# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

# FACULTY OF SCIENCE AND TECHNOLOGY BOARD OF STUDIES IN ZOOLOGY

## SUBMISSION OF

## CHOICE BASED CREDIT SYSTEM (CBCS)

## SYLLABUS OF ZOOLOGY FOR UNDER GRADUATE (B. Sc.)

## PROGRAMME OF SEMESTER III AND SEMESTER IV

## FROM SESSION 2018 - 19

# SCHEME AND SYLLABUS UNDER CHOICE BASED CREDIT SYSTEM (CBCS) FOR B.Sc. ZOOLOGY

| Semester | Core Course (12) | Ability Enhancement Compulsory Courses AEC(2) | Skill Enhancement (Foundation) Courses SEC(4) | Discipline Specific Elective (DSE) |
|---|---|---|---|---|
| I | CC - Chemistry P -I<br>CC - Chemistry P -II<br>CC - Botany P -I<br>CC - Botany P -II<br>CC - Zoology P -I<br>CC - Zoology P -II | English (1)<br>Marathi (1) | | |
| II | CC - Chemistry P -III<br>CC - Chemistry P -IV<br>CC - Botany P -III<br>CC - Botany P -IV<br>CC - Zoology P -III<br>CC - Zoology P -IV | English (1)<br>Marathi (1) | | |
| III | CC - Chemistry P -V<br>CC - Chemistry P -VI<br>CC - Botany P -V<br>CC - Botany P -VI<br>CC - Zoology P -V<br>CC - Zoology P -VI | | Environmental Studies | |
| IV | CC - Chemistry P -VII<br>CC - Chemistry P -VIII<br>CC - Botany P -VII<br>CC - Botany P -VIII<br>CC - Zoology P -VII<br>CC - Zoology P -VIII | | Environmental Studies | |
| | CC - Chemistry P -IX<br>CC - Chemistry P -X<br>CC - Botany P -IX<br>CC - Botany P -X<br>CC - Zoology P- IX<br>CC - Zoology P -X | | (Any one)<br>1.Apiculture<br>2. Sericulture<br>3.Vermiculture and Lac Culture<br>4.Aquariumfish Culture | **DSE-Chem I**<br>**DSE - Bot I**<br>**DSE - Zoo I**<br>(Any One)<br>1.Parasitology<br>2.Applied Zoology<br>3. Insect Vectors and disease<br>4 Aquatic Biology |

| | | | | |
|---|---|---|---|---|
| VI | CC - Chemistry P -XI<br>CC - Chemistry P -XII<br>CC - Botany P -XI<br>CC - Botany P -XII<br>CC - Zoology P -XI<br>CC - Zoology P -XII | | 1.Medical diagnosis<br>2.Public Health & Hygiene<br>3.Research Methodology and Instrumentation | **DSE- Chem II**<br>**DSE - Bot II**<br>**DSE - Zoo II**<br>(Any One)<br>1. Immunology<br>2.Animal Biotechnology<br>3.Micro-technique, Bioinformatics and Biostatistics |

**Discipline Core Courses (DCC) : Zoology**

1. Animal Diversity
2. Cell Biology, Genetics and Evolutionary Biology
3. Comparative Anatomy and Developmental Biology of Vertebrates
4. Physiology and Biochemistry

**Discipline Specific Electives (DSE): Zoology (Any two)**

1. Applied Zoology
2. Animal Biotechnology
3. Aquatic Biology
4. Immunology
5. Reproductive Biology
6. Insect, Vector and Diseases

**Skill Enhancement Courses (SEC): Zoology**

1. Apiculture
2. Aquarium Fish Keeping
3. Aquatic Biology
4. Medical Diagnostics
5. Public Health and Hygiene
6. Sericulture

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

# CBCS SYLLABUS IN ZOOLOGY

## SEMESTER - I

| PAPER CODE | CORE PAPER | TITLE OF THE PAPER | CREDIT |
|---|---|---|---|
| USCZOT01 | I | NONCHORDATE - PROTOZOA TO ANNELIDA | 02 |
| USCZOT02 | II | CELL BIOLOGY | 02 |
| USCZOP01 | PRACTICAL | CORE COURSE I & II | 02 |

## SEMESTER - II

| PAPER CODE | CORE PAPER | TITLE OF THE PAPER | CREDIT |
|---|---|---|---|
| USCZOT03 | III | NONCHORDATE - ARTHOPODA TO HEMICHORDATA | 02 |
| USCZOT04 | IV | GENETICS & EVOLUTION | 02 |
| USCZOP02 | PRACTICAL | CORE COURSE III & IV | 02 |

