**BSc III Years Degree COURSE STRUCTURE AND SYLLABUS UNDER CBCS PATTERN**

**SUBJECT : ZOOLOGY w.e.f.2016-17**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Year | Semes ter | Paper | Paper Title | No. of Credits | Exam Hrs. | Max. Marks | | |
| I.E. | U.E. | Total |
| **I** | **I** | **I-Core**  **Theory** | **Animal Diversity-Invertebrates** | **3** | **3** | **20** | **80** | **100** |
| **I-Core**  **Practical** | **Animal Diversity-Invertebrates** | **2** | **3** | **-** | **50** | **50** |
| **II** | **II-Core**  **Theory** | **Ecology, Zoogeography and Animal behaviour** | **3** | **3** | **20** | **80** | **100** |
| **II-Core**  **Practical** | **Ecology, Zoogeography and Animal behaviour** | **2** | **3** | **-** | **50** | **50** |
| **II** | **III** | **III-Core**  **Theory** | **AnimalDiversity-Vertebrates and Developmental Biology** | **3** | **3** | **20** | **80** | **100** |
| **III-Core**  **Practical** | **AnimalDiversity-Vertebrates and Developmental Biology** | **2** | **3** | **-** | **50** | **50** |
| **IV** | **IV-Core**  **Theory** | **Cell Biology,Genetics and Evilution** | **3** | **3** | **20** | **80** | **100** |
| **IV-Core**  **Practical** | **Cell Biology,Genetics and Evilution** | **2** | **3** | **-** | **50** | **50** |
| **III** | **V** | **V-Core**  **Theory** | **Physiology and Biochemistry** | **3** | **3** | **15** | **60** | **75** |
| **V-Core**  **Practical** | **Physiology and Biochemistry** | **1** | **3** | **-** | **25** | **25** |
| **V** | **VII-Elective**  **(DSE)Theory** | **I).Entemology**  **II).Applied Zoology** | **3** | **3** | **15** | **60** | **75** |
| **VII-Elective**  **(DSE)Practical** | **I).Entemology**  **II).Applied Zoology** | **1** | **3** | **-** | **25** | **25** |
| **VI** | **Core-VI**  **(DSC)Theory** | **Immunology and Animal Biotechnology** | **3** | **3** | **15** | **60** | **75** |
| **VI-Core**  **(DSC)Practical** | **Immunology and Animal Biotechnology** | **1** | **3** | **-** | **25** | **25** |
| **VIII-Elective**  **(DSE)Theory** | **I). Clinical Science** | **3** | **3** | **15** | **60** | **75** |
| **II). Aquatic Biology.** |
| **III).Public Health and Hygiene** |
| **IV).Medical Transcription** |
| **VIII-Elective**  **(DSE)Practical** | **I). Clinical Science** | **1** | **3** | **-** | **25** | **25** |
| **II). Aquatic Biology.** |
| **III).Medical Transcription** |
| **III** | **V** | **GE** | **Public Health and Hygiene** | **2** | **3** | **10** | **40** | **50** |
|  |  |  |  |  |  |  |  |  |
|  |  |  |  | **38** |  | **160** | **900** | **1060** |

