enumeration of RBC & WBC from a given blood sample
3. Enumeration of Differential count of WBC from a given blood sample
4. Demonstration of
 - a. ELISA , b. Immunoelectrophoresis
5. PCR demonstration /virtual lab

II. Identification of Autoimmune disease through charts

- a. Rheumatoid arthritis
- b. Lupus
- c. Vasculitis
- d. Type 1 diabetes
- e. Addisons disease

III. Study of Animal Biotechnology techniques through photographs/virtual lab

1.
 - a. Southern blotting
 - a. Western blotting
 - b. DNA sequencing (Sanger's method)
 - c. DNA finger printing
2. **Identification of Vectors**
 - a. Plasmid
 - b. Cosmid
 - c. YAC
 - d. λ phase vector
3. **Identification of Transgenic animals**
 - a. Transgenic fish
 - b. Transgenic sheep
 - c. Transgenic goat
 - d. Transgenic primate

- **Laboratory Record work shall be submitted at the time of practical examination**
- Computer aided techniques should be adopted as per UGC guide lines.**

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Question Paper Model

- | | |
|--|-----------------|
| I. Immunology/ animal biotechnology Experiment | 10 Marks |
| II. Study of Auto immune diseases with photographs | 2x2=4 |
| III. Study of Biotechnology techniques/vectors/transgenic animals | 3x2=6 |
| 1. | |
| 2. | |
| 3. | |
| IV. Record & Viva | 5 Marks |



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Elective Paper – VIII

B) Aquatic Biology (Theory)

Max. Marks: 80

UNIT – I

- 1.1 Brief introduction of the aquatic biomes
- 1.2 Freshwater ecosystem (lakes, wetlands, streams and rivers), Estuaries, intertidal zones.
- 1.3. Zooplanktons classification (Cladocera, Copepoda, Ostracoda and Rotifera)
- 1.4 Coral reefs

UNIT – II

- 2.1 Lakes Origin and classification of lakes, Lake as an Ecosystem, Lake morphometry,
- 2.2 Physical Characteristics of fresh water bodies: Light, Temperature, Thermal stratification, Transparency, Turbidity
- 2.3. Chemical Characteristics of fresh water bodies: Free CO₂, Dissolved Oxygen, Dissolved Solids, Carbonates, Bicarbonates, Phosphates and Nitrates,
- 2.4. Nutrient Cycles and Lakes- Nitrogen, Sulphur and Phosphorous

UNIT – III

- 3.1 Salinity and density of sea water,
- 3.2 Continental shelf, Oceanic pelagic zone, marine benthic zone.
- 3.3 Adaptation of deep sea organisms.
- 3.4. Sea weeds.

UNIT – IV

- 4.1 Aquatic pollution - Agricultural, Industrial, Sewage, Thermal and Oil spills,
- 4.2 Eutrophication
- 4.3 Management and conservation of water bodies.
- 4.4 Water pollution acts of India, Sewage treatment and water quality assessment - BOD and COD.



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Elective Paper – VIII

B) AQUATIC BIOLOGY (Practical)

Max.Marks:25

PRACTICAL

I. MAJOR WATER ANALYSIS EXPERIMENT

1. Study of topography of lake
2. Estimation of Dissolved oxygen by Winklers method in the given sample
3. Estimation of BOD in the given sample
4. Estimation COD in the given sample

II. MINOR WATER ANALYSIS EXPERIMENT

1. Estimation of Transparency of a nearby lake
2. Estimation of Turbidity of a nearby lake
3. Estimation Free Carbon dioxide of a lake
4. Estimation of Carbonates in a given sample
5. Estimation of Bicarbonates in a given sample

III. Study about water analysis instruments and Zooplanktons.

1. Sacchi disk
2. Van dorn bottle
3. Conductivity meter
4. Method of collection of Zooplankton

IV. A Project Report on a visit to a Sewage treatment plant / Fisheries Institutes/lake.

Suggested Readings:

1. Ananthkrishnan : Bioresources Ecology 3rd Edition
2. Goldman – Limnology, 2nd Edition
3. Odum and Barrett – Fundamentals of Ecology, 5th Edition\
4. Pawlowski: Physicochemical Methods for water and Wastewater Treatment, 1st Edition
5. Wetzel: Limnology, 3rd edition
6. Trivedi and Goyal: Chemical and biological methods for water pollution studies
7. Welch: Limnology Vols.I-II

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Elective Paper – VIII

B) AQUATIC BIOLOGY (Practical)

Max.Marks:25

- | | |
|---------------------------------------|----------|
| 1. Major water analysis experiment | 10 Marks |
| 2. Minor water analysis experiment | 5 Marks |
| 3. Water analysis tools & Zooplankton | 3 Marks |
| 4. Project Report | 2 Marks |
| 5. Record & Viva | 5 Marks |



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Elective Paper – VIII

A) Reproductive Biology (Theory)

Max. Marks: 80

Unit 1: Reproductive Endocrinology

Gonadal hormones and mechanism of hormone action, steroids, glycoprotein hormones, and prostaglandins, hypothalamo – hypophyseal – gonadal axis, regulation of gonadotrophin secretion in male and female; Reproductive System: Development and differentiation of gonads, genital ducts, external genitalia, mechanism of sex differentiation.