## SEMESTER- III

| PAPER CODE | CORE PAPER | TITLE OF THE PAPER | CREDIT | SEC |
|---|---|---|---|---|
| USCZOT05 | V | ANIMAL DIVERSITY (CHORDATES) and COMPARATIVE ANATOMY | 02 | ENVIRONMENTAL STUDIES |
| USCZOT06 | VI | PHYSIOLOGY & BIOCHEMISTRY - I | 02 | |
| USCZOP03 | PRACTICAL | CORE COURSE V & VI | 02 | |

## SEMESTER- IV

| PAPER CODE | CORE PAPER | TITLE OF THE PAPER | CREDIT | SEC |
|---|---|---|---|---|
| USCZOT07 | VII | DEVELOPMENTAL BIOLOGY | 02 | ENVIRONMENTAL STUDIES |
| USCZOT08 | VIII | PHYSIOLOGY & BIOCHEMISTRY - II | 02 | |
| USCZOP04 | PRACTICAL | CORE COURSE VII & VIII | 02 | |

## SEMESTER -V

| SEC (ANY ONE) | DSE (ANY ONE) |
|---|---|
| 1. APICULTURE | 1. PARASITOLOGY |
| 2. SERICULTURE | 2. APPLIED ZOOLOGY |
| 3. VERMICULTURE & LAC CULTURE | 3. INSECT VECTOR & DISEASE |
| 4. AQUARIUM FISH CULTURE | 4. AQUATIC BIOLOGY |

## SEMESTER- VI

| SEC (ANY ONE) | DSE (ANY ONE) |
|---|---|
| 1. MEDICAL DIGNOSTICS | 1. IMMUNOLOGY |
| 2. PUBLIC HEALTH AND HYGIENE | 2. ANIMAL BIOTECHNOLOGY |
| 3. RESEARCH METHODOLOGY | 3. MICROTECHNIQUE, BIOINFORMATICS & BIOSTATISTICS |
| 4. INSTRUMENTATION | 4. REPRODUCTIVE BIOLOGY |

## Scheme of Marks of Theory and Practical

| Semester | Paper | Title | Marks | | Total |
|---|---|---|---|---|---|
| | | | Theory | Internal Assessment | |
| III | I | Animal Diversity(Chordate)and Comparative Anatomy | 50 | 10 | 150 |
| | II | Physiology and Biochemistry - I | 50 | 10 | |
| | Practical | Animal Diversity, Comparative Anatomy, Physiology and Biochemistry-I | 30 | - | |
| IV | I | Developmental Biology | 50 | 10 | 150 |
| | II | Physiology and Biochemistry - II | 50 | 10 | |
| | Practical | Developmental Biology, Physiology and Biochemistry - II | 30 | - | |

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER-III**

**SUBJECT- ZOOLOGY, THEORY (CREDITS 2)**

**CORE PAPER V**

**USCZOT05**

**Paper I - ANIMAL DIVERSITY (CHORDATES) AND COMPARATIVE ANATOMY**

**Unit- I** **(12 periods)**

1. Urochordata- General characters, Ascidian tadpole and retrogressive metamorphosis
2. Cephoalochordata- General characters, Amphioxus - External morphology and digestive system.
3. Cyclostomata- General characters, external morphology of-Petromyzon and Myxine.
4. Pisces- General characters and Classification up to order; Osmoregulation in Fishes, Accessory respiratory organs.

**Unit-II** **(12 periods)**

1. Amphibia– General characters and Classification up to order, Parental care and Neoteny.
2. Reptilia- General characters and Classification based on temporal vacuities. Snake venom, Poison apparatus & biting mechanism, Poisonous and non poisonous snake

**Unit-III** **(12 periods)**

1. Aves – General characters and classification up to order. Flight adaptations (Morphological, Anatomical and Physiological), Birds migration and its significance
2. Mammals – General characters and classification up to order. Prototheria, Metatheria and Eutheria.

**Unit-IV :** Comparative anatomy **(12 periods)**

1. Comparative account of derivatives of integuments (Scale and horn).
2. Comparative account of aortic arches and heart.
3. Types of receptors (General cutaneous receptors and chemoreceptor).
4. Comparative account of Urinogenital system.

**Suggested Readings : Animal Diversity:-**

1) Invertebrate Zoology- Ruppert and Barnes, R.D. (2006) VIII Edition. Holt Saunders International Edition.

