Gondwana University, Gadchiroli

DIRECTION RELATING TO THE EXAMINATION LEADING TO THE THREE YEAR OF SCIENCE DEGREE WITH SEMESTER PATTERN

SCHEME AND SYLLABUS

Under National Education Policy 2020

Faculty- Science and Technology

Subject- Zoology

B.Sc. Semester –I&II

Session 2024-25

GONDWANA UNIVERSITY
GADCHIROLI
Proceedings of the meeting of BOS (UG) in Zoology

Reference: National Education Policy 2020 (NEP 2020) letter date 21/04/2023 and 29/04/2023

Agenda:

Approval of syllabus for BSc in Zoology theory and Practical and Scheme of examination for I and II semesters of Gondwana University, Gadchiroli.

Several discussions were held on following dates: 16 Cotober and and also on 03 May 2023 2023 to reach final consensus on final syllabus of B.Sc. Sem-I and II.

Resolution:

The proposed syllabus for BSc in Zoology theory and Practical and Scheme of examination for I and II semesters were scrutinized thoroughly, finalised with appropriate inclusion(s) and deletion(s) of content(s) and finally approved.

Members Participated

1. Dr. P. M. Telkhade, Dept of Zoology, Dr. Khatri Mahavidyalaya Chandrapur. Chairman

2. Dr. A.P. Sawane, Dept of Zoology, Anand Niketan College Warora. Member

3. Dr. R.R. Kulkarni, Dept of Zoology, Sardar Patel College Chandrapur. Member

4. Dr. S.R. Sitre, Dept of Zoology, N.S. College, Bhadrawati. Member

5. Dr. S.D. Misar, Dept of Zoology, Janata Mahavidyalaya . Member

6. Dr. A.S Bele, Dept of Zoology, Sardar Patel College Chandrapur. Member

7. Dr. Pankaj P. Chawahan, JSPM Arts and Science College Dhanora. Member

8. Dr. U.S. Indurkar, Dept of Zoology,. Dhyanesh Mahavidyalaya, Navergaon. Member

9. Dr. Amir A. Dhamani , Principal, Gramgeeta Mahavidyalaya Chimur. Member

10. Dr.Pravin P. Joshi , Dept of Zoology, Amolchand Mahavidyalaya Yeotmal. Member

The meeting concluded with the chairman thanking all members for their cooperation. The draft of new syllabus prepared submitted academic section of Gondwana University for approval and implementation.

Date:

Dr. P.M. Telkhade
CHAIRMAN BOS (UG)

Gondwana University, Gadchiroli
SCHEME AND SYLLABUS
Under National Education Policy 2020
B.Sc. Semester –I with Zoology

UG	Semester -I	Credit	Marks	Hours
Major + IKS-SS	Life and Diversity of Animals (Non-Chordata-Protozoa to Annelida) Course Code:1BSCZOO01	4- Theory 2- Practical	100+50 =150	L-60 hrs P-60 hrs
Major Elective	_			
Minor	_			
Open Elective (OE) Theory Paper	1.Vermiculture Course Code: 1BSCZOO02 2. Poultry Farming Course Code: 1BSCZOO03	2+2	50 50	L-30+30 hrs
VSC	Advanced Laboratory Practical Course Code: 1BSCZOO04	2X1	50	P-60 hrs
SEC	Clinical Instrumentation Technology Practical Course Code: 1BSCZOO05	2X1	50	P-60 hrs
VEC	Environmental Studies	2X1		
AEC		2X1		
IKS	Taxonomy and Evolution Course Code: 1BSCZOO06	2X1	50	L-30 hrs
OJT	_	20	400	

Abbreviations:
OE : Generic/ Open Electives
SEC: Skill Enhancement Courses
IKS: Indian Knowledge System
OJT: On Job Training: Internship/ Apprenticeship
CEP: Community engagement and service
RM: Research Methodology
AEC: Ability Enhancement Courses:
VEC: Value Education Courses
FP: Field: projects,
CC: Co-curricular Courses
RP: Research Project
VSEC/VSC: Vocational Skill and Skill Enhancement Courses

Gondwana University, Gadchiroli.

NEP 2020 U.G. PROGRAMME (FROM SESSION 2024-25)

Faculty Name : Science and Technology

Programme Name: UG Zoology

SEM -I

Core	Paper name	Theory / Practical	Teaching Scheme			Credit	Duration	Examination Scheme				
			Theory	Practical	Total			Max. Marks		Total	Minimum Marks	
								UA	CA		Theory	Practical /CA
Major (DSC) (4+2) 6	**Life and Diversity of Animal (Non-chordata- Protozoa to Annelida): T+P**	**T+P**	**60**	**60**	**120**	**4+2**	**90 D**	**80 30**	**20 20**	**100 50**	**40**	**25**
Major Elective (DSE)												
Minor												
OE (2+2) 4	**1. Vermiculture 2. Poultry Farming**	**Th Th**	**60**		**60**	**2+2**	**90 D**	**40 40**	**10 10**	**50 50**	**20 20**	**5 5**
VSC (2x1) 2	**Advanced Laboratory Practical**	**Prac**		**60**	**60**	**2**	**90 D**	**30**	**20**	**50**		**15+ 10**
SEC (2x1)2	**Clinical Instrument Technology**	**Prac**		**60**	**60**	**2**	**90 D**	**30**	**20**	**50**		**15+ 10**
VEC (2x1) 2	**Environmental Studies**					**2**	**90 D**					
AEC (2x1) 2						2						
IKS (2x1) 2	**Taxonomy and Evolution**	**Th**	**30**		**30**	**2**	**90 D**	**40**	**10**	**50**	**20**	**5**
Total Credit 20												
Total			190	240	430	20		290	110	400		

Core Course prerequisite: To study Zoology in undergraduate, student must have studied Biology or equivalent subject in Class 12.

GONDWANA UNIVERSITY, GADCHIROLI

NEP SYLLABUS

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

SUBJECT- ZOOLOGY, THEORY (CREDITS 4)

DISCIPLINE CORE (DSC) PAPER I

I Semester BSc Zoology
Core Course Content

Course Title/Code: ANIMAL DIVERSITY OF NON-CHORDATE (PROTOZOA TO ANNELIDA)	Course Credits: 6/ 150 Marks
Course Code: 1BSCZOO01	T-P per week: 4-4
Total Contact Hours: 60 for Theory / 60 period for Practical	Duration of Theory Exam: 3 Hour and For Practical:5 hrs
Theory Marks :80 Assessment Marks: 20	Practical Marks -30 and CA-20

Name of Paper- ANIMAL DIVERSITY OF NON-CHORDATE

(PROTOZOA TO ANNELIDA)

Unit 1: A) Phylum -Protozoa (15 Periods)

General characters and classification up to classes; Locomotory Organelles and locomotion inProtozoa. Nutrition and Reproduction in *Paramoecium*.

