DEPARTMENT OF ZOOLOGY
GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
Approved syllabus for M.Sc. ZOOLOGY by the members of Board of Studies for the Sessions 2019 - 20

Syllabus and Marking Scheme for Semester - II (2019-20)

Paper No.	Title of the Paper	Marks Allotted in Theory		Marks Allotted in Internal Assessment		Credits
		Max	Min	Max.	Min.	
I	POPULATION GENETICS AND EVOLUTION	80	16	20	04	05
II	REPRODUCTIVE BIOLOGY	80	16	20	04	05
III	TOOLS AND TECHNIQUES IN BIOLOGY	80	16	20	04	05
IV	ENVIRONMENTAL PHYSIOLOGY	80	16	20	04	05
V	Lab Course I POPULATION GENETICS AND EVOLUTION , REPRODUCTIVE BIOLOGY	100	33			04
IV	Lab Course II TOOLS AND TECHNIQUES IN BIOLOGY ENVIRONMENTAL PHYSIOLOGY	100	33			04
	Total	**520**		**80**		**28**

04 Theory papers	-	**320**
04 Internal Assessment	-	**80**
02 Practical	-	**200**
Total Marks	-	**600**
Credits	-	**28**

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
M.Sc. ZOOLOGY
Semester - II
SESSION 2019-2020
PAPER- I
POPULATION GENETICS & EVOLUTION

Max. M.- 80
Min. M.-16

UNIT -I

- Quantifying genetic variability: Genetic variation, Allele frequencies.
- Genetic structure of natural populations: Introduction, Optimum phenotypes & selection pressure. Kinds of selection, genetic variability, Canalization, genetic homeostasis.
- Phenotypic variation: Loss of genetic variations, genetic load, genetic death, mutational & segregation loads,
- Genetic Equilibrium: Balancing selection, mutation drift balance, Mutation selection balance.

UNIT - II

- Analysis of quantitative traits: Quantitative traits and natural selections.
- Estimation of heritability: Narrow sense & Broad sense Heritability.
- Genotype environmental interactions. Phylogenetic & Biological concept of species.
- Pattern & Mechanism of Reproductive Isolation.
- Modes of speciation (Allopatric, Sympatric & Parapatric.)

UNIT - III

- Concept of Evolution: Micro-evolution, Meso-evolution and macro-evolution.
- Theories of evolution with an emphasis on Darwinism. Emergence of Neo–Darwinism, neutral theory of Evolution.
- Molecular Clock.
- Neo -Darwinism: Hardy - Weinberg law of genetic equilibrium.

UNIT - IV

- Modern Synthetic theory of Evolution.
- Molecular evolution: Gene evolution, gene families, Molecular drive.
- Natural selection, Mutation, Genetic drift, Migration, Meiotic-drive.
- Evolution of horse and man.

SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. **Gene & Evolution:** Jha A.P. John Publication, New Delhi.
2. **Evolution & Genetics:** Merrel D.J. Holt rinchert & Wiston INC.
3. **The Genetics & Origin of Species:** Dobzhansky, Columbia University Press.
4. **Evolution:** Dobzhansky, Ayala F.J., Stebbins G.L. & Valentine J.M. Surjeet Publication New Delhi.
5. **Species Evolution - The Role of Chromosomal Change:** King M. Cambridge University Press, Cambridge.
6. **A Primer of Population Genetics -** Hartl D.L. Suinaer Associates INC, Massachusetts.
7. **Evolutionary Genetics:** Smith J.M. Oxford University Press, NewYork.
8. **Evolutionary Biology:** Futuyama D.J. Suinaer Associates INC publishers, Dunderland.
9. **Evolution:** Strikberger M.W. Johns & Bartett Publishers, Boston London.

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Section A: Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Section B: Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Section C: Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper I[st] (M.Sc. ZOOLOGY, Sem. - II) is hereby approved for the Session 2019 -20.

Name and Signatures

Chairperson /H.O.D ..... Subject Expert ..... Subject Expert ..... Subject Expert ..... Representative from Industry/entrepreneur ..... Student representative ...../27.08.2019 Other Prof. from Science faculty	Departmental members 1. ..... 2. ..... 3. ..... 4. ..... 5. ..... 6. ..... 7. ..... 8. .....

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
M.Sc. ZOOLOGY
Semester - II
SESSION 2019-2020
PAPER- II
REPRODUCTIVE BIOLOGY

Max. M.-80

UNIT- I

- Anatomy and histology of Testis, structure and function of Leydig cell and Sertoli cells.
- Spermatogenesis, spermeogenesis & Hormonal regulation.
- Structure of vertebrate sperm.
- Composition and function of seminal and prostatic fluid.
- Transportation of sperm .