**COURSE STRUCTURE AND SYLLABUS UNDER CBCS PATTERN**

**SUBJECT : ZOOLOGY**

**BSc III YEAR (V & VI SEMESTER)**

**W.e.f. 2018-19**

**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**(With effect from 2018-19)**

**V – SEMESTER Core Paper – V**

**Physiology and Biochemistry**

**Periods: 45 (3 hrs/week) Max. Marks: 75**

**UNIT – I Physiology (15 Periods)**

**1.1 Digestion**

1.1.1 Digestion definition and extra and intracellular digestion.

1.1.2. Digestion of Carbohydrates, Proteins, Lipids and Cellulose.

1.1.3. Absorption and Assimilation of digested food.

1.1.4. Role of Gastrointestinal hormones in digestion

**1.2. Respiration**

1.2.1. Definition of Respiration and Respiratory mechanisms – External, Internal and cellular.

1.2.2. Respiratory Pigments

1.2.3. Transport of oxygen, Oxygen dissociation curves. Bohr’s effect.

1.2.4. Transport of CO2 – Chloride shift.

1.2.5. Regulation of respiration – nervous and chemical

**1.3 Circulation**

1.3.1. Types of circulation - Open and Closed circulation

1.3.2. Structure of Mammalian Heart, Types of hearts – Neurogenic and Myogenic.

1.3.3. Heart function – Conduction and regulation of heart beat.

1.3.4. Regulation of Heart rate – Tachycardia and Bradycardia

1.3.5. Blood Clotting mechanism

**1.4 Excretion**

1.4.1. Classification of Animals on the basis of excretory products- Ammonotelic, Uricotelic, Ureotelic

1.4.2.. Structure and function of Nephron

1.4.3. Urine formation, Counter current mechanism.

**UNIT – II Physiology (15 Periods)**

**2.1. Muscle Contraction**

2.1.1. Types of Muscles

2.1.2. Ultra structure of skeletal muscle fibre

2.1.3. Sliding Filament theory, muscle contraction mechanism and energetics.

**2.2. Nerve Impulse**

2.2.1. Structure of Neuron

2.2.2. Nerve impulse - Resting potential and Action potential and Conduction of Nerve impulse

2.2.3. Synapse, types of synapses and Synaptic transmission.

**2.3. Endocrine System**

2.3.1. Endocrine glands - Structure, secretions and functions of Pituitary, Thyroid, Parathyroid, Adrenal glands and Pancreas

2.3.2. Hormone action and concept of Secondary messengers

2.2.3. Male and Female Hormones, Hormonal control of Menstrual cycle in humans.

**UNIT – III Physiology & Biochemistry (15 periods)**

**3.1. Homeostasis and Enzymes**

3.1.1. Concept of Homeostasis.

3.1.2. Mechanism of Homeostasis.

3.1.3.Osmoregulation - Water and ionic regulation by freshwater, brackish water and marine animals

