Bagalkot University, Jamkhandi
Zoology Syllabus for B.Sc.III and IV semester under CBCS scheme

BAGALKOT UNIVERSITY

Mudhol Road, Jamkhandi-587301 Dist: Bagalkot

PROGRAM /COURSE STRUCTURE AND SYLLABUSFOR ZOOLOGY

As per the Choice Based Credit System (CBCS) designed inaccordance with Learning Outcomes-Based Curriculum Framework (LOCF)

For

Bachelor of Science with ZOOLOGY
(General Degree)
III and IV Semester

w.e.f.

Academic Year 2025-26

PROGRAM STRUCTURE

Syllabus and Credits Structure under Choice Based Credit System [CBCS] General Degree for the Three YearsB.Sc. with Zoology Undergraduate Programme with effect from 2025-26

Third Semester B.Sc. (Zoology) Scheme

SEMESTER-III											
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/ week**			**Credits**	**Duration of Exam** (Hrs)	**Teaching Department**
			IA	**SEE**	**Total**	**L**	**T**	**P**			
L5	------	Language-I	20	80	100	4	-	-	3	3	-------
L6	-------	Language-II	20	80	100	4	-	-	3	3	----------
Major DSC-7	2A3ZM03T	Animal Physiology and Biochemistry	20	80	100	4	-	-	3	3	Zoology
	2A3ZM03L	Animal Physiology and Biochemistry	10	40	50	-	-	4	2	3	Zoology
Major-DSC-8	------	Major Subject 2	20	80	100	4	-	-	3	3	- - -
	-------	Practical	10	40	50	-	-	4	2	3	- - -
Major-DSC-9	-----	Major Subject 3	20	80	100	4	-	-	3	3	- - -
	------	Practical	10	40	50	-	-	4	2	3	- - -
CEC-1	2A3ZOOCEC.1.T	Insect Vectors and Diseases	20	80	100	3	-	-	3	3	
Total Marks					**750**	**Semester Credits**			**24**		

Fourth Semester B.Sc. (Zoology) Scheme

	SEMESTER-IV										
Category	**Course code**	**Title of the Paper**	**Marks**			**Teaching hours/ week**			**Credits**	**Duration of exams (Hrs)**	**Teaching Department**
			IA	**SEE**	**Total**	**L**	**T**	**P**			
L7	----	English	20	80	100	4	-	-	3	3	------
L8	----	Kannada/Hindi /Sanskrit/Urdu/ Marathi/Arabic	20	80	100	4	-	-	3	3	------
Major-DSC-10	2A4ZM04T	Genetics, Evolution and Developmental Biology	20	80	100	4	-	-	3	3	Zoology
	2A4ZM04L	Genetics, Evolution and Developmental Biology	10	40	50	-	-	4	2	3	Zoology
Major-DSC-11	----	Major Subject 2	20	80	100	4	-	-	3	3	----
	----	Practical	10	40	50	-	-	4	2	3	----
Major-DSC-12	----	Major Subject 3	20	80	100	4	-	-	3	3	----
	----	Practical	10	40	50	-	-	4	2	3	
CEC-2	2A4ZOOCEC.2.T	Reproductive Biology	20	80	100	4	-	-	3	3	———
SEC	**2A4ZOOSEC.01**	Vermiculture and Vermicompostin g	10	40	50	2	-	2	2	2	———
Total Marks					**800**	**Semester Credits**			**26**		

B.Sc. III- Semester ZOOLOGY (Theory) DSC-7

Course Code: 2A3ZM03T | **Paper Title: Animal Physiology and Biochemistry**

Teaching Hours / Week: 4 | **Total Marks: Th- 80 + IA- 20 = 100**

Total Teaching Hours: 52 | **Credits: 3**

Course Outcomes (CO's): At the end of the course students will be able to

1. Understand the Process taking place in the different organ systems in relation to their secretions, functions of the respective organs.
2. Physical activities, Chemical reactions and cycles taking place within the cells.
3. Knowledge of Enzymatic actions within cell.