UNIT II

- Anatomy and histology of ovary,
- Types of eggs in vertebrate.
- Oogenesis
- Ovarian follicular growth, oogenesis & hormonal regulation.
- Puberty, menarchy, menopause.

UNIT III

- Fertilization and its biochemistry.
- Post Fertilization events.
- Cleavage, blastula, gastrulation and fate map.
- Organogenesis in mammals.

UNIT IV

- Placentation.
- Extra embryonic membrane in mammal.
- Metamorphosis (progressive & retrogressive).
- Regeneration

SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. **Foundation of Embryology:** Bradley N.Patten, McGrow Publication.
2. **Fertilization in Animal:** Brain Dale, Arnold Heiniman, Gulab Vazerani Publication.
3. **Developmental Biology:** N.J. Berril, Tata McGrow Hill Publication N. Delhi.
4. **Embryology of Vertebrates:** Nelson.

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Section A: Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Section B: Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Section C: Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper II[nd] (M.Sc. ZOOLOGY, Sem. - II) is hereby approved for the Session 2019 - 20.

Name and Signatures

Chairperson /H.O.D	**Departmental members** 1. ..... 2. ..... 3. ..... 4. ..... 5. ..... 6. ..... 7. ..... 8. .....
Subject Expert	
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Student representative ...../27.08.2019.....	
Other Prof. from Science faculty	

GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
M.Sc. ZOOLOGY
Semester - II
SESSION 2019-2020
Paper - III
TOOLS & TECHNIQUE IN BIOLOGY

Max. M.- 80
Min. M.-16

UNIT -1

Principles and uses of analytical instruments.

- Balances – different parts & uses.
- pH meter – Principle, construction, types & uses.
- Colorimeters – Principle, construction, types & uses.
- Spectrophotometer – Principle, construction, types & uses.
- Ultra centrifuge – Principle, construction, types & uses.
- Spectroflurometer– Principle, construction, types & uses.
- Radioactivity counter– Principle, construction, types & uses.

UNIT – II

Microscopy.

- Principles of light transmission,
- Phase contrast microscope – principle, construction & uses
- Fluorescence microscope – principle, construction & uses
- Transmission electron microscope(TEM) – principle, construction & uses
- Scanning Electron microscopes (SEM) – principle, construction & uses
- Immunological Techniques-ELISA and RIA

Biosensors –

- Types and applications.

UNIT-III

Separation techniques in biology:-

- **Chromatography** – Principle, process (method) & uses of Paper, Thin layer & Ion Exchange chromatography.
- **Gel Electrophoresis** – Principle, process (method) & uses.
- **Centrifugation** – Principle, process (method) & uses of Density gradient centrifugation and Unit gravity centrifugation.
- **Flow cytometry** – Principle, process (method) & uses

UNIT – IV

Cell culture -

- Culture media –NAM and PDA ,
- Cell harvesting methods,
- Cell proliferation measurements.

Sterilization techniques –

- Chemical and physical methods of sterilization
- Principle, Construction and Uses of Autoclave and Laminar Air Flow

Cryopreservation –

- different process & uses.

Basic concept and application of Remote sensing and GIS in biology.

SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. **Practical Biochemistry:** Wilson & Walker, Cambridge University Press, Cambridge.
2. **Text book of Biotechnology:** Chatwal G.R. Anmol publications Pvt. Ltd. New Delhi.
3. **Tools of Biochemistry:** Cooper T.G.
4. **Microbiology:** Sharma P.D. Rastogi publication, Meerut.

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Section A: Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Section B: Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Section C: Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper III[rd] (M.Sc. ZOOLOGY, Sem. - II) is hereby approved for the Session 2019 - 20.

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GOVT. V.Y.T. PG. AUTONOMOUS COLLEGE DURG
M.Sc. ZOOLOGY (2019-20)
Semester – II
Paper -IV
ENVIRONMENTAL PHYSIOLOGY

Max. M. - 80

Min. M.-16

UNIT – I

- Adaptation: Pre adaptation and post adaptation, Causes of adaptation, Mechanism of adaptation,
- Adaptive radiation: Adaptive radiation in mammals, Causes and Significance.
- Acclimatization.
- Mimicry and Coloration

UNIT –II

- Freshwater Adaptation in animals: Lentic habitat & Lotic habitat.
- Marine water Adaptation in animals: Benthic Region, Pelagic Region and Deep Sea Region.
- Estuaries Adaptation in animals.
- Terrestrial Adaptation in animals: Desert, arboreal, Burrowing, Cursorial & Cave.
- Aerial adaptation
- Parasitic Adaptation

UNIT –III

- Basic concept of environmental stress and strain.
- Role of hormone during stress and strain.
- Homeostasis.
- Thermoregulation (Comfort zone, body temperature, Physical, chemical and neural regulation).
- Physiological response to body exercise.