2) The Invertebrates - A New Synthesis Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). III Edition, Blackwell Science

3) The Life of Vertebrates - Young, J. Z. (2004) III Edition. Oxford University Press.

4) Vertebrate life - Pough H. (2007) VIII Edition, Pearson International.

5) Strickberger's Evolution - Hall B.K. and Hallgrimsson B. (2008) IV Edition. Jones and

6. Ruppert and Barnes, R.D. (2006). Invertebrate Zoology, VIII Edition. Holt Saunders International Edition.

7. Barnes, R.S.K., Calow, P., Olive, P.J.W., Golding, D.W. and Spicer, J.I. (2002). The

8. Invertebrates: A New Synthesis, III Edition, Blackwell Science

9. Young, J. Z. (2004). The Life of Vertebrates. III Edition. Oxford university press.

10. Pough H. Vertebrate life, VIII Edition, Pearson International.

11. Hall B.K. and Hallgrimsson B. (2008). Strickberger's Evolution. IV Edition. Jones and Bartlett Publishers Inc.

**Suggested Readings : Comparative anatomy:-**

1) Vertebrates' Comparative Anatomy, Function and Evolution - Kardong, K.V. (2005). IV Edition. McGraw-Hill Higher Education.

2) Comparative Anatomy of the Vertebrates - Kent, G.C. and Carr R.K. (2000).. IX Edition. The McGraw- Hill Companies.

3) Analysis of Vertebrate Structure - Hilderbrand, M and Gaslow G.E., John Wiley and Sons.

4) Biology of Vertebrates - Walter, H.E. and Sayles, L.P; Khosla Publishing House.

5. Kardong, K.V. (2005) Vertebrates' Comparative Anatomy, Function and Evolution. IV Edition. McGraw-Hill Higher Education.

6. Kent, G.C. and Carr R.K. (2000). Comparative Anatomy of the Vertebrates. IX Edition. The McGraw-Hill Companies.

7. Hilderbrand, M and Gaslow G.E. Analysis of Vertebrate Structure, John Wiley and Sons.

8. Walter, H.E. and Sayles, L.P; Biology of Vertebrates, Khosla Publishing House.

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER-III**

**SUBJECT- ZOOLOGY, THEORY (CREDITS 2)**

**CORE PAPER VI**

**USCZOT06**

**Paper - II: PHYSIOLOGY AND BIOCHEMISTRY - I**

**Unit I:** Metabolism **(12 periods)**

1. Carbohydrates- Glycolysis, gluconeogenesis, glycogen metabolism,
2. Protein- Transamination , deamination and urea cycle
3. Lipid- Biosynthesis of triglycerides

**Unit – II:** Enzymes **(12 periods)**

1. General properties of enzymes
2. Classification of enzymes
3. Enzymes –Distribution and chemical nature of enzymes
4. Factors affecting enzyme activity

**Unit-III:** Nutrition and Digestion **(12 periods)**

1. Structure and functions of digestive glands - (Salivary, Gastric, Intestinal, Liver and Pancreas )
2. Gastro-intestinal hormones
3. Digestion and absorption of proteins, carbohydrates and lipids.
4. Vitamins- Sources, types, deficiency and diseases

**Unit-IV:** **(12 periods)**

1. Mechanism of Respiration
2. Transport of $O_2$ and $CO_2$
3. Respiratory pigments - Types, distribution and properties
4. Respiratory disorders and effects of smoking

**Suggested Readings : Animal Physiology:-**


1. Human Physiology – Chatterjee, A. G. Vol. I & II
2. Medical Physiology – Gyton
3. T. B. of Animal Physiology – Berry
4. Introduction to Animal Physiology and Related Biotechnology – H. R. Singh
5. Animal Physiology – Arora, M.P.
6. General and Comparative Physiology – Hoar, W. S.
7. T. B. of Animal Physiology – Hurkat and Mathur
8. Animal Physiology – Naghbhushanam and Kodarkar
9. T. B. of Animal Physiology & General Biology – Thakur &Puranik
10. General Endrocrinology – Turner Bagnaro
11. Reproduction and Human welfare – Greep and Koblinsky
12. Animal Physiology – Shastri&Goel
13. Animal Physiology – Verma &Tyagi
14. Human Physiology - Vander and Sheman
15. Applied Physiology – Keels, Neils and Joels
16. Animal Physiology – Rastogi, S. C.
17. Animal Physiology – VeerbalaRastogi
18. Comparative Vertebrate Endocrinology – Beutley
19. S.Y. B. Sc. Zoology Sem-V- Dhamani, Bakare, Harney & Bhute