Units	(Course Content)	Hours
Unit-I	**Structure and Functions of Biomolecules:** Structure and biological importance of Carbohydrates and Lipids (Saturated and Unsaturated Fatty Acids, Tri-glycerol's, Phospholipids, Glycolipids and Steroids). Structure, **Classification and General properties of α – amino acids** (Essential and Non-essential amino acids) Levels of Organizations in Proteins: Simple and Conjugate Proteins**.** **Carbohydrate Metabolism:** Glycolysis, Krebs Cycle, Gluconeogenesis, Glycogen metabolism.	**13**
Unit-II	**Vitamins:** Classification, (Fat soluble and Water-soluble vitamins), Physiological role and disorders. **Enzymes:** Introduction, Classification of Enzymes, Isoenzymes, Mechanism of Enzyme action, Enzyme inhibitors, Specificity of enzymes, reversibility of Enzyme action, Factors affecting rate of enzyme catalyzed reaction. Brief account of co-enzymes and Co-factors. Clinical importance of enzymes.	**13**
Unit-III	**Digestion:** Structure and functions of gastro-intestinal glands. Mechanical and chemical digestion of food: Absorption of carbohydrates, lipids, proteins, water, minerals and vitamins. **Respiration:** Mechanism of respiration, Pulmonary ventilation, Transport of Oxygen and Carbon Dioxide in blood, Chloride shift, and Respiratory pigments. **Excretion:** Structure of Nephron, Mechanism and physiology of Urine formation, Ornithine cycle.	**13**
Unit-IV	**Circulation:** Components of blood and their functions, Hemopoiesis. Blood clotting mechanism. Structure of mammalian heart, Cardiac cycle, Cardiac output and its regulation, ECG. **Nervous System**: Structure of neuron, resting membrane potential. Origin of action potential and its propagation across the myelinated and non-myelinated nerve fiber. Types of synapses. **Muscular System:** Ultrastructure of Skeletal muscle. Molecular basis of muscle, Sliding filament theory of muscle contraction, Muscle twitch, Motor unit.	**13**

SUGGESTED READINGS:

1. Essentials of Animal Physiology by Rastogi S C. New Age International Publishers, New Delhi.
2. By Nigam H C. Vishal Publishing Co. New Delhi
3. Animal Physiology by P S Verma, V K Agarwal and B S Tyagi. S Chand & Company Ltd, New Delhi
4. Lehninger Principles of Biochemistry by Nelson D L Publisher: W H Freeman & Co
5. Biochemistry By Mathews Van Holde Publisher. Ahren Pearson Education 2000.
6. Animal Physiology by Schmidt Nielson Cambridge University Publications
7. Cells and Tissues: Introduction to Histology by N D Cells and Rogers. A W Academic Press
8. Basic medical Histology: Biology of cells, tissues and organs By Kessel Richard G Oxford University Press
9. Textbook of Histology by Bloom and Fawcett. Saunders Publishers Philadelphia
10. Bailey's Textbook of Histology by W M Copenhaver, R P Bunge and Mary B Bunge. Willims and Wilkins Company, Baltimore

B.Sc. III- Semester ZOOLOGY (Practical's)-DSC-7P

Course Code: 2A3ZM03L | **Paper Title: Animal Physiology and Biochemistry**

Teaching Hours / Week: 4 | **Total Marks: Th- 40 + IA- 10 = 50**

Total Teaching Hours: 40 | **Credits: 2**

Course Outcomes (CO's): At the end of the course students will be able to

1. Develop the skills like keen observation, analysis and confer the Physiological samples.
2. Know the uniqueness of Enzymes and their reactions.
3. Develop the skill to identify the different types of blood cells.
4. Develop the skill to count the RBC's and WBC's and to identify and count its different types of blood cells.
5. Develop the skill to identify the HB %, Blood glucose level and to prepare Hematin crystal.