UNIT-IV

- Osmoregulation: Fresh and marine fishes.
- Osmoregulation: Human beings.
- Physiological response to oxygen deficient stress.
- Acid–base balance in mammals.
- Meditation, yoga and their effects on digestive, respiratory and endocrine system.
- Significance of body size.

SUGGESTED READING MATERIALS - (ALL LATEST EDITION).

1. **ANIMAL PHYSIOLOGY, MECHANISM AND ADAPTATION:** Eckert, R., W.H. Freeman and Co.
2. **BIOCHEMICAL ADAPTATION:** Hochachka, P.W, and Somero S.N, Princeton, New Jersey.
3. **ANIMAL PHYSIOLOGY, ADAPTATION AND ENVIRONMENT:** Hochachka, P.W. and Somero S.N, Princeton, New Jersey Schiemidt Nielsen, Cambridge.
4. **GENERAL & COMPARATIVE ANIMAL PHYSIOLOGY:** Hoar W.S. Princeton Hall of India.
5. **ENVIRONMENTAL PHYSIOLOGY:** Willmer, P.G. Stone & Johansan I, Blackwell Science Oxford.

EVALUATION PATTERN

- **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Section A: Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
Section B: Short answer type question. Attempt one question from each unit with internal choice Word limit 200-250	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks	1X4 = 4 Marks
Section C: Long answer type question. Attempt one question from each unit with internal choice. Word limit 400-450	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks	1X12 = 12 Marks

The syllabus for Paper IVth (M.Sc. ZOOLOGY, Sem. - II) is hereby approved for the Session 2019 - 20.

Name and Signatures

Chairperson /H.O.D ..... Subject Expert ..... Subject Expert ..... 27/8/19 VK Gupta Subject Expert ..... 27.8.19 Representative from Industry/entrepreneur ..... Student representative ..... /27.08.2019 Other Prof. from Science faculty	Departmental members 1. ..... 2. ..... 3. ..... 4. ..... 5. ..... 6. ..... 7. ..... 8. .....

M.Sc. ZOOLOGY (2019-20)
SEMESTER – II
LAB COURSE-I
(Syllabus & Scheme of Marks allotment in Practical examination)

1. CULTURE AND CONTROLLED BREEDING OF DROSOPHILLA.
2. STUDY OF MORPHOLOGICAL VARIATIONS IN DROSOPHILA.
3. PRACTICALS BASED ON POPULATION ESTIMATION & POPULATION GENETICS.
4. EXERCISES BASED ON EVOLUTION.
   a. CONSTRUCTION OF PHYLOGENETIC TREE.
   b. EVOLUTIONARY RACES OF MAN.
5. IDENTIFICATION OF STAGES OF OOGENESIS & SPERMATOGENESIS.
6. IDENTIFICATION OF DEVELOPMENTAL STAGES OF GONADS.
7. IDENTIFICATION OF EMBRYONIC DEVELOPMENTAL STAGES IN FISH AND FROG.
8. STUDY OF EXTRA EMBRYONIC MEMBRANE IN CHICK.
9. IDENTIFICATION OF GAMETES.
10. STUDY OF GONADS (HISTOLOGY OF TESTES & OVARY) IN VERTEBRATES (THROUGH MICROTOMY).

EXAMINATION SCHEME

S.NO.	EXERCISES	MARKS
1.	EXPERIMENT BASED ON POPULATION GENETICS	20
2.	EXERCISE BASED ON EVOLUTION	15
3.	EXERCISE BASED ON REPRODUCTIVE BIOLOGY	20
4.	MICROTOMY	10
5.	VIVA	15
6.	SESSIONAL	20
	TOTAL	100

M.Sc. ZOOLOGY (2019-20)
SEMESTER – II
LAB COURSE-1I
(Syllabus & Scheme of Marks allotment in Practical examination)

- APPLICATIONS OF FOLLOWING EQUIPMENTS IN BIOLOGICAL TECHNIQUES: pH METER, COLORIMETER/SPECTROPHOTOMETER,CHROMATOGRAPHY (PAPER & THIN LAYER), CENTRIFUGE AND MICROSCOPE.
- MEDIA PREPARATION.
- STERILIZATION.
- CULTURE OF BACTERA.
- DETERMINATION OF BLOOD PRESSURE UNDER NORMAL AND STRESSED CONDITION.
- QUANTITATIVE ESTIMATION OF GLUCOSE LEVEL IN BLOOD.
- OXYGEN CONSUMPTION OF ANIMALS UNDERS STRESS.