3.1.4. Enzymes: Definition, Classification, Inhibition and Regulation

**3.2. Bio molecules and Metabolism**

3.2..1. Carbohydrates: Classification and function of Carbohydrates

3.2.2. Carbohydrate metabolism - Glycolysis, Krebs cycle, , Electron transport and oxidative phosphorelation.

3.2.3. Proteins: Classification of proteins based on functions and Chemical nature

3.2.4. Protein Metabolism – Transamination, Deamination and Urea Cycle

3.2..5. Lipids: Classifiation of Lipids

3.2.6. Lipid Metabolism – Fatty acid synthesis and Fatty acid oxidation.

**Suggested readings**

**1.Gerard J. Tortora and Sandra Reynolds Garbowski** Principles of Anatomy and Physiology, Tenth Ed., John Wiley & Sons

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

**3.William F. Ganong,** A Review of Medical Physiology, 22 ed, McGraw Hill, 2005

**4.Sherwood, Klandrof, Yanc,** Animal Physiology, Thompson Brooks/Coole, 2005. .

**5.Knut Scmidt-Nielson,** Animal Physiology, 5th ed, Cambridge Low Price Edition.

**6.Roger Eckert and Randal,** Animal Physiology, 4th ed, Freeman Co, New York.

**7.Singh. H.R,** Text Book of Animal Physiology and Biochemistry

**8.Nagabhushanam**  , Comparative Animal Physiology

**9.Veer Bal Rastogi,** Text Book of Animal Physiology

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**Faculty of Science**

**B.Sc. III Year V - SEMESTER**

**ZOOLOGY Core Paper – V**

**Physiology and Biochemistry**

**MODEL PAPER (Theory)**

**Time: 3 hrs Max. Marks: 60**

**Note :Draw labelled diagrams wherever necessary**

**Section- I (Marks: 3x5 = 15)**

I **Answer any Three of the following questions (Short Answer)**

1. From Unit I

2. From Unit I

3. From Unit II

4. From Unit II

5. From Unit III

6. From Unit III

**Section- II (Marks: 3x15=45)**

**II Answer all of the following questions (Long Answer) .**

7 a). From Unit I

Or

b). From Unit I

8 a). From Unit II

Or

b). From Unit II

9 a). From Unit III

Or

b). From Unit III

**B.Sc. III Year ZOOLOGY PRACTICAL SYLLABUS**

**V - SEMESTER**

**Core Paper – V**

**Physiology and Biochemistry**

**Periods: 30 (2 hrs/week) Max. Marks: 25**

1. Qualitative tests for identification of carbohydrates, proteins and lipids.

2. Qualitative tests for identification of ammonia, urea and uric acid (Nitrogenous excretory products)

3. Effect of pH and Temperature on salivary amylase activity.

4. Study of permanent histological sections of Mammalian Endocrine glands - pituitary, thyroid, pancreas, adrenal gland.

5. Estimation of Haemoglobin by Sahlis method.

6. Estimation of total protein by Lowry’s method.

7. Estimation of unit Oxygen consumption of fish with reference to body weight.

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

**Suggested manuals**

**Tortora, G.J. and Derrickson, B.H.** (2009). Principles of Anatomy and Physiology, XII Edition, John Wiley & Sons, Inc.

**Widmaier, E.P., Raff, H. and Strang, K.T.** (2008) Vander’s Human Physiology, XI Edition., **McGraw Hill Guyton, A.C. and Hall, J.E.** (2011). Textbook of Medical Physiology, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company

**Berg, J. M., Tymoczko, J. L. and Stryer, L.** (2006). Biochemistry. VI Edition. W.H Freeman and Co.

**Nelson, D. L., Cox, M. M. and Lehninger, A.L.** (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co.

**Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W.** (2009).

**Harper’s Illustrated Biochemistry.** XXVIII Edition. Lange Medical Books/Mc Graw3Hill.

**B.Sc. III Year ZOOLOGY PRACTICAL EXAMINATION**

**V - SEMESTER Core Paper – V**

**Physiology and Biochemistry**

**MODEL PAPER**

**Time: 3 Hrs. Max. Marks: 25**

1. Identification, labeled diagram and salient features of spots: ------- 5

(05 spots)

2. Estimation of …….from Biochemistry ------ 03

3. Identification/Study of……from Physiology ------ 03

4. Qualitative Test ------ 03

5. Project Work ------ 05

6. Certified practical record ------ 04

7. Viva voce ------ 02

**B.Sc. III Year ZOOLOGY SYLLABUSUNDER CBCS**

**V -SEMESTER Paper –VII (DSE –I)**

**Entomology**  **Periods: 45 (3 hrs/week) Max. Marks: 75**

**UNIT –I: (15 Periods)**

**1.1.Basics of Entomology**

1.1.1. Definition, scope and importance of Entomology.

1.1.2. Insect classification and their distinctive characters.

1.1.3. Insect External morphology-Head, Thorax, and Abdomen.

1.1.4. Insect Internal Morphology –Digestive, Respiratory, Circulatory, Excretory, Nervous, and Reproductive systems.

1.1.5. Insect growth and development.

**1.2.Insect vectors and pests.**

1.2.1. Introduction and history of medical entomology

1.2.2. Vectors of public health importance –Mosquitoes, Housefly, Sand fly, Lice & Bedbugs

1.2.3. Vector-borne diseases-(Malaria, Dengue, Filaria) and their control measures.

1.2.4. Role of pests in Agriculture.

1.2.5. Crop Pests and their control measures

**UNIT –II: (15 Periods)**

**3.1. Beneficial Insects -Apiculture.**

3.1.1. Selection of Bee Species for Apiculture.

3.1.2. Bee Keeping Equipment.

3.1.3. Methods of Extraction of Honey (Indigenous and Modern).

3.1.4. Bee Diseases and Enemies. 3.1.5. Products of Apiculture Industry and its Uses (Honey, Bees Wax).

**UNIT –III : (15 Periods)**

**3.1.Beneficial Insects - Sericulture**. **and Harmful Insects**

3.1.1. Life cycle of Bombyx mori

3.1.2. Structure of silk gland and secretion of silk

3.1.3. Silkworm rearing technology.

3.1.4. Spinning, harvesting and storage of cocoons.

3.1.5. Silk worm Pests and Diseases: Uzi fly; Protozoan, Viral, Fungal and Bacterial; Control and prevention.

3.1.6. Prospects of Sericulture in India

**3.2. Social life of Insects.**

**3.3. Venomous Insects.**

**REFERENCES**

1.Text Book of Applied Entomology Vol. I & II by K.P. Srivastava

2. General Applied Entomology by B.V. David and T.N. Ananthakrishnan

3. Destructive and Useful Insects by C.L. Metcalf

4.A Text Book of Entomology by Mathur and Upadhyay

5. Pedigo, L.P. (2002). Entomology and Pest Management, Prentice Hall.

6. Prost, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.

7. Bisht. D.S., Apiculture, ICAR Publication.

8. Singh S., Beekeeping in India, Indian council of Agricultural Research, NewDelhi.

9. Ullal S.R. and Narasimhanna, M.N. Handbook of Practical Sericulture: CSB,Bangalore

10. Jolly. M. S. Appropriate Sericultural Techniques; Ed., Director, CSR & TI, Mysore.

11. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co.