(Course Content)	Hours
1. Qualitative analysis of Carbohydrates, Proteins and Lipids. 2. Qualitative analysis of Nitrogenous wastes – Ammonia, Urea and Uric acid 3. Separation of Amino acids or Proteins by Paper Chromatography.	**10**
4. Estimation of total protein in given solutions by Lowry's method. 5. Determination of the activity of enzyme Urease. 6. Study of activity of Salivary amylase under optimum conditions. 7. Determination of HB% in human blood using Sahli's Haemometre.	**10**
8. Hematin Crystal preparation. 9. Counting of RBCs from Human blood using Hemocytometer. 10.Counting of WBCs from Human blood using Hemocytometer 11. Differential count of WBCs using Leishmania stain.	**10**
12. Record of Blood glucose level using Glucometer. 13. To study the Enzymatic activity of Trypsin and Lipase. 14. To perform the Acid and Alkaline phosphatase assay from serum/ tissue. 15. Any other practical depending on feasibility.	**10**

SUGGESTED READINGS:

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

2.Widmaier, E.P., Raff, H. and Strang, K.T. (2008) *Vander's Human Physiology*, XI Edition., McGrawHill

3.Guyton, A.C. and Hall, J.E. (2011). T*ext book of Medical Physiology*, XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company

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

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

6.Murray, R.K., Granner, D.K., Mayes, P.A. and Rodwell, V.W. (2009). *Harper'sIllustrated Biochemistry*. XXVIII Edition. Lange Medical Books/McGraw3Hill.

B.Sc. III- Semester ZOOLOGY (Theory) CEC-1

Course Code: 2A3ZOOCEC.1.T | **Paper Title: Insect Vectors and Diseases**

Teaching Hours / Week: 4 | **Total Marks: Th- 80 + IA- 20 = 100**

Total Teaching Hours: 52 | **Credits: 3**

Course Outcomes (CO's): At the end of the course students will be able to

1. Explain the basic biology and life cycle of insect vectors.
2. Recognize morphological characteristics for identification of insect vectors, their types and developmental stages.
3. Explain the associations between insect vectors and humans.
4. Discuss the life cycle and importance of major parasites.
5. Analyse the medical and public health aspects of human parasitic infections.
6. Justify the control measures of insect vectors.
7. Understand the importance of hygiene with respect to epidemic diseases.

Units	(Course Content)	Hours
Unit-I	**Introduction to Insects:** General features of Insects, Morphological features, Head – Eyes. **Concept of Vectors:** Brief introduction of Carrier and Vectors (mechanical and biological vector), Reservoirs, Host-vector relationship, Adaptations as vectors.	**13**
Unit-II	**Insects as Vectors:** Classification of insects up to orders– Diptera, Siphonaptera, Siphunculata, Hemiptera **Dipterans as Disease Vectors:** Dipterans as important insect vectors – Mosquitoes, Houseflies; Study of mosquito-borne diseases – Malaria, Dengue, Chikungunya, Filariasis; Control of mosquitoes.	**13**
Unit-III	**Study of Sand fly-borne diseases** – Leishmaniasis, Phlebotomus fever; Control of Sand fly; Study of house fly as important mechanical vector, Myiasis, Control of house fly **Siphonaptera's as Disease Vectors:** Study of Flea-borne diseases – Plague, Typhus fever; Control of fleas.	**13**
Unit-IV	**Siphunculata as Disease Vectors:** Human louse (Head, Body and Pubic louse) as important insect vectors; Study of fever, Vagabond's disease, Phthiriasis; Control of human louse **Hemiptera as Disease Vectors** Bed bugs as mechanical insect vectors; Blood-sucking bugs; Chagas disease, Control and prevention of bugs.	**13**

SUGGESTED READINGS:

1. Imms, A.D. (1977). A General Text Book of Entomology. Chapman & Hall, UK
2. Chapman, R.F. (1998). The Insects: Structure and Function. IV Edition, Cambridge University Press, UK
3. Pedigo L.P. (2002). Entomology and Pest Management. Prentice Hall Publication
4. Mathews, G. (2011). Integrated Vector Management: Controlling Vectors of Malaria and Other Insect Vector Borne Diseases . Wiley-Blackwell
5. Imms, A.D. (1977). *A General Text Book of Entomology*. Chapman & Hall, UK
6. Chapman, R.F. (1998). *The Insects: Structure and Function.* IV Edition, Cambridge University Press, UK
7. Pedigo L.P. (2002). *Entomology and Pest Management.* Prentice Hall Publication
8. Mathews, G. (2011). *Integrated Vector Management: Controlling Vectors of Malariaand Other Insect Vector Borne Diseases*. Wiley-Blackwell
9. Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007). *Biology of Disease.*Taylor and Francis Grou

