॥ अंतरी पेटवू ज्ञानज्योत ॥

उत्तर महाराष्ट्र विद्यापीठ,जळगाव
NORTH MAHARASHTRA UNIVERSITY,
P.B.NO.80, UMAVINAGAR, JALGAON- 425 001 (M S)
EPABX:(0257)252187-90 Fax No:0257-252183Gram: UTTAMVIDYA

जा.क्र.: उमवि/१२ /विज्ञान विद्याशाखा /६३९/२००२. दिनांक : १६/०७/२००२

* परिपत्रक क्र. ४१ / २००२ *

विषय :- शैक्षणिक वर्ष २००२-२००३ पासून सुधारित अभ्यासक्रम लागू करणेबाबत....

विद्यापीठ अनुदान आयोगाचे निर्देशाप्रमाणे व विद्यापीठ अधिकार मंडळांनी घेतलेल्या निर्णयानुसार **शैक्षणिक वर्ष २००२-२००३** पासून **विज्ञान विद्याशाखेतील** खालील सुधारित अभ्यासक्रम लागू करण्यात येत आहेत :-

प्रथमवर्ष विज्ञान.

१) गणित.
२) वनस्पतीशास्त्र.

एम.एससी. (भाग-१)

१) प्राणीशास्त्र.

२) केमिकल सायन्सेस -
(पॉलीमर केमेस्ट्री/इंडस्ट्रीयल केमेस्ट्री/
पेस्टीसाईडस् ॲण्ड ॲग्रो केमिकल्स)

सहपत्र :- वरीलप्रमाणे अभ्यासक्रमाच्या प्रती.

२५/७/०२
कुलसचिव.

प्रति,
मा.प्राचार्य / विभागप्रमुख,
सर्व संबंधित संलग्नित महाविद्यालये/प्रशाला /विभाग.

प्रतिलिपी :-

१) मा.अधिष्ठाता, विज्ञान विद्याशाखा.
२) मा.प्रा.श्री. _____ अध्यक्ष, _____ अभ्यासमंडळ.
३) मा.परिक्षा नियंत्रक (पाच प्रती)
४) उपकुलसचिव, संलग्नता विभाग, उ.म.वि., जळगाव
५) पध्दती विश्लेषक, संगणक विभाग, उ.म.वि., जळगाव.
६) सहा.कुलसचिव, परीक्षा विभाग, संबंधित विद्याशाखा, उ.म.वि., जळगाव.
७) सभा व दप्तर विभाग, उ.म.वि., जळगाव.
८) मा.कुलगुरू कार्यालय, उ.म.वि., जळगाव.
९) मा.कुलसचिव कार्यालय, उ.म.वि., जळगाव.

॥ अंतरी पेटवू ज्ञानज्योत ॥

उत्तर महाराष्ट्र विद्यापीठ, जळगाव
NORTH MAHARASHTRA UNIVERSITY,
P.B.NO 80, UMAVINAGAR, JALGAON- 425 001 (M S)
EPABX:(0257)252187-90 Fax No:0257-252183Gram: UTTAMVIDYA

जा.क्र.: उमवि/१२ /विज्ञान विद्याशाखा /६३९/२००२. दिनांक : १६/०७/२००२

※ परिपत्रक क्र. ४१ / २००२ ※

विषय :– शैक्षणिक वर्ष २००२–२००३ पासून सुधारित अभ्यासक्रम लागू करणेबाबत....

विद्यापीठ अनुदान आयोगाचे निर्देशाप्रमाणे व विद्यापीठ अधिकार मंडळांनी घेतलेल्या निर्णयानुसार शैक्षणिक वर्ष २००२–२००३ पासून विज्ञान विद्याशाखेतील खालील सुधारित अभ्यासक्रम लागू करण्यात येत आहेत :-

प्रथमवर्ष विज्ञान.

१) गणित.
२) वनस्पतीशास्त्र.