**Suggested Readings : Biochemistry:-**


1. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
2. Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co.
3. 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.
4. Fundamental of Biochemistry- Jain and Jain
5. Principals of Biochemistry -White, Handler and Smith
6. Biochemistry - Stryer

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER-III**

**SUBJECT- ZOOLOGY, PRACTICAL (CREDITS 2)**

**CORE COURSE-V & VI**

**USZOP03**

**PRACTICAL**

**B.Sc. II (Zoology), Semester-III**

**(Animal Diversity, Comparative Anatomy & Physiology and Biochemistry-I)**

**Section A - Animal Diversity, Comparative Anatomy**

**1. Identification and Classification of museum specimens**

a. Urochordates : Herdmania, Salpa, Doliolum

b. Cephalochordate : Amphioxus

c. Cyclostomata: Myxine, Petromyzon

d. Pisces : Pristis, Torpedo, Notopterus, Exocoetus, Clarius, Ophiocephalus, Catla, Labeo, Mrigal

e. Amphibia : Bufo, Salamandra, Ichthyophis

f. Reptilia : Chameleon, Varanus, Phrynosoma, Draco, Tortoise, Naja , Bungarus, Hydrophis.

g. Aves : Owl, Woodpecker, Kingfisher, Kite, Duck, Parrot

h. Mammals: Squirrel, Mongoose, Bat, Loris, Rabbit

**2. Anatomical Observations**

Anatomical observations, demonstration and detailed explanation of the following with the help of ICT tools/ models/ charts/ photographs etc. (Any locally available fish)

a) Digestive system

b) Reproductive system

c) Brain and Cranial Nerves

**3. Study of skeleton of Rabbit or Fowl**

(Loose bones of skull not to be studied)

**5. Study of permanent slides-**

Fish scales - Placoid, Cycloid and Ctenoid, V.S. Skin of Frog and Mammal.

6. **Permanent stained micro preparation** of the following

Fish scales **–** Placoid, Cycloid and Ctenoid, Hyaline cartilage and Striated muscle

**Section B – Physiology and Biochemistry**

**7. Physiology and Biochemistry**

1. Study of histological slides of Mammal**–** Duodenum, Liver, Lung, Bone and Cartilage.
2. Demonstration of carbohydrates, proteins and lipids by histochemical methods

   (Source of tissue: Animal wastes from local recognized slaughter houses/ poultry farms/ fish markets etc.)
3. Estimation of total protein in given solution by Lowry**'**s method
4. Study of activity of salivary amylase under optimal condition.
5. Qualitative test to identify functional group carbohydrate in given solution (glucose, fructose, sucrose, lactose).

**8. Submission of slides and study tour report**

**Practical Question Paper and Distribution of Marks**

| **Practical - Distribution of Marks** | **Total marks – 30 (Time – 4 hours duration)** |
|---|---|
| 1. Anatomical observation | 05 |
| 2. Spotting- (4 specimens, 4 slides, 2 bones). | 10 |
| 3. Physiology/Biochemistry experiment | 05 |
| 4. Permanent stained micro preparation | 03 |
| 5. Class record and submission of slides and study tour report | 03 |
| 6. Viva-voce | 04 |

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER-III SUBJECT- ZOOLOGY – THEORY INTERNAL ASSESSMENT**

**Theory Internal Assessment (Paper I and Paper II) – 20 Marks (Assignment, class test, curricular and co-curricular activities, seminar, field work, tour etc.)**

## Format for the theory internal assessment

| Sr.No | Evaluation type | Marks | Marks |
|---|---|---|---|
| | | P-I | P-II |
| **01** | One assignment | 2 | 2 |
| **02** | One class test | 5 | 5 |
| **03** | Active participation in routine class activities / seminars etc. | 3 | 3 |

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

## CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS

## PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER-III

## SUBJECT- ZOOLOGY – THEORY QUESTION PAPER PATTERN

**Maximum Marks – 50** **Time – 3 Hours**

**Note : 1) All questions are compulsory**

**2) All questions carry equal marks**

**3) Draw well labeled diagram wherever necessary**

Q1) Unit I – Long question – 10 Marks

**OR**

a. Short question – 05 Marks

b. Short question – 05 Marks

Q2) Unit II – Long question – 10 Marks

**OR**

a. Short question – 05 Marks

b. Short question – 05 Marks

Q3) Unit III – Long question – 10 Marks

**OR**

a. Short question – 05 Marks

b. Short question – 05 Marks

Q4) Unit IV – Long question – 10 Marks

**OR**

a. Short question – 05 Marks

b. Short question – 05 Marks

Q5) Write short notes on any 10 out of 12(3 questions from each units) – 10 Marks