B.Sc. IV- Semester ZOOLOGY (Theory) DSC-10

Course Code: 2A4ZM04T Paper Title: **Genetics, Evolution and Developmental Biology**

Teaching Hours / Week: 4 **Total Marks: Th- 80 + IA- 20 = 100**

Total Teaching Hour: 52 **Credits: 3**

Course Outcomes (CO's): At the end of the course students will be able to

1. Understand Mendelian and Non-Mendelian inheritance
2. Concept behind genetic disorder, gene mutations- various causes associated with inborn errors of metabolism
3. Theories of Evolution
4. Knowledge of eras and evolution of species
5. Imparts knowledge regarding the various theories of evolution, evolutionary process such as variation, speciation, natural selection, origin of primates and man
6. Basic concepts of developmental biology
7. Knowledge about genetics, developmental biology and organogenesis
8. Gains knowledge about gametogenesis, cleavage mechanisms, gastrulation and role of hormones in metamorphosis and regeneration

Units	(Course Content)	Hours
Unit-I	**Introduction to Genetics:** Basic principles of heredity: Mendel's laws – Mono and Dihybrid cross. Genetic terminologies, Genetic Variation, Molecular basis of Genetic information. **Mendelian Genetics**: Principles of Inheritance, Chromosomal theory of inheritance, Incomplete and Complete dominance. Multiple alleles, Lethal alleles, Sex Linked Inheritance. **Linkage, Crossing Over and Chromosomal Mapping:** Linkage and Crossing Over. Somatic cell genetics – an alternative to gene mapping.	**13**
Unit-II	**Mutations:** Chromosomal Mutations: Deletion, duplication, Inversion, Translocation, Aneuploidy and Polyploidy. **Gene Mutation**: Induced versus Spontaneous mutations. **Sex Determination**: Chromosomal mechanisms, dosage compensation **Theories of Evolution:** Lamarckism, Darwinism, Neo-Darwinism, Mutation Theory of Evolution. **Evidence in favor of organic evolution:** Fossilization, Types of fossils. Dating fossils. Paleontological evidence in favor of evolution.	**13**
Unit-III	**Process of Evolutionary Change:** Organic variations, Isolating Mechanisms, Natural Selection (Industrial Melanism) Artificial Selection. **Species Concept**: Biological species concept: Modes of Speciation (Allopatric and Sympatric) **Macro-evolution**: Macro-evolutionary Principles (Darwin's Finches) Direct Evidence of Evolution: Evolution of Horse and Man.	**13**

Unit-IV	**Introduction to Developmental Biology**; **Gametogenesis:** Spermatogenesis and Oogenesis **Fertilization:** External and internal fertilization **Embryonic membranes and early development of Chick:** Development, structure and functions of yolk sac, amnion, chorion and allantois. Structure of Hen's egg, cleavage, blastula, gastrulation, origin and structure of primitive streak, structure of 18, 24, 36 and 48-hours chick embryo. **Placenta:** Morphology and Histological based classification of Placenta and functions.	**13**

SUGGESTED READINGS:

1. Genetics By Kavita B Ahluwalia. Wiley Eastern Ltd, New Age International Ltd, NewDelhi
2. A text book of Genetics By H S Bhamrah and C M Chaturvedi. Anmol Publications Pvt. Ltd. NewDelhi
3. Cell Biology, Genetics, Molecular Biology, Evolution and Ecology By Dr P S Verma and Dr V K Agarwal. S Chand & Company Pvt. Ltd. NewDelhi
4. Principles of Molecular Genetics By S Sundara Rajan. Anmol Publications Pvt. Ltd
5. Genetics By P S Verma and V K Agarwal. S Chand & Company Pvt. Ltd. New Delhi
6. Principles of Genetics By Edmund W Sinnott, L C Dunn and T Dobzhanksy. Tata McGraw Hill Publishing Company, NewDelhi
7. Genetics By Monroe W Strickberger. Prentice Hall of India Pvt. Ltd, New Delhi
8. Evolution. Cold Spring, Harbour Laboratory Press.
9. Hall, B. K. and Hallgrimsson, B. Evolution. IV Edition. Jones and Bartlett Publishers
10. Douglas, J. Futuyma (1997). Evolutionary Biology. Sinauer Associates.
11. Gilbert, S. F. (2006). Developmental Biology, VIII Edition, Sinauer Associates,Inc., Publishers, Sunderland, Massachusetts, USA.
12. Balinsky, B.I. (2008). An introduction to Embryology, International Thomson Computer Press.
13. Carlson, Bruce M (1996). Patten's Foundations of Embryology, McGraw Hill,Inc.
14. Ridley, M (2004) Evolution (3rd edition) Backwell Publishing.
15. Hall, B.K. and Hallgrimson, B (2008) Evolution (4th edition) Jones and Barlett Publishers.
16. Developmental Biology: T. Subramanian, (Reprint), Narosa Publishing House PVT, Ltd,s, New Delhi

B.Sc. IV- Semester ZOOLOGY (Practical's)-DSC-10P

Course Code: 2A4ZM04L **Paper Title: Genetics, Evolution and Developmental Biology**

Teaching Hours / Week: 4 **Total Marks: Th- 40 + IA- 10 = 50**

Total Teaching Hours: 40 **Credits: 2**

Course Outcomes (CO's): At the end of the course students will be able to

1. Understand the Laws of Mendelian Genetics.
2. Develop the Skill to prepare Human Karyotype charts.
3. Gain the Knowledge of Homology and Analogy. Evolutionary stages of Horse and Man.
4. Develop the skill of Preparing Chick embryology slides and knowledge to decide the age of the embryo.

(Course Content)	Hours
1.Study of Mendelian Inheritance and Gene Interactions (Non-Mendelian Inheritance) using suitable example 2. Study of Mutant varieties of *Drosophila*. (Charts / Photographs).	**10**
3. Study of Human Karyotypes (Normal and Abnormal) 4. Study of Connecting links and Living fossils. (Specimens/Charts/Photographs)	**10**
5. Study fossils. (Use of models and pictures) 6. Study of Homology and Analogy from suitable specimens / charts. 7. Evolution of Horse and Human (Charts / models). Darwin's Finches with the use of (Charts / Photographs).	**10**
8. Study of Permanent slides of Chick embryos of 18, 24, 36 and 48 hours. 9. Preparation of Chick embryo slides through incubated Chick eggs up to 48 hours. 10. Any other practical depending on feasibility	**10**

SUGGESTED READINGS:

1.Snustad, D.P., Simmons, M. J. (2009). *Principles of Genetics*, V Edition, John Wiley & Sons.
2.Klug, W.S. Cummings, M. R. Spencer, C. A. (2012) Concepts of Genetics X Edition., Benjamin Cummings.
3.Ridley, M. (2004) Evolution III Edition, Blackwell Publishing.
4.Evolution Cold Spring, Harbour Laboratory Press,
5.Douglas, J. Futuyma (1997) Evolutionary biology. Sinauer Associates.
6.Balinsky, B. I. (2008) An Introduction to Embryology, International Thomson Computer Press.
7.Developmental Biology: Michael J. F. Barresi, Scott F. Gilbert, Oxford University Press. (2019).

B.Sc. IV- Semester ZOOLOGY-CEC-2

Course Code: 2A4ZOOCEC.2.T | **Paper Title: Reproductive Biology**
Teaching Hours / Week: 4 | **Total Marks: Th- 80 + IA- 20 = 100**
Total Teaching Hour: 52 | **Credits: 3**

Course Outcomes (CO's): At the end of the course students will be able to understand

1. Sex determination and differentiation of sex
2. The functions of gonadal hormones in male and female and their regulation.
3. Functional anatomy of male reproductive system.
4. Functional anatomy of female reproductive system.
5. The process of Assisted Reproductive Techniques and different contraceptive methods.