EXAMINATION SCHEME

S.NO.	EXERCISE	MARKS
1.	TWO EXPERIMENTS BASED ON TOOLS AND TECHINIQUES	20
2.	TYPES OF MICROSCOPE.	05
3.	EXERCISE BASED ON MEDIA PREPARATION, STERILIZATION AND CULTURE TECHNIQUES.	10
4.	TWO EXERCISE BASED ON ENVIRONMENTAL PHYSIOLOGY	30
5.	VIVA	15
6.	SESSIONAL	20
	TOTAL -	100

The syllabus for M.Sc. ZOOLOGY, Sem. - II is hereby approved for the sessions 2019 -20.

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Student representative ...../27:08:2019	
Other prof. from Science faculty	

GENERAL INSTRUCTIONS FOR STUDENTS

1. The candidate has to obtain minimum 20% marks in each theory paper and internal assessment separately.
2. The candidate has to secure minimum 36% marks as an aggregate in order to pass that semester examination.
3. The internal assessment shall include class test, home assignment and seminar presentation.
4. In internal assessment, the marks taken into consideration will be the average of two tests (i.e. the class test and the home assignment) for each paper and shall of 20 marks.
   b. The seminar shall be in lieu of class test and home assignment combined and shall be of 20 marks.
   c. There shall be one seminar in each semester.
   d. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

DIRECTIVES FOR STUDENTS, FACULTY AND EXAMINERS

1. There shall be three sections (Section A, B, and C) in each theory paper.
2. Section A shall contain very short answer type questions (One or two line answer) or objective type questions (fill in the blank, **not multiple choice questions).**
3. Section B shall contain short answer type questions with the limit of 250 words.
4. Section C shall contain long answer/ descriptive type questions. The students are required to answer precisely and the answer should not exceed the limit of 450 words.
5. The students are required to study the content mentioned in the curriculum exhaustively.

EVALUATION PATTERN

➢ **Theory 80 marks = 04 Credits**

Question Pattern	Unit I	Unit II	Unit III	Unit IV
Section A: Very short answer type questions. (2 Questions from each Unit without internal choice). Maximum in two sentences.	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks	2X2 = 4 Marks
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Internal Assessment 20 marks = 01 credit

- Unit test – One class test in each theory paper comprising 20 marks. (containing two short answer type questions of 05 marks each and 05 objective type questions of 10 marks).
- Home assignments – Two long answer type questions from each theory paper containing 10 marks each. The answer should be prepared with the help of standard reference books. (The titles of those books, authors, year of publication and publishers details should be mentioned in an appropriate way, at the end of each assignment).
- Seminar presentations (Power point) – Comprising 20 marks.
  Each student has to be prepare one seminar in each semester. The marking of seminar shall be in terms of hard copy submission (10 marks) and presentation and open discussion (10 marks).

➢ **Practical 200 marks = 08 credits**

Two practicals of 100 marks each

CREDIT ALLOTMENTS

- Theory Paper = 05 credits (04+01)
- Practical = 04/ 08 credits

TOTAL CREDITS/ SEMESTER

- Science Subjects with 04 theory papers (100 each) and one /two practical (100 each) – 20 + 08 = 28 credits
- Science Subjects with 05 theory papers (no practical-Maths) – 25 credits
- Arts Subjects with 04 theory papers – 20 credits
- Arts Subjects with 05 theory papers – 25 credits
- Commerce subject with 05 theory papers – 25 credits

TOTAL CREDITS / PROGRAMME

- 16 Theory + 08 Practical + Project work – 80 + 32 + 08 = 120 credits
- 20 Theory – 100 credits (Maths)
- 20 Theory – 100 credits (Arts and Commerce)
- 16 Theory – 80 credits (Arts)

The syllabus (M.Sc. ZOOLOGY, Sem. - II) is hereby approved for the sessions 2019 -20.

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	7. .....
	8. .....