12. Narasimhanna, M. N. Manual of Silkworm Egg Production;, CSB, Bangalore 1988.

13. Wupang—Chun and Chen Da-Chung, Silkworm Rearing;, Pub. By FAO, Rome 1988.

14. Sengupta, K. A Guide for Bivoltine Sericulture; Director, CSR & TI, Mysore 1989.

15. Krishnaswamy, S. Improved Method of Rearing Young age

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**B.Sc. III Year V – SEMESTER**

**Paper –VII (DSE –I)**

**Entomology**

**MODEL PAPER (Theory)**

**Time: 3 hrs Max. Marks: 60**

**Note :Draw labelled diagrams wherever necessary**

**Section- I (Marks: 3x5 = 15)**

I **Answer any Three of the following questions (Short Answer)**

1. From Unit I

2. From Unit I

3. From Unit II

4. From Unit II

5. From Unit III

6. From Unit III

**Section- II (Marks: 3x15=45)**

**II Answer all of the following questions (Long Answer) .**

7 a). From Unit I

Or

b). From Unit I

8 a). From Unit II

Or

b). From Unit II

9 a). From Unit III

Or

b). From Unit III

**B.Sc. III Year ZOOLOGY PRACTICAL SYLLABUS**

**V – SEMESTER**

**Paper – VII (DSE-I)**

**Entomology**

**Periods: 30 (2 hrs/week) Max. Marks: 25**

1. Identification and study of house hold Insects -Cockroach, Silver fish, Crickets

2. Identification and study of important Insect vectors –Mosquitoes, House fly, Head lice.

3. Mounting of mouth parts of mosquitoes.

4. Identification different larvae of silk worm-Using specimens / pictures.

5. Field visits to a Sericulture/ apiculture farm and submission of report.

**References**

1. Text Book of Applied Entomology Vol. I & II by K. P. Srivastava

2. General Applied Entomology by B V David and T N Anathakrishnan

3. Destructive and Useful Insects by C. L. Metcalf

4. A text book of Entomology by Mathur and Upadhay

**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**(With effect from 2018-19)**

**V – SEMESTER PAPER – VII (DSE-II)**

**Applied Zoology**

**Periods: 45 (3 hrs/week) Max. Marks: 75**

**UNIT – I (15 Periods)**

**1.1. Aquaculture**

1.1.1. Types of Fisheries

1.1.2. Fresh Water Fish and Prawn culture

1.1.3. Fresh water fishing gears and crafts.

1.1.4. Induced Breeding.

1.1.5. Hatchery design and Management of fish and prawn.

1.1.6. Transportation of fish and prawn seed.

1.1.7. Preservation, Processing and By-products of fishes.

1.1.8. Fish Diseases and control measures

**1.2.Sericulture**

1.2.1. Life cycle of Bombyx mori

1.2.2. Structure of silk gland and secretion of silk

1.2.3. Silkworm rearing technology.

1.2.4. Spinning, harvesting and storage of cocoons.

1.2.5. Silk worm Pests and Diseases: Uzi fly; Protozoan, Viral, Fungal and Bacterial; Control and prevention.

1.2.6. Prospects of Sericulture in India

**UNIT – II (15 Periods)**

**2.1. Apiculture**

2.1.1. Selection of Bee Species for Apiculture.

2.1.2. Bee Keeping Equipment.

2.1.3. Methods of Extraction of Honey (Indigenous and Modern).

2.1.4. Bee Diseases and Enemies.

2.1.5. Products of Apiculture Industry and its Uses (Honey, Bees Wax).

**2.2. Vermiculture**

2.2.1. Introduction of Vermiculture and Vermicomposting.

2.2.2. Vermiculture techniques.

2.2.3. Bedding, Essential parameters for Vermiculture and Management

2.2.4 Methods of Harvesting (Manual & Mechanical).

2.2.5. Economic Importance of Vermiculture.

**UNIT – III (15 Periods)**

**3. Poultry Farming & Animal Husbandry**

3.1. Classification of Fowls based on their use – Broilers and Commercial layers.

3.2. Principles of poultry breeding, Management of breeding stock and broilers, Processing and preservation of eggs.