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER-IV**

**SUBJECT- ZOOLOGY, THEORY (CREDITS 2)**

**CORE PAPER VII**

**USCZOT07**

**Paper - I : DEVELOPMENTAL BIOLOGY**

**Unit-I :** Early development **(12 periods)**

1. Types of eggs- Classification on the basis of amount and distribution of yolk. Chemical composition of yolk.
2. Fertilization-Mechanism and significance.
3. Cleavage- Types of cleavages
4. Blastulation- Definition and types.

**Unit-II :** Frog and Chick embryology **(12 periods)**

1. Morphogenetic movements in the early development of Frog (Invagination, Epiboly and Emboly).
2. Development of Chick up to the formation of primitive streak.
3. Development of extra embryonic membranes in Chick and their significance.

**Unit-III :** Mammalian development **(12 periods)**

1. Gametogenesis- (Spermatogenesis and Oogenesis).
2. Structure of a Sperm and Ovum.
3. Implantation- Definition and types.
4. Placentation- Definition, types and functions of placenta.

**Unit –IV** **(12 periods)**

1. Apoptosis –Mechanism and significance.
2. Stem Cells- Sources, types and their use in human welfare.
3. In Vitro fertilization- Technique, advantages and disadvantages, Test tube Baby.
4. Semen bank, Artificial inseminations and Contraceptives.

**Suggested Readings: Developmental Biology**

1) Developmental Biology - Gilbert, S. F. (2006) VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.

2) An introduction to Embryology - Balinsky, B.I. (2008) International Thomson Computer Press.

3) Patten's Foundations of Embryology - Carlson, Bruce M (1996) McGraw Hill, Inc.

4) Biology - Campbell, N. A. and Reece J. B. (2011) IX Edition, Pearson, Benjamin, Cummings.

5) Evolutionary Biology - Douglas, J. Futuyma (1997) Sinauer Associates.

6. Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates, Inc., Publishers, Sunderland, Massachusetts, USA.

7. Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.

8. Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill, Inc.

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER-IV**

**SUBJECT- ZOOLOGY, THEORY (CREDITS 2)**

**CORE PAPER VIII**

**USCZOT08**

**Paper - II: PHYSIOLOGY AND BIOCHEMISTRY-II**

**Unit-I :** Excretion **(12 periods)**

1. Structure of uriniferous tubule
2. Mechanism of urine formation
3. Counter – current mechanism
4. Normal and abnormal constituents of urine. Elementary idea of dialysis

**Unit-II :** Endocrinology and Reproduction **(12 periods)**

1. Structure and functions of pituitary gland
2. Structure and functions of thyroid and adrenal gland
3. Oestrous and menstrual cycle
4. Male and female sex hormones

**Unit–III :** Nerve and Muscle Physiology **(12 periods)**

1. Types of neurons, E.M. structure of neuron
2. Conduction of nerve impulse
3. Ultra-structure of striated muscle, Sliding filament theory of muscle contraction
4. Properties of muscles (Twitch, Tetanus, Tonus, Summation, All or None Principle, Muscle fatigue)

**Unit-IV :** Circulation **(12 periods)**

1. Composition and functions of blood
2. Blood clotting – Intrinsic and extrinsic factors, blood groups and Rh factor
3. Cardiac cycle
4. E.C.G. and Blood pressure

**Suggested Readings : Animal Physiology**


1. Human Physiology – Chatterjee, A. G. Vol. I & II
2. Medical Physiology – Gyton
3. T. B. of Animal Physiology – Berry
4. Introduction to Animal Physiology and Related Biotechnology – H. R. Singh
5. Animal Physiology – Arora, M.P.
6. General and Comparative Physiology – Hoar, W. S.
7. T. B. of Animal Physiology – Hurkat and Mathur
8. Animal Physiology – Naghbhushanam and Kodarkar
9. T. B. of Animal Physiology & General Biology – Thakur & Puranik
10. General Endrocrinology – Turner Bagnaro
11. Reproduction and Human welfare – Greep and Koblinsky
12. Animal Physiology – Shastri & Goel
13. Animal Physiology – Verma & Tyagi
14. Human Physiology - Vander and Sheman
15. Applied Physiology – Keels, Neils and Joels
16. Animal Physiology – Rastogi, S. C.
17. Animal Physiology – Veerbala Rastogi
18. Comparative Vertebrate Endocrinology – Beutley
19. S.Y. B. Sc. Zoology Sem-V- Dhamani, Bakare, Harney & Bhute