	Course Contents	Hours
Unit-I	**Reproductive Endocrinology: Hypothalamus, Pituitary gland,** Gonadal Hormones, Steroids, Glycoprotein Hypothalamo – hypophyseal gonadal axis, GnRH, Gonadotropins. **Sex determination**: Genetic determination of sex, XX and XY	**13**
Unit-II	**Male Reproductive System:** Anatomy of male reproductive system in human, Spermatogenesis and their hormonal regulation, Sertoli and Leydig cells; Accessory male reproductive organs; Epididymis, Vas deferens, Ejaculatory duct, Seminal vesicle, Prostate gland, Cowper's glands, Male sex hormones; Testosterone and DHT.	**13**
Unit-III	**Female Reproductive System:** Anatomy of female reproductive system in human, Oogenesis and their hormonal regulation, Ovulation. Reproductive cycles (human): menstrual cycle and their regulation. Accessory female reproductive organs: Oviduct, Uterus, Cervix and vagina, Fertilization of Ovum and sperm, Implantation; Gestation, Parturition and its hormonal regulation; Lactation.	**13**
Unit-IV	**Reproductive Health:** Infertility in male and female: causes, diagnosis and management; Assisted Reproductive Techniques: Induction of ovulation, AI, sperm banks, frozen embryos, IVF, ET, GIFT, ZIFT, ICSI, Surrogacy. **Contraceptive methods in male and female**: Natural methods, Barrier methods, IUD's, Hormonal contraceptive, surgical methods used in family planning	**13**

SUGGESTED READINGS

1. Knobil, E., and Neil, J. D. (Eds.) The Physiology of Reproduction. II Ed, Vol-I and II. Raven Press Ltd, 1994
2. Knobil, E., and Neil, J. D. (Eds.). Encyclopedia of Reproduction. Vol. I-IV. Academic Press, 1998
3. Saidapur, S. K. (Ed) Reproductive Cycles of Indian Vertebrates. Allied Publishers Ltd, New Delhi, 1989
4. Devaraj Sarkar, .Principles of Vertebrate Reproduction. Informatics Publishing Ltd
5. Saidapur, S. K. (Ed) Reproductive Cycles of Indian Vertebrates.Allied Publishers Ltd, New Delhi, 1989
6. Young,J.Z.TheLifeofVertebrates–IIIEd.(IndianEd)OxfordUnivPress,1981
7. Dingle, H.Migration: The Biology of Life on the Move.Oxford UnivPress, 1996
8. Degroot, L. J., and Neill, J. D. (Ed).Endocrinology- IV Ed, Vol. I-III. W.B. Saunders Company, 2001
9. Austin, C.R. and Short, R.V. reproduction in Mammals. Cambridge University Press.
10. Hatcher, R.A. et al. The Essentials of Contraceptive Technology. Population Information Programme.

SKILL ENHANCEMENT COURSE
IV-Semester B.Sc. (Zoology) SEC

Paper Code: 2A4ZOOSEC.01 **Paper Title: Vermiculture and Vermicomposting**

Teaching Hours: 1+ 2 =03 H / Week **Marks: Th- 40 +IA 10 = 50**
Total Hours: 26 **Credits: 2**

Course Outcome (COs): After completion of Skill Enhancement course, students will be able to:

1. Understands the importance of earthworms in maintaining soil quality.
2. Learns that the vermicomposting is an effective organic solid waste management method.
3. Gets acquainted with the importance of earthworms in agro -based economic activity.
4. Vermicomposting leads to organic farming and healthy food production.
5. Vermicomposting may be taken up as a small-scale industry by the farmers and unemployed youth.
6. Get jobs in teaching institutions or vermiculture units as technicians.
7. Learn the concept of vermicomposting as bio fertilizers thus student can become an entrepreneur after completion of the course.
8. Best opportunity for self-employment and lifelong learning with farmers.