3.3. Poultry diseases - Viral, Bacterial, Fungal, Protozoan

3.4. Management of a modern Poultry Farm, progressive plans to promote Poultry as a SelfEmployment venture

3.5. Dairy farm and its management

3.6. Animal Husbandry – Introduction, Preservation of semen, artificial insemination of cattle, Induction of early puberty and synchronization of estrus in cattle

**Suggested Readings**

1. Prost, P. J. (1962). Apiculture. Oxford and IBH, New Delhi.

2. Bisht. D.S., Apiculture, ICAR Publication.

3. Singh S., Beekeeping in India, Indian council of Agricultural Research, NewDelhi.

4. Ullal S.R. and Narasimhanna, M.N. Handbook of Practical Sericulture: CSB,Bangalore

5. Jolly. M. S. Appropriate Sericultural Techniques; Ed., Director, CSR & TI, Mysore.

6. Handbook of Silkworm Rearing: Agriculture and Technical Manual-1, Fuzi Pub. Co.

7. Narasimhanna, M. N. Manual of Silkworm Egg Production;, CSB, Bangalore 1988.

8. Wupang—Chun and Chen Da-Chung, Silkworm Rearing;, Pub. By FAO, Rome 1988.

9. Sengupta, K. A Guide for Bivoltine Sericulture; Director, CSR & TI, Mysore 1989.

10. Krishnaswamy, S. Improved Method of Rearing Young age silkworm;CSB,Bangalore,1986.

11. Jhingran. V.G. Fish and fisheries in India.,

12. Khanna. S.S, An introduction to fishes

13. Santanam, B. et al, A manual of freshwater aquaculture,

14. Boyd. C.E. & Tucker.C.S, Pond aquaculture water quality management,

15. Biswas.K.P, Fish and prawn diseases,

16. Hafez, E. S. E. (1962). Reproduction in Farm Animals. Lea & Fabiger Publisher

17. Dunham R.A. (2004). Aquaculture and Fisheries Biotechnology Genetic Approaches. CABI

18. Pedigo, L.P. (2002). Entomology and Pest Management, Prentice Hall.

19. Lee, Earthworm Ecology

20. Stevenson, Biology of Earthworms

21. Ranganathan L.S, Vermicomposting technology- soil health to human health

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**B.Sc. III Year Zoology**

**V – SEMESTER PAPER – VII (DSE-II)**

**Applied Zoology**

**MODEL PAPER (Theory)**

**Time: 3 hrs Max. Marks: 60**

**Note :Draw labelled diagrams wherever necessary**

**Section- I (Marks: 3x5 = 15)**

I **Answer any Three of the following questions (Short Answer)**

1. From Unit I

2. From Unit I

3. From Unit II

4. From Unit II

5. From Unit III

6. From Unit III

**Section- II (Marks: 3x15=45)**

**II Answer all of the following questions (Long Answer) .**

7 a). From Unit I

Or

b). From Unit I

8 a). From Unit II

Or

b). From Unit II

9 a). From Unit III

Or

b). From Unit III

**B.Sc. III Year ZOOLOGY PRACTICAL SYLLABUS**

**V – SEMESTER**

**Paper – VII (DSE –II)**

**Applied Zoology**

**Periods: 30 (2 hrs/week) Max. Marks: 25**

1. Identification and study of important cultivable and edible fishes - Any five

2. Identification and study of important cultivable and edible crustaceans - Any five

3. Identification different larvae of silk worm- Using specimens / pictures

4. Identification of mulberry and non mulberry silkworms

5. Mounting of mouth parts of adult silk worm and silk gland of larva

6. Estimation of quality of milk from different dairy farm units – specific gravity, fat content, pH viscocity.

7. Identification of purity of Honey in different samples

8. Field visits to a Vermiculture / Sericulture / fisheries / apiculture / poultry / dairy farmsubmission of any 3 Reports

* Laboratory Record work shall be submitted at the time of practical examination

* Computer aided techniques should be adopted as per UGC guide lines.

