

## Choice Based Credit System (CBCS)

"Education for Knowledge, Science and Culture"

-Shikshanmaharshi Dr. Bapuji Salunkhe

Shri Swami Vivekanand Shikshan Sanstha's

# VIVEKANAND COLLEGE, KOLHAPUR (AUTONOMOUS)



(Affiliated to Shivaji University Kolhapur)  
NAAC Reaccredited: "A" with CGPA 3.24

## Revised Syllabus For Zoology **B. Sc. Part- II**

Syllabus to be implemented from  
July, 2022 onwards

**B.Sc. II Subject Zoology Choice Based Credit System (CBCS)**

**MARKING SCHEME**

Sr. No	Internal Examination DSC Course				Total (a+b+c+d)	Conversion of 70 marks in Total(I) (e)	SEE (Semester End Examination) DSC Course		Total (II) (f+g) = h	Total (I and II) (e+h) = i
<b>1</b>	Paper-III Mammalian Physiology and Biochemistry-I (DSC1008C)	Paper-III Mammalian Physiology and Biochemistry-II (DSC1008C)	Home assignment	Home assignment			Paper-I (f)	Paper-II (g)		
	Section -I (Two tests each of 10 marks) (a)	Section -II (Two tests each of 10 marks) (b)	Section- I (c)	Section -II (d)						
<b>1</b>	20	20	15	15	70	<b>30</b>	35	35	<b>70</b>	<b>100</b>
<b>1</b>	Paper-IV Cell Biology, Genetics, Evolution and Ethology-I (DSC1008D)	Paper-IV Cell Biology, Genetics, Evolution and Ethology-II (DSC1008D)	Home assignment	Home assignment			Paper-I (f)	Paper-II (g)		
	Section- I (Two tests each of 10 marks) (a)	Section- II (Two tests each of 10 marks) (b)	Section- I (c)	Section - II (d)						
<b>1</b>	20	20	15	15	70	<b>30</b>	35	35	<b>70</b>	<b>100</b>

**Practical Examination B.Sc. II**

Sr. No.	Lab work	Journal (Punctuality, Neatness)	Attendance, and participation in the practical's, motivation	Total
1	40	5	5	50

## Structure of Examination

### SCHEME OF MARKING (THEROY)

Sem.	Core Course	Credit	Marks	Evaluation	Sections	Answer Books	Standard of passing
III	Mammalian Physiology and Biochemistry (DSC1008C)	4	70	Semester wise	Section- I (35 Marks)  Section-II (35 Marks)	As per Instruction	35% (25 Marks)
IV	Cell Biology, Genetics, Evolution and Ethology (DSC1008D)	4	70	Semester wise	Section- I (35 Marks)  Section -II (35 Marks)	As per Instruction	35% (25 Marks)

### SCHEME OF MARKING – CIE (Continuous Internal Evaluation)

Sem.	Core Course	Credit	Marks	Evaluation	Sections	Answer Books	Standard of passing
III	DSC1008C	2	30	Concurrent	-	As per Instruction	35% (11 marks)
IV	DSC1008D	2	30	Concurrent	-	As per Instruction	35% (11 marks)

### SCHEME OF MARKING (PRACTICAL)

Sem.	Course	Marks	Evaluation	Sections	Standard of passing
III and IV	DSC1008 C & D (PR)	100	Annual	As per Instruction	35% (35 marks)

### SKILL ENHANCEMENT COURSE (SEC)

Semester	Course	Credit	Course Title
III	SEC-1	2	Medical diagnostics
IV	SEC-2	2	Public Health and Hygiene

\*A separate passing is mandatory

## **Aim**

- To impart the knowledge of animal science.
- To use the knowledge in their daily life and aware of natural resources and environment.
- To provide practical experiences and skill development which enhance students learning processes.
- To increase scientific aptitude among the students.
- To encourage stakeholders to take life science as a carrier in future.
- To make the students fit for the society.