Units	(Course Content)	Hours
Unit-I	Earthworm Diversity – Types of earthworms, Biology of earthworms and importance of earthworms. Scope of Vermiculture. Vermiculture techniques – Selection and collection of Species, Essential parameters for vermiculture –Bedding materials, Method of harvesting earthworm biomass.	**13**
Unit-II	Traditional composting - Organic waste degradation and management – problems in traditional composting, Vermicomposting-Types of vermicomposting, Chemical composition of vermicompost, storing and packing of vermicompost Applications of vermicomposting in agricultural and horticultural practices	**13**

List of the Experiments (Practical's):

1. Biology and life cycle of earthworm, Types of earthworms. Establishment of vermiculture unit, Preparation of bed, inoculation, composting process, harvesting of vermicompost and worms, Economic importance of vermicompost, vermiwash, Vermi-protein. Natural enemies of earthworms and their control measures
2. Visit to vermiculture farm to acquaint latest field techniques
3. Collection of native earthworm species to study habit and habitat.
4. Keys to identify different species of earthworms
5. Study of vermicomposting equipment and devices.
6. Preparation of vermibeds and their maintenance
7. Study of different vermicomposting methods.
8. Harvesting of compost and separation of worms,
9. Establishment of vermiwash unit,
10. Packaging, transport and storage of vermicompost.
11. Worm meal preparation, preservation and packing
12. Physico-chemical and estimation of vermicompost, vermiwash and Verm protein
13. Any other practical depending upon the feasibility

SUGGESTED READINGS:

1. Bhatt J.V. &S.R. Khambata (1959)—Role of Earthworms in Agriculture Indian Council of Agricultural Research, New Delhi
2. Edwards, C.A. and J.R. Lofty (1977) —Biology of Earthworms Chapman and Hall Ltd.,London.
3. Lee, K.E. (1985) —Earthworms: Their Ecology and Relationship with Soils and Land Use Academic Press, Sydney.
4. Dash, M.C., B.K.Senapati,P.C.Mishra(1980)—Verms and Vermicomposting Proceedings of the National Seminar on Organic Waste Utilization and Vermicomposting Dec. 5-8, 1984, (Part B),School of Life Sciences, Sambalpur University, Jyoti Vihar, Orissa.
5. Kevin,A and K.E.Lee(1989)—Earthworm for Gardeners and Fisherman (CSIRO, Australia, Division of Soils)
6. Satchel, J.E. (1983) —Earthworm Ecology Chapman Hall, London.
7. Wallwork, J.A. (1983) —Earthworm Biology Edward Arnold (Publishers)Ltd. London

Scheme of Semester End Practical Examination: 40 Marks

(Question Paper Pattern)

I/II/III/IV/V/VI SEMESTER B.Sc. PRACTICAL EXAMINATIONS

ZOOLOGY

COURSE CODE: COURSE TITLE

Assessment Distribution of Marks

(Perform all the experiments as per the instructions in each question)

1. Major Experiments	12 Marks
2. Minor Experiments	08 Marks
3. Identifications (A-D)	12 Marks
4. Viva	04 Marks
5. Journal	04 Marks

Total: 40 Marks

Note: Same Scheme may be used for IA (Formative Assessment) examination for 40 marks and converted to 10 IA marks

B.Sc. Theory Question Paper Pattern

I, II, III, IV, V and VI Semester End Examination

(CBCS Scheme-2024-25 onwards: Regular)

ZOOLOGY

Course Code:

Name of the Course

Time: 3 Hours **Max. Marks: 80**

PART – A

Q. No. I. Answer in brief *ANY TEN* of the following questions: **10X2= 20 Marks**

a)
b)
c)
d)
e)
f)
g)
h)
i)
j)
k)
l)

PART – B

Q. No 2.
a) **5 Marks**

b) **10 Marks**

Q. No 3.
a) **5 Marks**

b) **10 Marks**

Q. No 4.
a) **5 Marks**

b) **10 Marks**

Q. No 5.
a) **5 Marks**

b) **10 Marks**

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