**Suggested Readings : Biochemistry**


1. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). Biochemistry. VI Edition. W.H Freeman and Co.
2. Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). Principles of Biochemistry. IV Edition. W.H. Freeman and Co.
3. 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.
4. Fundamental of Biochemistry- Jain and Jain
5. Principals of Biochemistry -White, Handler and Smith
6. Biochemistry - Stryer

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER - IV**

**SUBJECT- ZOOLOGY, PRACTICAL (CREDITS 2)**

**CORE COURSE-VII & VIII**

**USZOP04**

**PRACTICAL**

**B.Sc. II (Zoology), Semester-IV**

**DEVELOPMENTAL BIOLOGY & PHYSIOLOGY AND BIOCHEMISTRY-II**

**Section A:** Developmental Biology

Study of the following slides-

1. Frog embryology: T.S. of Tadpole through internal and external gills, V.S. of Blastula, Gastrula and Neurula,
2. Study of permanent slide of Chick embryology : Whole mount of 18 hrs, 24 hrs, 30 hrs, 36 hrs and 72 hrs.

1. Detection of urea, albumin, sugar and creatin in urine
2. Sperm count of any domestic animal (Source of semen: Government artificial insemination centre).
3. Study of histological slides of Mammal– T.S. of Kidney, Pituitary, Thyroid and Adrenal glands, Testis, Ovary, Uterus, Placenta, Medulated and Non medulated nerve fibres, Smooth and Striated muscle, Spinal cord.

1. Preparation of haemin and haemochromogen crystal
2. Quantitative estimation of amino acids using ninhydrin reaction
3. Estimation of glycin by Sorenson formal titration

**Section D :** Permanent stained micro preparation

1. Examination of gametes of Frog – Sperm and Ova through permanent slide or microphotograph

**Section E :** Submission of slides and study tour report

**Practical Question Paper and Distribution of Marks**

**Practical - Distribution of Marks** **Total marks – 30 (Time – 4 hours duration)**

1. Physiology experiment ..... 05
2. Identification and comments on spots ..... 10

   (Mammalian histology-3, Frog embryology-1 and Chick embryology-1 spots)
3. Biochemistry experiment ..... 05
4. Submission of slides or microphotograph and study tour report ..... 02
5. Submission of certified practical record ..... 03
6. Viva- voce ..... 05

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CREDIT SYSTEM (CBCS) SYLLABUS PROGRAMME-**

**BACHELOR OF SCIENCE (B.Sc.), SEMESTER-IV SUBJECT-**

**ZOOLOGY – THEORY INTERNAL ASSESSMENT**

**Theory Internal Assessment (Paper I and Paper II) – 20 Marks(Assignment, class test, curricular and co-curricular activities, seminar, field work, tour etc.)**

**Format for the theory internal assessment**

| Sr.No | Evaluation type | Marks P-I | Marks P-II |
|---|---|---|---|
| **01** | One assignment | 2 | 2 |
| **02** | One class test | 5 | 5 |
| **03** | Active participation in routine class activities / seminars etc. | 3 | 3 |

# DR.C.V.RAMAN SCIENCE COLLEGE, SIRONCHA

**CHOICE BASED CREDIT SYSTEM (CBCS) SYLLABUS**

**PROGRAMME- BACHELOR OF SCIENCE (B.Sc.), SEMESTER- IV**

**SUBJECT- ZOOLOGY – THEORY QUESTION PAPER PATTERN**

**Maximum Marks – 50** **Time – 3 Hours**

**Note : 1) All questions are compulsory**

**2) All questions carry equal marks**

**3) Draw well labeled diagram wherever necessary**

Q1) Unit I – Long question – 10 Marks

Or

a. Short question – 05 Marks

b. Short question – 05 Marks

Q2) Unit II – Long question – 10 Marks

Or

a. Short question – 05 Marks

b. Short question – 05 Marks

Q3) Unit III – Long question – 10 Marks

Or

a. Short question – 05 Marks

b. Short question – 05 Marks

Q4) Unit IV – Long question – 10 Marks

Or

a. Short question – 05 Marks

b. Short question – 05 Marks

Q5) Write short notes on any 10 out of 12(3 questions from each units) – 10 Marks