## **Objectives**

- To impart knowledge about life science.
- The students are expected to acquire the knowledge of animal science, natural phenomenon, conservation of nature & environment.
- Understanding the scientific terms, concepts, facts, phenomenon & their interrelationships.
- Applications of the knowledge for society development.
- To develop skills in practical work, experiments & laboratory materials.
- To develop scientific attitude for critical observations, thinking, problem solving, curiosity in the zoology.
- To develop abilities to apply scientific methods, collection of scientific data, organize science exhibitions, clubs etc.
- To expand scientific contributions of among the students,
- To develop scientific methods, scientific programs etc. among the students

**Shri Swami Vivekanand Shikshan Sanstha's  
VIVEKANAND COLLEGE KOLHAPUR (AUTONOMOUS)  
B. Sc. Part – II CBCS Syllabus with effect from June, 2022  
ZOOLOGY-DSC -1008C  
Semester: III Zoology-Paper- III  
Mammalian Physiology and Biochemistry  
Theory: 60 Hours - (75 lectures of 48 minutes) Credits -04**

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**SECTION I**

**UNIT- I**

**Nerve and Muscle (9hrs.)**

Structure of a neuron, Resting membrane potential, Origin of action potential and its propagation in myelinated and non-myelinated nerve fibers, Neurotransmitter, Synapse-Electrical and chemical synapse. Ultra-structure of skeletal muscle, Molecular and chemical basis of muscle contraction

**Digestion (5 hrs.)**

Brief account of alimentary canal and digestive glands, Physiology of digestion in the alimentary canal; Absorption of carbohydrates, Proteins, Lipids

**UNIT- II**

**Respiration (6 hrs.)**

Pulmonary ventilation, Respiratory volumes and capacities, Transport of oxygen and Carbon dioxide in blood, Haldane effect, Bohr's effect, Chloride shift.

**Excretion (5 hrs.)**

Structure of nephron, Glomerular capsule, Mechanism of Urine formation, Counter-current Mechanism.

**Cardiovascular system (5 hrs.)**

Composition of blood, Origin and conduction of the cardiac impulse, cardiac cycle

## SECTION II

### UNIT- III

#### **Endocrine Glands**

**(6 hrs.)**

Structure and function of Hypothalamus, Pituitary, Thyroid, Parathyroid, Adrenal

#### **Carbohydrate Metabolism**

**(7 hrs.)**

Structure of Carbohydrate, Glycolysis, Krebs cycle, Pentose phosphate pathway, Electron transport chain

### UNIT- IV

#### **Lipid Metabolism**

**(6 hrs.)**

Structure of lipids, Types of lipids, Biosynthesis and  $\beta$  oxidation of palmitic acid

#### **Protein metabolism**

**(5 hrs.)**

Structure of amino acids, Types of proteins, Transamination, Deamination and Urea Cycle

#### **Enzymes**

**(6 hrs.)**

Introduction, Mechanism of action, Factors affecting enzyme activity, Inhibition and Regulation of enzyme action

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Semester: IV      Zoology-Paper- IV  
Cell Biology, Genetics, Evolution and Ethology  
Theory: 60 Hours - (75 lectures of 48 minutes) Credits -4**

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**SECTION I**

**UNIT-I**

**Structure of Biomolecules - DNA, RNA and its types** (3 hrs)

**Ultra-structure of cell organelle** (8 hrs)

Structure of prokaryotic and eukaryotic cell, Ultra structure and function of – Plasma membrane, Nucleus, Mitochondria, Golgi apparatus, Endoplasmic reticulum, Ribosome, lysosomes  
Introduction to cell cycle and cell division

**Mendelian Genetics and its Extension** (6 hrs.)

Terminology in genetics, Principles of inheritance, Chromosomal theory of inheritance, Incomplete dominance and codominance, Multiple alleles with respect to ABO

**UNIT-II**

**Linkage, Crossing Over** (4 hrs.)

Types of linkage and mechanism of crossing over, Cytological evidence of crossing over, Significance of crossing over

**Mutations** (5 hrs.)

Chromosomal mutations: Deletion, Duplication, Inversion, Translocation, Aneuploidy and Polyploidy, Gene mutations: Induced versus Spontaneous mutations, Frameshift mutation, Point mutation

**Sex Determination** (5 hrs.)

Dosage compensation, Chromosomal theory of sex determination, Sex linked inheritance, Geneic balance theory, Haploidy-diploidy mechanism, Environmental sex determination

## SECTION II

### UNIT-III

**History of Life** (3 hrs.)

Major events in history of life, Geological time scale

**Introduction to Evolutionary Theories** (3 hrs.)

Lamarckism, Darwinism, Neo-Darwinism

**Evolutionary Change** (5 hrs.)

Organic variations, Isolating mechanisms, Natural selection (Example: Industrial melanism);  
Types of natural selection (Directional, Stabilizing, Disruptive), Artificial selection