B) Phylum-Porifera

General characters and classification up to classes; Structure, Histology of body walland Canal System in *Sycon*

Unit 2: C) Phylum-Cnidaria (15 Periods)

General characters and classification up to classes; Structure and life cycle of *Obelia*,Polymorphism in Hydrozoa, Alternation of generation, Locomotion and Nutrition in *Hydra*, Nematocyst, Coral reef.

Unit 3: D) Phylum-Platyhelminthes (15 Periods) General characters and classification up to classes; Structure and Life history of *Taenia solium*

E) Phylum-Nemathelminthes

General characters and classification up to classes; Structure and Life history of A*scaris lumbricoides* and its parasitic adaptations.

Unit 4: F) Phylum-Annelida (15 Periods)

General characters and classification up to classes; *Hirudinaria*: External morphology, Digestive, excretory, Nervous system, Reproductive system, Copulation,Fertilization and Cocoon formation.

GONDWANA UNIVERSITY, GADCHIROLI

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

SUBJECT- ZOOLOGY, PRACTICAL I (CREDITS 2)

I. **Classification of Specimen (uptoclass)**

Protozoa – *Entamoeba, Euglena, Paramoecium*

Porifera – *Leucosolenia, Euplectella, Spongilla*

Coelenterata - *Aurelia, Tubipora, Adamsia.*

Platyhelminthes - *Planaria, Fasciola, Taenia.*

Aschelminthes- *Ascaris, Ancylostoma, Wuchereria*

Annelida – *Aphrodite, Neries, Pheretima, Hirudinaria*

II. Study of Slides:

Entamoeba, *Plasmodium*, Sponge gemmule, L.S. *Sycon*, *Obelia* medusa, Miracidium, Cercaria larva of *Fasciola*, T.S. *Ascaris* (male and female) , T.S. of Leech through crop.

III. Anatomical Observations

Anatomical observations, demonstration and detailed explanation of the following with thehelp of ICT tools/ models/ charts/ photographs etc.

a. Leech – Digestive – Excretory and reproductive system

b. Earthworm – Nervous system, Reproductive system

IV. Study of permanent Preparation of the following with the help of already availablematerial (Any three)

Obelia colony, sponge gemmules, sponge spicules, *Nereis* parapodia, Jaws of Leech, Nervering of earthworm

Distribution of Marks - Total Marks - 30

Practical examination - 30 **Duration - 4 Hours**

I.	Anatomical observation	05
II.	Identification and comment on spot (3 specimen & 2 slides)	10

III.	Field work (Submission)	05
IV.	Permanent stained micro-preparation (Comment + Diagram)	05
V.	Viva - Voce	03
VI.	Class record	02
	Total----------30	

Scheme for Practical Assignment
Marks - 20

Que. 1. General Characters, Classification and Life cycle ----------10

Que 2. Preparation of model or Chart or Poster ---------- 05

Que 3. Submission of Tour diary ---------- 05

Web References: Anatomy of earthworm: The dissection works (CD); www.scienceclass.com, www.neosci.com Cockroach dissection- www.ento.vt.edu

Pedagogy: Lectures, Presentations, videos, Labs, Assignments, Tests, Individual or group Field oriented Project Report on, Visit to one research institute/ one wild life sanctuary / museum / zoo.

Recommended Books -

Structure and function of Invertebrates

1. HymanL.H.The Invertebrate Vol.I, Protozoa through Ctenophora. McGraw-Hill Co., NewYork.
2. Barrington E.J.W. Invertebrate structure and function. Thomas Nelson and sons Ltd.,London.
3. Jagerstein G. Evolution of Metazoan life cycle .Academic press, New York and London.
4. Hyman L.H. The invertebrate vol. 2 McGraw-Hill Co., New York.
5. Hyman L.H. The invertebrate vol. 8 McGraw-Hill Co., New York.
6. Barnes R.D. Invertebrate Zoology W.B. Saunders and Co., Philadelphia
7. Russet HunterW.D.D. biology of higher invertebrate The Macmillan Co. Ltd., London.
8. Hyman L.H. The Invertebrates, smaller coelomate groups.Vol.5 McGraw-Hill Co. NewYork.
9. Read C.P. Animal Parasitism. Prentice Hall.New-Jersey.
10. KudoR.R.. (1966) Protozoology, Charler, C. Thomas Springfield, Illinois
11. Barradailes L.A. and potts F.A. Invertebrates (1961) The Eastham L.E. S. Saunders,Cambridge University Press, Cambridge.
12. Russel W.D.Hunter, Biology of lower invertebrates McMillan, New York
13. Marshall A.J. and Williams W.D. (1972) J. B. Zoology of Invertebrates ,ElBs andMcMillan, London.
14. Gtryyrt V. and Graham A. AFunctional anatomy of Invertebrates. Academic press, NewYork.

15. Backlemiccher W.N. Principles of comparative anatomy of Invertebrates Oliver andBoyed Edinberg.
16. HadisiJ.The Evolution of Metazoa.Pergamon Press, Oxford.
17. Dales R.P. Annelids, Hutchinson, London.
18. Green J.Biology of Crustacea, Wither by, London.
19. Morton J. E. Mollusca, Hutchinson, London.
20. Nichols D. Echinodermata, Hutchincon, London

GONDWANA UNIVERSITY, GADCHIROLI
NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-I
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
I Semester BSc Zoology
OE

Course Title/Code: **1) Vermiculture**	Course Credits: 2 each / 50 Marks each
Course Code: 1BSCZOO02	T- per week: 2
Total Contact Hours: 30+30 for Theory	Duration of TH Exam: 2 Hour
Theory papers Marks 40 each	Internal Assessment : 10 each

Name of Paper- VERMICULTURE

Unit – I **(8 Periods)**

- Introduction Vermiculture, Vermicompost and Vermiwash
- Earthworm species for vermicompost production
- Identification of earthworms species
- Worm related opportunities for farmers – Potential income diversification – sale of vermicompost, sale of worms.

Unit – II **(8 Periods)**

- Essential things for vermicompost production
- Common bedding materials and worm feed stocks
- Method of vermiwash production and their uses
- Moisture and aeration in vermicompost production

Unit –III **(8 Periods)**

- Vermicompost pit construction, Calculating rates of reproduction of worms
- Other important parameters for vermicompost production and vermiculture- PH, Salt Content, Urine content.
- Methods of Harvesting worms – Manual methods, Self Harvesting methods

- The value of vermicompost – Ability to stimulate plant growth, level of beneficial microorganisms, level of plant available nutrients, ability to repel pests.