**B.Sc. III Year PRACTICAL MODEL PAPER**

**V – SEMESTER Paper – VII (DSE-II)**

**Applied Zoology**

**MODEL PAPER**

**Time: 3 Hrs. Max. Marks: 25**

1. Identification, labeled diagram and salient features of spots: ------- 10

(05 spots)

2. Field trip reports (3) ------ 5

3. Project Work ------ 04

4. Certified practical record ------ 04

5. Viva voce ------ 02

**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**(With effect from 2018-19)**

**VI- SEMESTER**

**Core Paper – VI**

**Immunology and Animal Biotechnology**

**Periods: 45 (3hrs/week) Max. Marks: 75**

**UNIT – I (15 Periods)**

**1. Immunology – I (Basic concepts,** . **Antigens and antibodies)**

1.1. Basic concepts of immunology.

1.2. Cells of immune system

1.3. Primary and secondary Organs of immune system

1.4. Types of Immunity – Innate and acquired **)**

1.5. Antigens and antibodies . Basic properties of antigens

1.6. Structure, function and types of an antibody.

1.7. B and T cell epitopes, haptens, adjuvants.

1.8. Antigen-antibody reactions,

1.9. T-Cell and B-Cell activation

1.10. Monoclonal antibodies and their production

**UNIT – II (15 Periods)**

**2. Immunology - II (** **Working of an Immune system, . Immune system in health and disease)**

2.1. Structure and functions of major histocompatibility 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.

2.6. Introduction to Vaccines and types of Vaccines

**UNIT – III (15 Periods)**

**3. Animal Biotechnology and Genetically modified organisms**

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, Applications of cell culture techniques

3.5. Recombinant DNA technology and its applications

3.6.Transgenesis – Methods of Transgenesis.

3.7. Production of Transgenic animals and Application of Transgenic animals in Biotechnology.

3.8. Stem cells –types and their applications

**Suggested Readings**

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

2.William F. Ganong, A Review of Medical Physiology, 22 ed, McGraw Hill, 2005

Sherwood, Klandrof, Yanc, Human Physiology, Thompson Brooks/Coole, 2005.

3.Knut Scmidt-Nielson, Animal Physiology, 5th ed, Cambridge Low Price Edition.

4.Richard A. Glodsby, Thomas J Kind, Barbara A. Osborne, Janis Kuby, Immunology, 5th ed,

5.Freeman and Co. New York]

6.Ivan Roitt, Immunology, 4th ed, Johanthan Brostoff, Moshy, London.

7.Thomas C. Chung, General Parasitology, Hardcourt Brace and Co ltd. Asia. New Delhi.

8.Gerard D. Schmidt and Larry S Roberts, Foundations of Parasitology, McGraw Hill

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

10.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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**B.Sc. III YEAR ZOOLOGY**

**VI - SEMESTER Core Paper – VI**

**Immunology and Animal Biotechnology**

**MODEL PAPER**

**Time: 3 hrs Max. Marks: 60**

**Note :Draw labelled diagrams wherever necessary**

**Section- I (Marks: 3x5 = 15)**

I **Answer any Three of the following questions (Short Answer)**

1. From Unit I

2. From Unit I

3. From Unit II

4. From Unit II

5. From Unit III

6. From Unit III

**Section- II (Marks: 3x15=45)**

**II Answer all of the following questions (Long Answer) .**

7 a). From Unit I

Or

b). From Unit I

8 a). From Unit II

Or

b). From Unit II

9 a). From Unit III

Or

b). From Unit III

**B.Sc. III Year PRACTICAL SYLLABUS**

**VI- SEMESTER Core Paper – VI**

**Immunology and Animal Biotechnology**

**Periods: 30 (2 hrs/week) Max. Marks: 25**

**I. Immunology**

1.Identification of Blood groups

2. Histological study of spleen, thymus and lymph nodes (through prepared slides)

3. Enumeration of RBC & WBC from a given blood sample

4. Enumeration of Differential count of WBC from a given blood sample

5. Demonstration of a. ELISA b. Immunoelectrophoresis

6. Identification of Autoimmune disease through charts.

**II. Animal Biotechnology**

1. Study the following techniques through photographs / virtual lab

a. Southern blotting

b. Western blotting

c. DNA sequencing (Sanger’s method)

d. DNA finger printing e. Identification of Vectors f. Identification of Transgenic animals

2. PCR demonstration /virtual lab

 Laboratory Record work shall be submitted at the time of practical examination

 Computer aided techniques should be adopted as per UGC guide lines.