### UNIT-IV

**Direct Evidences of Evolution** (4 hrs.)

Types of fossils, Process of fossilization, Dating of fossils

**Species Concept** (4 hrs.)

Biological species concept (Advantages and limitations); Modes of speciation (Allopatric, Sympatric, Peripatric and Parapatric)

**Extinction** (4 hrs.)

Mass extinction (Causes, Names of five major extinctions, K-T extinction in detail), Role of extinction in evolution

**Ethology** (7 hrs.)

Classification of Animal behavior, Inborn and instinct behavior with suitable example, Acquired animal behavior- imprinting, conditioning, habitual, reasoning

Types of mimicry- protective and aggressive, Types of coloration- protective aggressive and warning, Social behavior in animals-honey bee and ant.



## **ZOOLOGY LAB (III): DSC 1008C (PRACTICAL)**

### **Mammalian Physiology and Biochemistry**

**Credits-02**

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1. Preparation of hemin crystals
2. Detection of blood groups
3. Detection of bleeding and clotting time of own blood.
4. Erythrocyte Sedimentary Rate (E.S.R)
5. Estimation of Hb by Sahli's haemometer
6. Counting of RBCs and WBCs
7. Measurement of human blood pressure
8. Interpretation of ECG.
9. Study of permanent histological sections of mammalian pituitary, thyroid, pancreas, adrenal gland, testes, ovary
10. Study of permanent slides of spinal cord, duodenum, liver, lung, kidney, bone, cartilage
11. Estimation of glucose by using standard methods
12. Detection of amino acids by paper chromatography
13. Qualitative tests to identify proteins and lipids in given sample
14. Qualitative tests to identify carbohydrates in given solutions (Glucose, Fructose, Sucrose, Lactose, Starch)
15. Estimation of total protein in given solutions by Lowry's method/Biuret method.
16. Study of activity of salivary amylase under optimum conditions (pH and temperature)
17. Detection of abnormal urine constituents from given sample
18. Project report

## **ZOOLOGY LAB (III): DSC 1008D**

### **Practical Based on**

### **Cell biology, Genetics, Evolution and Ethology**

**Credits- 02**

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1. Temporary preparation of nucleus from W.B.Cs.
2. Mitochondria staining by Janus Green B
3. To observe Barr bodies from given sample
4. To study mitosis in onion root tip
5. Study of polytene chromosome
6. Isolation of DNA from given sample
7. Study of Mendelian Inheritance and gene interactions (Non-Mendelian Inheritance) using suitable examples
8. Study of Linkage, recombination using the given data
9. Study of Human karyotypes (normal and abnormal)
10. Study of fossil evidences from plaster cast models and pictures
11. Study of homology and analogy from suitable specimens/ pictures
12. Charts:
  - a. Phylogeny of human evolution
  - b. Darwin's finches with diagrams/ cut outs of beaks of different species
13. To study positive and negative phototropism with suitable example
14. To study positive and negative chemotactic response with suitable example
15. To study coloration as adaptive behavior in animals with suitable example
16. Visit to natural history museum/study tour/visit to educational institutes