Unit –IV **(8 Periods)**

- Pests and diseases of worms – moles, birds, centipedes, ants, mites, protein poisoning of worms.
- Vermicompost systems – Windrows, top feed windrows, beds or bins, flow through reactors.
- Vermicomposting and water quality issues, climate change factors, nutrient profile of vermicompost.
- Micronutrients in vermicompost and Growth promoter as vermiwash

Recommended Books :

- Vermicomposting - P.K.Gupta
- Earthworm in Agriculture – Talashikar and Dsoahni
- Organic Farming - A.K.Dahama
- Organic Farming – A.K.Sharma
- Soil Management and Organic Farming – S.C.Panda
- Bio-Fertilizer – A.K.Sharma
- Vermibiotechnology – L.S.Ranganathan
- Manual on Farm Vermicomposting and Vermiculture – Glenn Munroe, Organic Agriculture Centre of Canada.
- Myers Ruth (1969). The ABC's of Earthworm Business, Shields Publication, Wisconsin, USA, 64 pp.

GONDWANA UNIVERSITY, GADCHIROLI
NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-I
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
OE

Course Title/Code: **Poultry Farming**	Course Credits: 2 each / 50 Marks each
Course Code: 1BSCZOO03	T- per week: 2
Total Contact Hours: 30+30 for Theory	Duration of TH Exam: 2 Hour
Theory papers Marks 40 each	Internal Assessment : 10 each

Name of Paper- 2) Poultry Farming

Unit I (Introduction to poultry) **(8 Periods)**

1.General introduction to poultry farming – Definition of poultry, past and present scenario of poultry industry in india.

2.Principles of poultry housing, poultry house, system of poultry farming.

3.Management of chick, growers and layers, Management of Broilers.

4.Preparation of project report for banking and insurance.

Unit II (Feed, livestock health and harvesting eggs) (8 Periods)

1.Poultry feed management – principles of feeding, nutrient requirement for different stages of layers and broilers, feed formulation and method of feeding.

2.Poultry of diseases – viral, bacterial, fungal and parasitic (two each) symptom, control and management, vaccination programe.

3.Selection, care and handling of hatching egg, method of hatching.

4.Brooding and rearing, sexing of chick, farm and water hygiene

Unit III (Manufacturing of Egg product) (8 Periods)

1Physical and chemical changes in the stored Egg.

2.Functional properties of Egg

3.Product – Egg powder, liquid egg, restaurant products.

4.Industrial use of egg and egg product.

Unit IV (Quality of Egg and Sanitation) (8 Periods)

1.The nutritive value of Egg after cooking

2.Nutrative value of Egg, other advantage of Egg in India and developed countries

3.Types of detergent and sanitizers for controlling Egg Quality and poultry products

4.Sources of contamination of Eggs and its product and prevention method.

Reference

1. Poultry Farming (in Bengali) by Dr Nilotpal Ghosh (Kalyani Publishers, New Delhi)
2. Sahaj Kathai Vigyan Vittik Murgee Palan OSwasthya Raksha (Scientific Poultry Rearing and Health Care in Simple Language, in Bengali) by Dr Nilotpal Ghosh (Mehanati Prokashani, Hooghly)
3. 3. Poultry Production in India (in English) by R.P. Sharma, R.N. Chatterjee, S.V. Rama Rao and S.R. Sharma (Indian Council of Agricultural Research, New Delhi)
4. 4.Poultry Science and Practice: A Text Book (in English) by N. Ghosh (CBS Publishers & Distributors Pvt Ltd, New Delhi)
5. Poultry Production and Management (in English) by J. Prasad (Kalyani Publishers, New Delhi)
6. Poultry Production (in English) by R.A. Singh (Kalyani Publishers, New Delhi)
7. Poultry Diseases (in English) by JL. Vegad (International Book Distributing Co., Lucknow)

8. Poultry Diseases, Diagnosis and Treatment (in English) by H.V.S. Chauhan (Wiley Eastern Ltd., New Delhi)

GONDWANA UNIVERSITY, GADCHIROLI

NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-I
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
VSC Vocational Skill Course
Semester-I BSc Zoology
VSC

Course Title/Code: **1. Advanced Laboratory Practical**	Course Credits: 2/ 50 Marks
1. Course Code: 1BSCZOO04	Practical per week: 2
Total Contact Hours: 60 period for Practical	Practical exam Duration of : 5 Hour
Practical Marks -30	CA Marks -20

Name of Paper- Advanced Laboratory Technology

Unit – I **(08 Periods)**
Basic Laboratory Principles and Procedures: Types of laboratories, Decontamination, Disinfection, laboratory safety, First aid measures, factors responsible for productivity.
Unit – II **(08 Periods)**
Instruments techniques: Types of Microscops, Use of pH meter, Colorimeter, Plankton Counter, BOD, COD, Tissue fixation, embedding in paraffin, microtomy and slide preparation of any endocrine gland and Double Staining.

Unit – III **(08 Periods)**
Instruments: Balances, Hot plate and magnetic stirrer, Centrifuge, Hot air oven, colorimetry and photometry instruments. Balance (Digital and Analytical,
Unit – IV **(08 Periods)**
Laboratory techniques: End point reaction method, PCR, Spectrophotometry, , Immuno essay, fluorometry, flame photometry, RIA, ELISA

Practical
1. Identification and handling of Instruments
2. Identification of Instruments
3. Demonstration for decontamination and disinfection.
4. Determination of unknown concentration of colour/ions solution by using colorimeter/Flame photometer/Spectrophotometer. (Major)
5. Double Staining Process.
6. Isolation of amino acids by using Electrophoresis/ Chromatography (Major)
7. Field Visit to any laboratory

Practical Question Paper and Distribution of Marks

Time: 4 Hrs. **Max. Marks: 30**

Practical Distribution of Marks

1. Identification of spots 10
2. Major experiment.....08
3. Minor Experiment 05
4. Field visit report 03
5. Class Record 05
6. Viva Voce 03

Scheme for Practical Assignment
Marks 20

Que. 1. Laboratory safety, First aid measures ----------08
Que 2. Types of Microscopes----------05
Que. 3Viva voce ---------- ---------- 04
Que 4. Field visit report ----------03

GONDWANA UNIVERSITY, GADCHIROLI
NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-I
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
SEC Skill enhancement Course
SEC

Course Title/Code: **1. Clinical Instrumentation Technology**	Course Credits: 2/ 50 Marks
Course Code: 1BSCZOO05	Practical per week: 2
Total Contact Hours: 60 period for Practical	Practical exam Duration of : 5 Hour
Practical Marks -30	CA Marks -20

Name of Paper- Clinical Instrumentation Technology

Unit-I **(08 Periods)**

1.Fundamentals of medical instrumentation. Sources of biomedical signals Generalized medical instrumentation block diagram. Medical electrodes -ECG, EEG, EMG, Defibrillator Medical transducers: Body temperature, Blood pressure, respiration rate