Unit 2: Functional anatomy of male reproduction

Outline and histological of male reproductive system in rat and human; Testis: Cellular functions, germ cell, stem cell renewal; Spermatogenesis: kinetics and hormonal regulation; Androgen synthesis and metabolism; Epididymal function and sperm maturation; Accessory glands functions; Sperm transportation in male tract

Unit 3: Functional anatomy of female reproduction

Outline and histological of female reproductive system in rat and human; Ovary: folliculogenesis, ovulation, corpus luteum formation and regression; Steroidogenesis and secretion of ovarian hormones; Reproductive cycles (rat and human) and their regulation, changes in the female tract; Ovum transport in the fallopian tubes; Sperm transport in the female tract, fertilization; Hormonal control of implantation; Hormonal regulation of gestation, pregnancy diagnosis, foeto – maternal relationship; Mechanism of parturition and its hormonal regulation; Lactation and its regulation

Unit 4: Reproductive Health

Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Technology: sex selection, sperm banks, frozen embryos, in vitro fertilization, ET, EFT, IUT, ZIFT, GIFT, ICSI, PROST; Modern contraceptive technologies; Demographic terminology used in family planning.

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Elective Paper – VIII

A) Reproductive Biology (Practical)

Max. Marks: 25

1. Study of animal house: set up and maintenance of animal house, breeding techniques, care of normal and experimental animals.
2. Examination of vaginal smear rats from live animals.
3. Surgical techniques: principles of surgery in endocrinology. Ovariectomy, hysterectomy, castration and vasectomy in rats.
4. Examination of histological sections from photomicrographs/ permanent slides of rat/human: testis, epididymis and accessory glands of male reproductive systems; Sections of ovary, fallopian tube, uterus (proliferative and secretory stages), cervix and vagina.
5. Human vaginal exfoliate cytology.
6. Sperm count and sperm motility in rat
7. Study of modern contraceptive devices

SUGGESTED READINGS

- Austin, C.R. and Short, R.V. reproduction in Mammals. Cambridge University Press.
- Degroot, L.J. and Jameson, J.L. (eds). Endocrinology. W.B. Saunders and Company.
- Knobil, E. et al. (eds). The Physiology of Reproduction. Raven Press Ltd.
- Hatcher, R.A. et al. The Essentials of Contraceptive Technology. Population Information Programme.



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SEMESTER – VI

Elective Paper – VIII

C) Sericulture (Theory)

Max.Marks:80

Unit-1: Silk industry and mulberry production

- 1.1 Historical account and types of silkworms
- 1.2 Sericulture as rural industry and employment generation
- 1.3 Morphology and anatomy of mulberry.
- 1.4 Mulberry plantation and package of practices.
- 1.5 Pest and diseases of mulberry.

Unit-2: Silkworm biology and silkworm seed production

- 2.1 External characters of silkworms
- 2.2 Anatomy of silkworm.
- 2.3 Establishment of modal grainage house and grainage equipments
- 2.4 Seed production process.
- 2.5 Egg preservation and hibernation schedules.

Unit-3: Silkworm cocoon production and crop production

- 3.1 Rearing requirements- rearing house, equipments and disinfection.
- 3.2 Rearing of silkworm - incubation, hatching, brushing and rearing methods (Chawkie and late age silkworm).
- 3.3 Mounting, spinning and harvesting of cocoons
- 3.4 Pests of silkworm
- 3.5 Diseases of silkworm.

Unit-4: Post cocoon production

- 4.1 Physical and commercial characteristics of cocoon.
- 4.2 Natural and synthetic fibres- types, identification and uses.
- 4.3 Cocoon handling- stifling, cooking and brushing.
- 4.4 Silk reeling process.
- 4.5 Raw silk testing and grading.

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Elective Paper – VIII

C) Sericulture (Practical)

Max.Marks:25

1. Morphology of mulberry plant with reference to various vegetative and floral parts.
2. Collection and identification of pests and disease of mulberry and control measures.
3. Anatomy of stem, root, leaf petiole (section cuttings & preparation of permanent slides)
4. Anatomy of silkworm- digestive system, silk gland, respiratory system.
5. Mother moth Examination (Individual and mass mother moth examination)
6. Identification of Mulberry and non mulberry silkworm
7. Identification of rearing equipments, chawkie and late age worms.
8. Identification different diseases and pest of silkworm and control measures.
9. Determination of silk ratio percentage of cocoons
10. Identification test for natural and synthetic fibres.



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