## SUGGESTED READINGS

1. Gardner, E.J., Simmons, M.J., Snustad, D.P. (2008). *Principles of Genetics*. VIII Edition. Wiley India.
2. Snustad, D.P., Simmons, M.J. (2009). *Principles of Genetics*. V Edition. John Wiley and Sons Inc.
3. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). *Concepts of Genetics*. X Edition. Benjamin Cummings.
4. Russell, P. J. (2009). *Genetics- A Molecular Approach*. III Edition. Benjamin Cummings.
5. Griffiths, A.J.F., Wessler, S.R., Lewontin, R.C. and Carroll, S.B. *Introduction to Genetic Analysis*. IX Edition. W. H. Freeman and Co.
6. Ridley, M. (2004). *Evolution*. III Edition. Blackwell Publishing  
Barton, N. H., Briggs, D. E. G., Eisen, J. A., Goldstein, D. B. and Patel, N. H. (2007).
7. *Evolution*. Cold Spring, Harbour Laboratory Press.
8. Hall, B. K. and Hallgrímsson, B. (2008). *Evolution*. IV Edition. Jones and Bartlett Publishers
9. Campbell, N. A. and Reece J. B. (2011). *Biology*. IX Edition, Pearson, Benjamin, Cummings.
10. Douglas, J. Futuyma (1997). *Evolutionary Biology*. Sinauer Associates.
11. Tortora, G.J. and Derrickson, B.H. (2009). *Principles of Anatomy and Physiology*, XII Edition, John Wiley & Sons, Inc.
12. Widmaier, E.P., Raff, H. and Strang, K.T. (2008) *Vander's Human Physiology*, XI Edition., McGraw Hill
13. Guyton, A.C. and Hall, J.E. (2011). *Textbook of Medical Physiology*, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company
14. Berg, J. M., Tymoczko, J. L. and Stryer, L. (2006). *Biochemistry*. VI Edition. W.H Freeman and Co.
15. Nelson, D. L., Cox, M. M. and Lehninger, A.L. (2009). *Principles of Biochemistry*. IV Edition. W.H. Freeman and Co.
16. 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.

## SKILL ENHANCEMENT COURSE (SEC)

### MEDICAL DIAGNOSTICS (SEC-1) (Credits 2)

**Unit 1: Introduction to Medical Diagnostics and its Importance** (2 hrs.)

**Unit 2: Diagnostics Methods Used for Analysis of Blood** (10 hrs.)

Blood composition, Preparation of blood smear and Differential Leucocyte Count (D.L.C) using Leishman's stain, Platelet count using hemocytometer, Erythrocyte Sedimentary Rate (E.S.R), Packed Cell Volume (P.C.V.)

**Unit 3: Diagnostic Methods Used for Urine Analysis** (6 hrs.)

Urine Analysis: Physical characteristics; abnormal constituents

**Unit 4: Non-infectious Diseases** (6 hrs.)

Causes, Types, Symptoms, Complications, Diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

**Unit 5: Infectious Diseases** (3 hrs.)

Causes, Types, Symptoms, Diagnosis and prevention of Tuberculosis and Hepatitis

**Unit 6: Tumours** (3 hrs.)

Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray of Bone fracture, PET, MRI and CT scan (using photographs).

### SUGGESTED READINGS

- Park, K. (2007), *Preventive and Social Medicine*, B.B. Publishers
- Godkar P.B. and Godkar D.P. *Textbook of Medical Laboratory Technology*, II Edition, Bhalani Publishing House
- Cheesbrough M., *A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses*
- Guyton A.C. and Hall J.E. *Textbook of Medical Physiology*, Saunders
- Robbins and Cortan, *Pathologic Basis of Disease*, VIII Edition, Saunders
- Prakash, G. (2012), *Lab Manual on Blood Analysis and Medical Diagnostics*, S. Chand and Co. Ltd.

## **PUBLIC HEALTH AND HYGIENE (SEC-2)**

**(Credits 2)**

### **Unit-I: Maintenance of personal hygiene**

**(3hrs.)**

Introduction to public health and hygiene- Role of health education in environment improvement and prevention of diseases. Personal hygiene, oral hygiene and sex hygiene.

### **Unit-II: Nutrient deficiency diseases**

**(8 hrs.)**

Classification of food into micro and macro nutrients. Balanced diet, Malnutrition anomalies – Anemia (Iron and B12 deficiency), Kwashiorkor, Marasmus, Rickets, Goiter (cause, symptoms, precaution and cure). Substitution of diet with required nutrients to prevent malnutrition disorders

### **Unit-III: Communicable and contagious diseases**

**(10 hrs.)**

Infectious agents responsible for diseases in humans. Communicable viral diseases- measles, chicken pox, dengue, chikungunya, rabies, and hepatitis. Communicable bacterial diseases- tuberculosis, typhoid, cholera, tetanus, sexually transmitted diseases- AIDS, Health education and preventive measures for communicable diseases

### **Unit-IV: Non-communicable diseases and cure**

**(9 hrs.)**

Non-communicable diseases such as Osteoporosis, osteoarthritis and rheumatoid arthritis-cause, symptom, precautions. Diabetes- types and their effect on human health. Gastrointestinal disorders- acidity, peptic ulcer, constipation, piles (cause, symptoms, precaution and remedy) etc. Obesity (Definition and consequences). Mental illness (depression and anxiety).