2.Classification of Medical instruments based on: Application - (diagnostic, therapeutic, Imaging, analytical) Physiological parameter and bio-potential Biological system Different departments in the hospital

Unit – II **(08 Periods)**

1. Study of clinical instruments based on application - Electro-cardiograph (ECG) machine, ECG block diagram, Bipolar and unipolar leads, Phono cardiograph, Electro-encephalograph (EEG).
2. Working of clinical instruments based on application - Electro-myograph (EMG) machine. 10-20 electrode placement system, EEG readout devices,

Unit – III **(08 Periods)**

1. Fundamentals of X-ray machine, CT-Scan machine, Properties of ultrasound, Ultrasonic foetal monitors.
2. Bio-feedback Instrumentation, Echo-encephalography, Echo-cardiograph, Colour Doppler ultrasound machine, Electro-surgery machine (cautery)

Unit – IV **(08 Periods)**

1. Types of test - Blood cell, working of Blood Cell Counter, Bio chemistry analyzer.
2. Working and application of Auto analyser, Blood gas analyser, Hemo-dialysis machine, Defibrillator Machine, Muscle stimulators

Suggested List of Books

1. Handbook of biomedical instrumentation, R. S. Khandpur , Tata McGraw Hill, New Delhi
2. Introduction to biomedical equipment technology, Carr Joseph J.,Brown J.M, Pearson education,New Delhi
3 Biomedical instrumentation measurements . Lesli P Cromwell, Fred J. Weibell, Erich A. Pfeiffer, PHI Learning, New Delhi
4. Medical instrumentation application & design, John G. Webster, Editor, John Wiley and Sons, New Delhi
5. Medical Electronics, A. G. Patil, Excel Book, New Delhi

Practicals:

S. No.	Unit No.	Practical Exercises (Outcomes' in Psychomotor Domain)	Approx Hrs. Required
1.	I	Identify ECG electrodes & Patient cable	2
2.	I	Identify EEG electrodes & Patient cable	2
3.	I	Identify EMG electrodes	2
4.	I	Measure blood pressure using sphygmomanometer.	2
5.	I	Measure respiration rate using respiration rate-meter.	2
6.	I	Measure body temperature using analog and digital thermometer.	2
7.	II	Identify various leads selector network of ECG machine	2
8.	II	Obtain Lead –I, II, III, aVr , aVl , V1 … v6 type of ECG.	2
9.	II	Calibrate & maintain ECG machine.	2
10.	II	Obtain EEG of patient using EEG machine.	2
11.	II	Demonstrate the Performance of EMG.	2
12.	II	Demonstrate the performance of Electro surgery – cautery machine.	2
13.	II	Demonstrate the performance of EEG machine	2
14.	II	Demonstration of Phono-cardiograph machine.	2

15.	III	Have a handle on different controls of X-ray machine.	2
16.	III	Calibrate X-ray machine.	2
17.	III	Demonstration of CT-scan machine.	2
18.	III	Demonstration and operation of Ultra sonic machine along with transducer & patient cable. cable	2
19.	III	Identify ultra sound probes for sonography machine.	2
20.	IV	Maintain different electrodes for Electro-surgery machine (cautery).	2
21.	IV	Demonstrate various cutting modes of Electro-surgery machine. (cautery)	2
22.	IV	Identify parts of Hemo-dialysis machine.	2
23.	IV	Demonstrate operation of Muscle Stimulators.	2
24.	V	Demonstrate operation of Blood Cell Counter.	2
25.	V	Demonstrate operation of Bio chemistry analyzer.	2
26.	V	Demonstrate operation of Auto analyzer.	2
Total hours	60		

List of Major Equipment/ Instrument with Broad Specifications

i. Heart rate monitor cum ECG trainer
ii. 12 lead ECG simulator
iii. Respiration-rate monitor
iv. Electro-myograph trainer
v. Phono-cardiograph trainer
vi. Blood pressure measurement trainer
vii. Sphygmomanometer
viii. Bio-Electrodes for (ECG/EEG/EMG)
ix. Ultra sound probes
x. Ultrasound machine trainer
xi. Electro cautery machine
xii. Muscle simulator
xiii. Electronic / electrical assorted tool kit

Scheme for Practical Examination
Time 6 Hours Marks 30

Que. 1. Major Experiment from Unit I andt II ---------- -------10
Que 2. Minor Experiment From Unit III and IV ---------- 05
Que 3. Identification A. B. C. D. F. ----------10
Que 4 Practical Record ----------05

Scheme for Practical Assignment
Marks 20

Que. 1. Study of structure and application of any two major instruments --10
Que 2. Viva voce ---------- ---------- 05
Que 3. Submission ---------- ---------- 05

GONDWANA UNIVERSITY, GADCHIROLI
NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-I
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
IKS
I Semester BSc Zoology
IKS

Course Title/Code: **Taxonomy and Evolution**	Course Credits: 2/ 50 Marks
Course Code: 1BSCZOO06	T per week: 2
Total Contact Hours: 30 for Theory /	Duration of Th Exam: 2 Hour
Theory Marks -40	Assignment Marks -10

Name of Paper- Taxonomy and Evolution

Unit I **(08 Periods)**

Taxonomy and Systematics: Introduction to taxonomy and its relationship with systematics. Importance and applications of biosystematics.

Zoological Nomenclature: International Code of Zoological Nomenclature, Bionomial and Trinomial components of classification.

Unit II **(08 Periods)**

Kinds of taxonomic characters and classification: Taxonomic characters: Morphological, Embryological, Cytogenetical, Biochemical and Numerical. Components of classification and Linnaean hierarchy.

Concepts of Species: Concept of species and speciation and potential modes of speciation.

Unit III **(08 Periods)**

Origin of life: Special creation theory, theories of spontaneous generation, cosmozoic theory, theory of chemical evolution and spontaneous origin of life at molecular level.

Concept of organic evolution: Concept of organic evolution: evidences from paleontology (types of fossils and determination of age of rocks and fossils), taxonomy, comparative anatomy, comparative embryology, physiology and biochemistry and cytology.

Unit IV **(08 Periods)**

Theory of organic evolution: Theories of organic evolution: Lamarckism, Darwinism, Mutation theory and modern synthetic theory.

Evolutionary concept: Modern evolutionary Concept and details of micro, macro and mega evolution

Recommended Books

1. Darlington, P.J. The Zoogeography: The geographical distribution of animals. Wiley Publication, New York.
2. Hubbs, C.L. Zoogeography. Ayer Co Pub; Reprint Edition.
3. Illies, J. 1974. Introduction to Zoogeography. Macmillan.