**Suggested manuals**

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

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

3Abbas, K. Abul and Lechtman H. Andrew (2003.) Cellular and Molecular Immunology. V Edition. Saunders Publication.

**B.Sc. III Year PRACTICAL MODEL PAPER**

**VI- SEMESTER Core Paper – VI**

**Immunology and Animal Biotechnology**

**Time: 3 Hrs. Max. Marks: 25**

1. Identification, labeled diagram and salient features of spots: ------- 10 (05 spots)

2. Demonstration and Study the technique from Anima Biotechnology ------ 05

3. Project Work ------ 04

4. Certified practical record ------ 04

5. Viva voce ------ 02

**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**VI - SEMESTER Paper VIII ( DSE-I )**

**CLINICAL SCIENCE**

**Periods: 45 (3hrs/week) Max. Marks: 75**

**UNIT – I (15 Periods)**

**1.0. HAEMATOLOGY**

1.1. Introduction of Haematology

1.2. Structure, Composition and functions of blood

1.3. Origin of blood cells (RBC, WBC, PLATELETS)

1.4. Blood coagulation and theories of blood coagulation, anticoagulants

1.5. Blood groups and Rh factor

1.6. Blood Transfusion and Blood Banking

1.7. Blood associated disorders – Anaemia, Leucopenia, Leucocytosis, Leukemia and Haemophilia

**UNIT – II (15 Periods)**

**2.0. TECHNIQUES**

2.1. Microscopy – Light, phase contrast and Electron Microscopy

2.2. Microtomy- Fixation, Section cutting and Staining procedures

2.3. Biopsy and Autopsy of normal and affected tissues

2.4. Histopathological manifestations in tissues.

2.5. Principles of Sterilization, Autoclave, Microbial plating and Antibiotic Sensitivity Tests.

2.6. Immunological techniques – Agglutinations, precipitation, complement fixation test and ELISA

**UNIT – III (15 Periods)**

**3.0. PATHOLOGY AND DISEASES**

3.1. Introduction to pathology – Definition, Scope and branches

3.2. Health and disease, Types of diseases

3.3. Bacterial diseases (Leprosy, Tuberculosis, Syphilis, Rickettsia and Spirochaete diseases).

3.4. Viral diseases (Dengue, Hepatitis, Swine flu, Chikun gunya, AIDS).

3.5. Protozoan diseases (Trypanosomiasis, Amoebiasis, Giardiasis, Toxoplasmosis).

3.6. Helminth diseases (Schistosomiasis, Echinococcosis, Dracunculosis, Ancylostomiasis).

3.7. Fungal diseases.(Aspergillosis,Candidiasis,Ring worm,athlete’s foot,diaper rash)

**REFERENCES**

1. Textbook of Microbiology – R.Anantharayan and CKJ. Paniker

2. A hand book of Medical laboratory technology – V.H. Talib

3. Medical Laboratory technology – (vol-I & vol-II) – Kanai.L. Mukherjee

4. Medical Zoology-Sobti

5. Medical Laboratory Technology-Ramnik Sood

6. Parasitology – Chatterjee

7. Parasilogy – Chakraborty.

**B.Sc. III Year ZOOLOGY PRACTICAL SYLLABUS**

**VI - SEMESTER Paper – VIII ( DSE-I)**

**CLINICAL SCIENCE**

**Periods: 30 (2 hrs/week) Max. Marks: 25**

I. Clinical Haematology

1.1. Total blood count a) RBC, b) WBC, c) Platelets

1.2. Differential Leucocyte count

1.3. Estimation of Haemoglobin 1.4. Erythrocyte sedimentation rate

1.5. Packed cell volume and Erythrocyte Indices (MCV, MCH & MCHC)

1.6. Bleeding and clotting time

1.7. Blood grouping

II. Estimation of Blood sugar and serum proteins

III. Preparation of blood & faecal smear and identification of protozoan & Helminth parasites

IV. Urine Analysis – Physical, Chemical and Microscope Examination.

V. WIDAL and VDRL tests.