## **SUGGESTED READINGS**

1. Mary Jane Schneider (2011) Introduction to Public Health.
2. Muthu, V.K. (2014) A Short Book of Public Health.
3. Detels, R. (2017) Oxford Textbook of Public Health (6th edition).
4. Gibney, M.J. (2013) Public Health Nutrition.
5. Wong, K.V. (2017) Nutrition, Health and Disease.

**B. Sc. Part – II Zoology**  
**Mammalian Physiology and Biochemistry (DSC1008C)**  
**Cell Biology, Genetics, Evolution and Ethology (DSC1008D)**

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**Nature of Question Paper**

- Instructions:** 1) All the questions are **compulsory**.  
2) Figures to the right indicate **full** marks.  
3) Draw neat labelled diagrams **wherever** necessary.

**Time: 2 hours**

**Total Marks: 35**

**SECTION-I**

**Q.1. A) Multiple choice questions** **(5)**

- i).....  
A)            B)            C)            D)
- ii).....  
A)            B)            C)            D)
- iii).....  
A)            B)            C)            D)
- iv).....  
A)            B)            C)            D)
- v).....  
A)            B)            C)            D)

**Q.1. B) Fill in the blanks.** **(2)**

- i).....
- ii) .....

**Q.2. Attempt any two.** **(16)**

- i)
- ii)
- iii)

**Q.3. Attempt any three.** **(12)**

- i)
- ii)
- iii)
- iv)
- v)

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**Nature of Question Paper**

- Instructions:** 1) All the questions are **compulsory**.  
2) Figures to the right indicate **full** marks.  
3) Draw neat labelled diagrams **wherever** necessary.

**Time: 2 hours**

**Total Marks: 35**

**SECTION-II**

**Q.1. A) Multiple choice questions** **(5)**

- i).....  
A)            B)            C)            D)
- ii).....  
A)            B)            C)            D)
- iii).....  
A)            B)            C)            D)
- iv).....  
A)            B)            C)            D)
- v).....  
A)            B)            C)            D)

**Q.1. B) Fill in the blanks.** **(2)**

- i).....
- ii) .....

**Q.2. Attempt any two.** **(16)**

- i)
- ii)
- iii)

**Q.3. Attempt any three.** **(12)**

- i)
- ii)
- iii)
- iv)
- v)

**Practical Based on  
Mammalian Physiology and Biochemistry (DSC 1008C)  
Practical Examination-I**

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**Practical Skeletal Question Paper**

**Total Marks: 50**

Q.1. Experiment on Physiology	10 marks
Q.2. Experiment on Physiology -Enzymes	07 marks
Q.3. Experiment on Biochemical test	07 marks
Q.4. Chromatography	06 marks
Q.5. Spotting	10 marks
Q.6. Project/field study report/ viva	05 marks
Q.7. Journal	05 marks

**Practical's based on  
Cell Biology, Genetics, Evolution and Ethology (DSC 1008D)  
Practical Examination-II**

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**Skeletal Question Paper**

**Total Marks: 50**

Q.1. Cytological preparation/Isolation	10 marks
Q.2. Temporary preparation	10marks
Q.3. Examples based on Genetics	08 Marks
Q.4. Ethology	06 Marks
Q4. Spotting	06 marks
Q5. Study tour and Viva voce	05 marks
Q6. Journal	05 marks

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## **B.Sc. II Course outcomes (COs)**

### **Paper III- Physiology and Biochemistry**

**After completion of this course students will be able to**

- Understand how different system works coordinated to maintain homeostatic in the body.
- Illustrate the endocrine system, carbohydrate, lipid and protein metabolism.
- Apply the knowledge of physiology and biochemistry in disease /health related problem.
- Distinguish the functioning of organs and cells of which they composed.
- Interpret the biochemical pathways and enzyme action.
- Compile interaction and interdependence of physiological and biochemical process.

### **Paper IV CELL BIOLOGY GENETICS, EVOLUTION AND ETHOLOGY**

**After completion of this course students will be able to:**

- Define the basic terms in cell biology and genetics.
- Explain the ultra-structure and function of cell organelle.
- Explain phenomenon of genetics and genetic mutations.
- Interpret the process of origin of evaluation and its evidences.
- Able to understand the sex determination mechanism in animals.
- Able to understand the animal behavior.