4. International Commission for Zoological Nomenclature (ICZN). 1999 International Code of Zoological
Nomenclature. Natural History Museum, Cromwell Road, London SW7 5BD-UK. (available online free:www.iczn.org).
5. Kapoor, V.C. Theory and Practice of Animal Taxonomy. Oxford-IBH Publishing Co., N. Delhi, Mumbai& Kolkota.
6. Mayer, E. Principles of Systematics Zoology. Mc-Graw Hill Publication, New Delhi.
7. Tiwari, S. Readings in Indian Zoogeography (Vol.1) Today & Tomorrow Printers & Publishers.
8. Evolutionary Biology – D. J. Futuyama (Sinauer Associates Inc.)
9. Evolution of the Vertebrates – E. H. Colbert, M. Morales & E. I. Minkoff (Science)
10. Introduction to Evolution – P. A. Moody (Kalyani Pub.)
11. Understanding Evolution – E. D. Hanson (Oxford Univ. Pr.)
12. Life: Origin, Evolution and Adaptation – S. Chattopadhyay (Books & Allied Pub.)
13. Organic Evolution – V. B. Rastogi (Kedarnath Ramnath)
14. Principles of Systematic Zoology – E. Mayr & P. D. Ashlock (McGraw Hill Int.)
15. Principle of Systematic Zoology – E. Mayr (TATA McGraw Hill)
16. Principles of Animal Taxonomy – G. G. Simpson (Oxford IBH)

Scheme for Assignment
Marks - 10

Que. 1. Importance and applications of biosystematics---------- --04
Que 2. Components of classification and Linnaean hierarchy.---------- 03
Que 3. Collection of types of fossils ---------- 03

Gondwana University, Gadchiroli

SCHEME AND SYLLABUS

Under National Education Policy 2020

Faculty- Science and Technology

Subject- Zoology

B.Sc. Semester –II

Session 2024-25

Gondwana University, Gadchiroli
SCHEME AND SYLLABUS
Under National Education Policy 2020
B.Sc. Semester –II with Zoology

UG	Semester -I	Credit	Marks	Hours
Major + IKS-SS	Life And Diversity Of Animals (Non-Chordata-Arthropoda To Hemichordata) Course Code:2BSCZOO01	4- Theory 2- Practical	100+50 =150	L-60 hrs P-60 hrs
Major Elective	-	-	-	-
Minor	Environmental Biology Course Code: 2BSCZOO02		50	
Open Elective (OE) Theory Paper	1. Apiculture, Course Code: 2BSCZOO03 2. Sericulture Course Code: 2BSCZOO04	2+2	50 50	L30+30 hrs
VSC	Advanced Laboratory Practical Course Code: 2BSCZOO05	2X1	50	P-60 hrs
SEC	Clinical Instrumentation Technology Practical Course Code: 2BSCZOO06	2X1	50	P-60 hrs
VEC	Good Governance	2X1	-	-
AEC	-	2X1	-	-
IKS	-	2X1	-	-
OJT	_		-	-
Total	-	20	400	-

Gondwana University, Gadchiroli.

NEP 2020 U.G. PROGRAMME (FROM SESSION 2024-25)

Faculty Name : Science and Technology

Programme Name: UG Zoology

SEM -II

Core	Paper name	Theory / Practical	Teaching Scheme			Credit	Duration	Examination Scheme				
			Theory	Practical	Total			Max. Marks		Total	Minimum Marks	
								UA	CA		Theory	Practical
Major (DSC) (4+2) 6	Life and Diversity of Animal ((Non-Chordata-Arthropoda To Hemichordata)	**T+P**	**60**	**60**	**120**	**4+2**	**90 D**	**80 30**	**20 20**	**100 50**	**40**	**25**
Major Elective (DSE)												
Minor (2x1) 2	Environmental Biology		**30**		**30**	**2**	**90 D**	**40**	**10**	**50**	**20**	**5**
OE (2+2) 4	1. Apiculture, 2. Sericulture	**Th Th**	**60**		**60**	**4**	**90 D**	**40 40**	**10 10**	**50 50**	**20 20**	**5 5**
VSC (2x1) 2	Advanced Laboratory Technology	**Prac**		**60**	**60**	**2**	**90 D**	**30**	**20**	**50**		**15+ 10**
SEC (2x1)2	Clinical Instrumentation Technology	**Prac**		**60**	**60**	**2**	**90 D**	**30**	**20**	**50**		**15+ 10**
VEC (2x1) 2	Good Governance					**2**	**90 D**					
AEC (2x1) 2												
IKS (2x1) 2						**2**	**90 D**					
Total Credit 20												
Total			190	240	430	20		290	110	400		

GONDWANA UNIVERSITY, GADCHIROLI

NEP SYLLABUS

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

SUBJECT- ZOOLOGY, THEORY (CREDITS 4)

DISCIPLINE CORE (DSC) PAPER I

Semester-II BSc Zoology
Core Course Content

Course Title/Code: **ANIMAL DIVERSITY OF NON-CHORDATE** (PROTOZOA TO ANNELIDA)	Course Credits: 6/ 150 Marks
Course Code: 2BSCZOO01	T-P per week: 4-4
Total Contact Hours: 60 for Theory / 60 period for Practical	Duration of Theory Exam: 3 Hour and For Practical:5 hrs
Theory Marks :80 Assessment Marks: 20	Practical Marks -30 and CA-20

Name of Paper- ANIMAL DIVERSITY OF NON-CHORDATE

(ARTHROPODA TO HEMICHORDATA)

Unit 1: Phylum-Arthropoda (15 Periods)

1.General characters and classification up to classes

2.Periplaneta - External Morphology, Digestive system, Circulatory system, Nervous system, Reproductive system and Sense organs.

Unit 2: Phylum-Mollusca (15 Periods)

1.General characters and classification up to classes

2.Pila- External Morphology, Digestive system, Nervous system, Reproductive system, Copulation and Fertilization.

3.Pearl formation.

Unit 3: Phylum-Echinodermata (15Periods)

1.General characters and classification up to classes

2.Asterias -External Morphology, Endoskeleton, Digestive system, Water vascular system,Bipinnaria and Brachiolaria larva.

3.Regeneration and Autotomy in Echinoderm.

Unit 4: Phylum Hemichordata (15Periods)

General characters and classification up to classes

Balanoglossus -External Morphology, Coelom, Digestive system, Nervous system, Sense organs, Reproductive system, Tornaria larva

Affinities of Balanoglossus.