**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**Subject : Zoology**

**VI - SEMESTER Paper VIII (Open Elective-I)**

**CLINICAL SCIENCE**

**MODEL PAPER**

**Time: 3 hrs Max. Marks: 60**

Note : Draw labelled diagrams wherever necessary

**Section –I (3X5=15 Marks)**

I. Answer any THREE of the following questions

1.I Unit

2. I Unit

3. II Unit

4. II Unit

5.III Unit

6. III Unit

**Section- II (Marks: 3x15=45)**

II. Answer (Long Answer) the following questions

7a). I Unit

OR

b).I Unit

8a). II Unit

OR

b).II Unit

9a). III Unit

OR

b).III Unit

**B.Sc. III Year SYLLABUS UNDER CBCS**

**Subject : Zoology**

**VI - SEMESTER Paper – VIII (DSE -II)**

**AQUATIC BIOLOGY**

**Periods: 45 periods (3hrs/week) Max. Marks: 75**

**UNIT – I (15 periods)**

**1.0.Aquatic Biomes**

1.1 Brief introduction of the aquatic biomes

1.2 Freshwater ecosystem (lakes, wetlands, streams and rivers),

1.3 Estuaries, intertidal zones,

1.4 Oceanic pelagic zone, marine benthic zone.

1.5 Coral reefs

**UNIT – II (15 periods)**

**2.0. Fresh water Biology & Marine Biology**

2.1. Lakes: Origin and classification of lakes,

2.2. Lake as an Ecosystem, Lake morphometry,

2.3. Physico-chemical Characteristics of fresh water bodies: Light, Temperature, Thermal stratification, Dissolved Solids, Carbonate, Bicarbonates, Phosphates and Nitrates, Turbidity: dissolved gases (Oxygen, Carbon dioxide).

2.4. Nutrient Cycles and Lakes- Nitrogen, Sulphur and Phosphorous.

2.5. Streams: Different stages of stream development, Physico-chemical environment, adaptation of hill-stream fishes.

2.6.Salinity and density of sea water,

2.7.Continental shelf,

2.8.Adaptation of deep sea organisms

2.9. Sea weeds.

**UNIT – III (15 periods)**

**3.0. Management of Aquatic Resources**

3.1. Aquatic pollution - Causes of pollution: Agricultural, Industrial, Sewage, Thermal and Oil spills,

3.2. Eutrophication

3.3. Management and conservation

3.4. Water pollution acts of India

3.5. Sewage treatment and water quality assessment - BOD and COD.

**B.Sc. III Year ZOOLOGY PRACTICAL SYLLABUS**

**VI - SEMESTER Paper – VIII (DSE-II)**

**AQUATIC BIOLOGY**

**Periods: 30 (2hrs/week) Max. Marks: 25**

1. Study of the topography of a lake

2. Physico-Chemical and biological analysis of a lake Physico-Chemical analysis of water - O2, CO2, BOD, COD Biological– Zooplanktons – Identification and population density of Zooplanktons of a lake

3. Determination of - Turbidity / transparency, Dissolved Oxygen, Free Carbon dioxide, Alkalinity (carbonates & bicarbonates) in water collected from a nearby lake / water body.

4. Instruments used in limnology (secchi disc, van dorn bottle, conductivity meter, Turbidity meter, PONAR grab sampler) and their significance.

5. A Project Report on a visit to a Sewage treatment plant / Marine bio-reserve/Fisheries Institutes.

**Suggested Readings**

1. Ananthakrishnan : 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 Welch: Limnology Vols.I-II

**B.Sc. III Year ZOOLOGY SYLLABUS UNDER CBCS**

**VI - SEMESTER Paper – VIII (DSE-II)**

**AQUATIC BIOLOGY**

**MODEL PAPER**

**Time: 3 hrs Max. Marks: 60**

Note : Draw labelled diagrams wherever necessary

**Section –I (3X5=15 Marks)**

I. Answer any THREE of the following questions

1.I Unit

2. I Unit

3. II Unit

4. II Unit

5.III Unit

6. III Unit

**Section- II (Marks: 3x15=45)**

II. Answer (Long Answer) the following questions

7a). I Unit

OR

b).I Unit

8 a). II Unit

OR

b).II Unit

9a). III Unit

OR

b). III Unit