GONDWANA UNIVERSITY, GADCHIROLI

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

SUBJECT- ZOOLOGY, PRACTICAL I (CREDITS 2)

I. **Observation, classification (uptoclass) and sketching of the following animals (specimen/model)**

Phylum Arthropoda – Palaemon, Limulus, Scolopendra, Julus, Moth

Phylum Mollusca – Chiton, Pila, Dentalium, Unio, Octopus

Phylum Echinodermata – Antedon, Holothuria, Echinus, Asterias, Ophiothrix

Phylum Hemichordata – Balanoglossus

II. Study of slides

Nauplius, Zoea, Megalopa,Glochidium, T.S. of arm of starfish, Bipinniria, Auricularia, Tornaria, T.S. of Balanoglossus through proboscis, collar and gonad

III. Anatomical Observations

Anatomical observations, demonstration and detailed explanation of the following with the help of ICT tools/ models/ charts/ photographs etc.

a) Digestive and Nervous system of Cockroach.

b) Digestive and Nervous system of Pila.

IV. Mounting - Study of permanent Preparation of the following with the help of already available material (Any five)

Mouth parts of Cockroach, Mosquito, Honey bee, Salivary gland and trachea of Cockroach, Redula of Pila, and Pedicillariae of starfish.

Distribution of Marks - Total Marks - 30

Practical examination - 30 **Duration - 5 Hours**

VII.	Anatomical observation	05
VIII.	Identification and comment on spot (3 specimen & 2 slides)	10
IX.	Field work (Submission)	05
X.	Permanent stained micro-preparation (Comment + Diagram)	04
XI.	Viva - Voce	03
XII.	Class record	03
	Total----------30	

Scheme for Practical Assignment
Marks - 20

Que. 1. General Characters, Classification and Life cycle ----------10

Que 2. Preparation of model or Chart or Poster ---------- 05

Que 3. Visit to one research institute (Report)---------- 05

Web References: Anatomy of earthworm: The dissection works (CD); www.scienceclass.com, www.neosci.com Cockroach dissection- www.ento.vt.edu

Pedagogy: Lectures, Presentations, videos, Labs, Assignments, Tests, Individual or group Field oriented Project Report on, Visit to one research institute/ one wild life sanctuary / museum / zoo.

1.HymanL.H.The Invertebrate Vol.I, Protozoa through Ctenophora. McGraw-Hill Co., New York.

2.Barrington E.J.W. Invertebrate structure and function. Thomas Nelson and sons Ltd.,London.

3.Jagerstein G. Evolution of Metazoan life cycle .Academic press, New York and London.

4.Hyman L.H. The invertebrate vol. 2 McGraw-Hill Co., New York.

5. Hyman L.H. The invertebrate vol. 8 McGraw-Hill Co., New York.

6.Barnes R.D. Invertebrate Zoology W.B. Saunders and Co., Philadelphia

7.Russet HunterW.D.D. biology of higher invertebrate The Macmillan Co. Ltd., London.

8.Hyman L.H. The Invertebrates, smaller coelomate groups.Vol.5 McGraw-Hill Co. New York.

9.Read C.P. Animal Parasitism. Prentice Hall.New-Jersey.

10KudoR.R.. (1966) Protozoology, Charler, C. Thomas Springfield, Illinois

11.Barradailes L.A. and potts F.A. Invertebrates (1961) The Eastham L.E. S. Saunders, Cambridge University Press, Cambridge.

12.Russel W.D.Hunter, Biology of lower invertebrates McMillan, New York

13.Marshall A.J. and Williams W.D. (1972) J. B. Zoology of Invertebrates ,ElBs andMcMillan, London.

GONDWANA UNIVERSITY, GADCHIROLI
NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-II
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
Semester-II BSc Zoology
Minor

Course Title/Code: **Environmental Biology**	Course Credits: 2/ 50 Marks
Course Code: 2BSCZOO02	T per week: 2
Total Contact Hours: 30 for Theory	Duration of Th Exam: 2 Hour
Theory Marks -40	Assignment Marks -10

Minor- Environmental Biology

Unit I **(8 Periods)**

1. Ecosystem - definition and type
2. Detailed study of pond ecosystem.
3. Producers, consumer, and decomposer.
4. Energy flow in ecosystem, food chain, food web and pyramids

Unit II **(8 Periods)**

1. Biodiversity and its conservation.
2. Genetic diversity, species diversity.
3. Causes of reduction, methods of conservation.
4. Present status of biodiversity in India, Conservation project, Project Tiger, National parks, and sanctuaries (Nagzira, Tadoba, Kaziranga).

Unit III **(8 Periods)**

1. Basic components of the Environment
Atmosphere: Major zones and importance, composition of air.
2. Hydrosphere: Global distribution of water, physicochemical characteristic of water.
3. Lithosphere: Types of rocks, formation of soil.
4. Renewable and non- renewable energy sources.

Unit IV **(8 Periods)**

1. Sources, effects of air pollution with special reference to Acid rain,
2. Global warming and Greenhouse effect, Control measures.
3. Sources, effects, and control measures of water pollution
4. Sources, effects, and control measures of Noise pollution
5. Sources, effects, and control measures of Heavy metal pollution (lead, mercury and cadmium).

Recommended Books

1. Ashthana D.K. – Environmental Problem & Solution

2. Agrawal K.C. – Environmental Biology
3. Agrawal K.C. - Biodiversity
4. Mukharjee – Environmental Biology
5. S. Arora – Fundamentals of Environmental Biology
6. Sharma – Ecology & Environmental Biology
7. Verma P.S. & Agrawal V.K. – Environmental Biology, S. Chand.
8. Trivedi & Rao – Air Pollution
9. Chapman & Reiss – Ecology-Principles and Applications, Cambridge.
10. Chatterjee B – Environmental Laws-Implementation and Problems.
11. . Sharma P.D. – Environmental Biology, Rastogi Publication, Meerut.
12. Trivedi R.K. – Hand Book of Environmental Laws, Rules, Guidelines, Compliances and
Standards, Enviromedia.
13. . Odum E.P. and Barret – Fundamentals of Ecology, Thomson.
14. . Smith R.L. – Ecology and Field Biology, Harper Collins.
15. D.N. Saksena &D.M. Gaidhane – Environmental Biology, Studium Press (India)

GONDWANA UNIVERSITY, GADCHIROLI
NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-II
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
Open Elective (OE)
I Semester BSc Zoology
OE

Course Title/Code: **Apiculture**	Course Credits: 2 / 50 Marks
Course Code: 2BSCZOO03	T- per week: 2
Total Contact Hours: 30 for Theory	Duration of TH Exam: 2 Hour
Theory papers Marks 40	Internal Assessment : 10

Name of Paper- 1) Apiculture

UNIT – I **(8Periods)**

1. To study the morphology of Honeybees and Identification of different species and classes of Honey bees.
2. To Study different stages in life cycle of Honey bees.
3. Identification of Queen cells, Drone cells & Brood.
4. Bee keeping: Tools and Equipment.

UNIT – II **(8 Periods)**

1. Basic requirements of Tools for starting bee keeping:
2. Introduction to types of bee

3. Bee keeping unit - Handling of frames with colonies
4. Honey Processing and Bee Hive Products

UNIT – III **(8 Periods)**

1. Honey extraction & handling - Quality control standards - Honey testing kit.
2. Processing of honey. Other valuable by products of honey bees Bee venom & Royal jelly extraction.
3. Economics of bee keeping.
4. Economics in small scale and large scale bee keeping.

UNIT – IV **(8 Periods)**

1. Economic Value of Commercial Beekeeping.
2. Preparing bankable bee keeping project:
3. Steps involved in starting a beekeeping project
4. Funding sources for beekeeping projects.

Recommended books

1.Reeling Technology Oxford & IBH Publishing Co. Pvt. Ltd., NewDelhi.

2.Roger, M (1990). The ABC and Xyz of Bee Culture: An Encyclopedia of Beekeeping, Kindle Edition

3.Shukla and Upadhyaya (2002). Economic Zoology, RastogiPublishers

4. YadavManju (2003). Economic Zoology, Discovery Publishing House.

5. JabdePradip V (2005). Textbook of applied Zoology, Discovery Publishing House, NewDelhi.

6. Cherian &Ramachandran Bee keeping in-South Indian Govt. Press,Madras.

GONDWANA UNIVERSITY, GADCHIROLI
NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-II
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
Open Elective (OE)

I Semester BSc Zoology
OE

Course Title/Code: **Sericulture**	Course Credits: 2 / 50 Marks
Course Code: 2BSCZOO04	T- per week: 2
Total Contact Hours: 30 for Theory	Duration of TH Exam: 2 Hour
Theory papers Marks 40	Internal Assessment : 10

Name of Paper- 2) Sericulture

Unit – I **(8 Periods)**

1. Types of silkworms.
2. Races & classification of silkworm
3. Sericulture industry in different states
4. Economic important of Silkworm

Unit II **(8 Periods)**

1. Mulberry silkworm structure and life cycle
2. Tasar silkworm structure and life cycle
3. Eri silkworm structure and life cycle
4. Muga silkworm structure and life cycle

Unit III **(8 Periods)**

1. Silkworm Rearing (C.S.B. proposed model rearing house)
2. Rearing appliances, disinfection, disinfectants, bed cleaning, feeding of worms
3. Maintaining optimum condition of rearing, brushing, frequency of spacing, care during mounting
4. Mounting and mountage, process of spinning, cocoon harvesting. Rearing method: chawki rearing or young age and late age worm rearing.

Unit IV **(8 Periods)**

1. Breeding station (P4, P3, P2, P1 station) and grainage management. Diapausing and Non-diapausing eggs, methods of egg storage, incubation, embryonic incubation
2. Industrial seed, reproductive seed, certified seed. Transportation of seed eggs.
3. Cocoon stifling (sun drying, steam stifling, hot air stifling), storage of cocoon, sorting of cocoons. Concept of difference reeling machines, reeling operation, reeling end formation.
4. Degumming, bleaching, dyeing of silk yarn Twisting, Reeling, Re-reeling, lacing, skeining and testing of raw silk material. Weaving of silk.

Recommended books

1. Text Book of Tropical Sericulture. Publ., Japan Overseas Corporation volunteers – 1975.
2. Silkworm Rearing Techniques in the Tropics, Dr. S. Omura, Japan International Cooperation Agency, 1980.
3. Manual on Sericulture; Food and Agriculture Organisation Rome 1976.
4. Handbook of Practical Sericulture : S.R. Ullal and M.N. Narasimhanna CSB, Bangalore 1987.
5. Modern Entomology: D. B. Tembhare, Himalaya Publishing House, Bombay

GONDWANA UNIVERSITY, GADCHIROLI

NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-II
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
VSC Vocational Skill Course
Semester-II BSc Zoology
VSC

Course Title/Code: **Advanced Laboratory Practical**	Course Credits: 2/ 50 Marks
Course Code: 2BSCZOO05	Practical per week: 2
Total Contact Hours: 30 period for Practical	Practical exam Duration of : 5 Hour
Practical Marks -30	CA Marks -20

Name of Paper- Advanced Laboratory Technology

Unit –I **(8 Periods)**

Basic principal, Desk top centrifuges, High Speed Centrifuges, The Ultracentrifuge, Analytical Ultacentrifuge, Rotors- Vertical tube, swinging basket, Density gradient centrifugation.

Unit- II - **(8 Periods)**

. Techniques of chromatography- Paper & thin layer chromatography, Column chromatography – Types of chromatography – adsorption, partition, gel filtration chromatography, ion exchange, affinity, HPLC.

Unit-III– **(8 Periods)**

Basic principal of electrophoresis, types of electrophoresis- free flow, zone, cellulose acetate electrophoresis, gel electrophoresis, electrophoresis procedure, applications of gel electrophoresis, discontinuous gel electrophoresis, high voltage electrophoresis,

Unit-IV– **(8 Periods)**

Determination of Gram staining, To Determination of Acid fast staining (Zeihl Neelsen staining) , Determination of Hanging drop method, Determination of Rheumatoid Arthritis (RA) test, Determination of Widal test, Determination of Rapid Plasma Reading (RPR) test. sickling test and Determination of Plasma Haemoglobin.

Recommended Books:

1. Bancroft's Theory and Practice of Histological Techniques, 7th Edition, Elsevier Publications
2. Bishop(2013), Clinical Chemistry, 7th edition, WileyPublications
3. C F A Culling,(1974), Handbook of Histopathological and Histochemical
4. Godkar.B. Praful,(2016) Textbook of MLT, 3rd edition, Bhalani Publications
5. Godkar.B. Praful,(2016) Textbook of MLT, 3rd edition,Bhalani Publications
6. Harshmohan (2017), Textbook of Pathology, 7th edition, Jaypee Publications

7. Henry's Clinical Diagnosis and Management by Laboratory Methods,(2011), 2nd edition, Elsevier
8. Mukherjee .L.K(2017), Medical Laboratory Technology,Vol.1-3, 3rd edition, Tata Mcgraw Hill
9. Ochei J & Kolhatkar A(2000), Medical Laboratory Science: Theory & Practice, 3rd edition, Mcgraw Hill Education
10. Singh & Sahni, (2008),Introductory Practical Biochemistry, 2nd edition, Alpha science
11. Singh Tejinder,(2014), Atlas & Textbook of Haematology, 3rd edition, Avichal Publications
12. Sood Ramnik,(2015), Text book of Medical Laboratory Technology, 2nd edition, Jaypee Publications
13. Teitz,(2007), Fundamentals of Clinical Chemistry, 6th edition,Elsevier Publications

Marks Distribution for Practical:

1. Major Experiment ---------- ---------- 10
2. Minor Experiment---------- 05
3. Visit to Pathology laboratory ---------- 05
4. Identification---------- 05
5. Class record ----------05

Total Marks 30

Scheme for Practical Assignment
Marks 20

Que. 1. Study of structure and application of any two major instruments -------10

Que 2. Viva voce ---------- 05

Que 3. Submission---------- 05

GONDWANA UNIVERSITY, GADCHIROLI
NEP SYLLABUS
PROGRAMME- BACHELOR OF SCIENCE (B.Sc), SEMESTER-II
SUBJECT- ZOOLOGY, THEORY (CREDITS 2)
SEC

Semester-II BSc Zoology
VSC/ SEC

Course Title/Code: **Clinical Instrumentation Technology**	Course Credits: 2/ 50 Marks
Course Code: 2BSCZOO06	Practical per week: 2
Total Contact Hours: 30 period for Practical	Practical exam Duration of : 5 Hour
Practical Marks -30	CA Marks -20

Paper -CLINICAL LABORATORY TECHNOLOGY

UNIT – I **(8 Periods)**

1.Definition and concepts of reference values and related terminology, safety measures
2.Procedure for specimen collection and procedure for collecting data.
3.Analytical goals. Performance criteria for laboratory tests.
4. Criteria to be used in evaluating and selecting appropriate clinical laboratory instrumentation.

UNIT – II **(8 Periods)**

1.Principles and practice of - Blood Grouping, Maintenance of Blood Bank Records
2.Principles Blood Transfusion, Blood Donation, Blood Collection, Storage & Transport,
3.Hanging drop method to study bacterial motility, Introduction, Protozoan infections, Helmiths
4.Identification of amoeba, Giardia, plasmodium, leishmania, trypanosome, ascaris, ancyclostoma, liver fluke, Tania solium.

UNIT – III **(8 Periods)**

1.Principle and methods of staining of Blood smears and bone marrow smears.
2.Supravital stain. Reticulocyte count, Heinz bodies.
3.Thrombocytopenia, platelet function test, platelet count.
4.Clot retraction test. Platelet factor III Test. Gram staining for bacteria

UNIT- IV **(8 Periods)**

1.Urine examination - Physical, Chemical & Microscopic,
2.Examination of body fluids - cell counts, Semen analysis,
3. Blood sugar and its types, Test for general sugar, protein and lipid
4.Compatibility Testing, Blood Components, Blood Transfusion Reactions. Stool Examination

Recommended Books:

1. Mukherjee K. L, 2017, Medical Laboratory Technology, Procedures Manual for Routine Diagnostic Tests, 3rd edition, McGraw Hill Education, Tennessee, United States.
2. Harold Varley, 2005, Practical C linical Biochemistry, 4th edition, A manual of laboratory Diagnostic tests Fischback c) Practical clinical Biochemistry, CBS, Karnataka, India.
3. Burtis, 2012, Tietz's Text book of Clinical Chemistry and Molecular Diagnostics, 5th edition, Elsevier, Amsterdam, Netherlands.
4. Kalpan, 2003, Clinical chemistry – Theory, Analysis, Correlation, 4th edition, CBS Publishers and Distributors Pvt. Ltd, Bangalore, India.
1. West & Todd, 1966. Text Book of Biochemistry, 4th Edition, Macmillan, New York City, United States.
2. Sood Ramnik, 2015, Text book of Medical Laboratory Technology, 2nd edition, Jaypee Brothers Medical Publishers Pvt Ltd, New Delhi, India.
3. Thomas M. Devlin, 2010, Text book of Biochemistry with clinical correlation, 7 th
edition, John Wiley & Sons, New Jersey, United States.
4. Harold Varley, 2005, Practical C linical Biochemistry, 4th edition, A manual of laboratory

Diagnostic tests Fischback c) Practical clinical Biochemistry, CBS, Karnataka, India.
WEB REFERENCE:

1.https://www.studocu.com/en-gb/document/university-of-nottingham/clinical-laboratory-sciences-i/complete-lecture-notes-clinical-laboratory-sciences-cls/132920
2.https://www.academia.edu/32040390/LECTURE_NOTES_For_Medical_Laboratory_Students
3.https://www.cartercenter.org/resources/pdfs/health/ephti/library/lecture_notes/med_lab_tech_students/medicallabtechnology.pdf
4.https://www.studypool.com/documents/4702704/medical-laboratory-technology-lecture-notes
5.https://fdocuments.in/download/for-medical-laboratory-technology-students-lecture-notes-for-medical-laboratory

Scheme for Practical Examination
Time 6 Hours Marks 30

Que. 1. Major Experiment from Unit III and IV ---------- ----10

Que 2. Minor Experiment From Unit I and II ---------- ----------05

Que 3. Identification A. B. C. D. F. ----------10

Que 4 Practical Record ---------- 05

Scheme for Practical Assignment
Marks 20

Que. 1. Study of structure and application of any two major instruments ---------10

Que 2. Viva voce ---------- 05

Que 3. Submission---------- 05

B.SC. SEMESTER I &II

Model Question Paper

Zoology Core Course/

Time: 3 Hrs Maximum Marks: 80

Instructions to Candidates:

1. All sections/parts are compulsory.
2. Draw neat labelled diagrams wherever necessary.
3. There will be five descriptive questions, each carrying 16 marks.

Qu. I. Long Question Unit 1 (16x1= 16)

OR

A) Short Question (8x2= 16)

B) Short Question

Qu. 2. Long Question Unit II (16x1= 16)

OR

A) Short Question (8x2= 16)

B) Short Question

Qu. 3. Long Question Unit III (16x1= 16))

OR

A) Short Question (8x2= 16)

B) Short Question

Qu.4. Long Question Unit IV (16x1= 16))

OR

A) Short Question (8x2= 16)

B) Short Question

Qu. 5. Answer any Four of the following (4x4= 16)

1. Unit I
2. Unit II
3. Unit III
4. Unit IV

B.SC. SEMESTER I &II

Model Question Paper

DSE/Minor/ OE/ VEC/IKS

Time: 2 Hrs Maximum Marks: 40

Instructions to Candidates:

1. All sections/parts are compulsory.
2. Draw neat labelled diagrams wherever necessary.
3. There will be five descriptive questions, each carrying 8 marks.

Qu. I. Long Question Unit 1 (8x1= 8)

OR

A) Short Question (4x2= 8)

B) Short Question

Qu. 2. Long Question Unit II (8x1= 8)

OR

A) Short Question (4x2= 8)

B) Short Question

Qu. 3. Long Question Unit III (8x1= 8)

OR

A) Short Question (4x2= 8)

B) Short Question

Qu.4. Long Question Unit IV (8x1= 8)

OR

A) Short Question (4x2= 8)

B) Short Question

Qu. 5. Answer any Four of the following (2x4= 8)

1. Unit I
2. Unit II
3. Unit III
4. Unit IV