एम.एससी. (भाग–१)

१) प्राणीशास्त्र.

२) केमिकल सायन्सेस –
(पॉलीमर केमेस्ट्री/इंडस्ट्रीयल केमेस्ट्री/
पेस्टीसाईडस् ॲण्ड ॲग्रो केमिकल्स)

सहपत्र :– वरीलप्रमाणे अभ्यासक्रमाच्या प्रती.

कुलसचिव.

प्रति,
मा.प्राचार्य / विभागप्रमुख,
सर्व संबंधित संलग्नित महाविद्यालये/प्रशाला /विभाग.

प्रतिलिपी :–

१) मा.अधिष्ठाता, विज्ञान विद्याशाखा.
२) मा.प्रा.श्री. _____ अध्यक्ष, _____ अभ्यासमंडळ.
३) मा.परिक्षा नियंत्रक (पाच प्रती)
४) उपकुलसचिव, संलग्नता विभाग, उ.म.वि., जळगाव
५) पध्दती विश्लेषक, संगणक विभाग, उ.म.वि., जळगाव.
६) सहा.कुलसचिव, परीक्षा विभाग, संबंधित विद्याशाखा, उ.म.वि., जळगाव.
७) सभा व दप्तर विभाग, उ.म.वि., जळगाव.
८) मा.कुलगुरू कार्यालय, उ.म.वि., जळगाव.
९) मा.कुलसचिव कार्यालय, उ.म.वि., जळगाव.

॥ अंतरी पेटवू ज्ञानज्योत ॥

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

Syllabus for M.Sc. (Part-I)

ZOOLOGY.

(W.e.f. Acd. Yr. 2002 - 2003)

। अंतरी पेटवू ज्ञानज्योत ।

NORTH MAHARASHTRA UNIVERSITY, JALGAON.

Syllabus for M.Sc. Zoology (Part-I).

(W.e.f. Acd.Yr. 2002-2003)

SEMESTER - I

Zoo – 101 (a) : Structure and function in invertebrates. - 40 Marks
Zoo – 101 (b) : Biochemistry. - 40 Marks

80 + 20 Int.

Zoo – 102 : Environment and Environmental Physiology - 80 + 20 Marks.
Zoo - 103 (a) : Structure and function in Vertebrates. - 40
Zoo 103 (b) : Biostatistic. - 40

80 + 20 Int.

Zoo - 104 : Practical I
9 Practicals correstonding to 101 (a) - 30 Marks.
9 ---------- ---------- to 103 (a) - 30 Marks.
7 ---------- ---------- to 103 (b) - 20 Marks.
Internal Assessment - 20 Marks

Zoo – 105 : Practical II
10 Practicals corresponding to 101 (b) - 30 Marks.
15 Practicals corresponding to 102 - - 50 Marks
Internal Assessment - 20 Marks.

SEMESTER –II

Zoo -201 (a) : General Physiology - 40 Marks
Zoo – 201 (b) : Writing Scientific report and oral Presentaiton in English - 40 Marks

- 80 + 20 Int.

OR

Zoo - 201 (b) : Economic Zoology - - 40 Marks
Zoo- 201 (b) : Endocrinology - 40 Marks

80+20 Int.

Zoo- 202 : Cellular and Developmental Biology - 80 Marks

80 + 20 Int

Zoo – 203 (a) : Molecular Biology and Biotechnology- 40 Marks
Zoo – 203 (b) : Genetics - 40 Marks

80+20 Marks

Zoo – 204 : Practical –I
9 practicals corresponding to 201 (a) – 30 marks
9 practicals corresponding to 203 (a) – 30 Marks
7 practicals corresponding to 203 (b) – 20 Marks
Internal Assessment -- 20 Marks

Zoo-205 Practical –II
18 practicals corresponding to 202 - 60 Marks
7 practicals corresponding to 201 (b) - 20 Marks
Internal Assessment - 20 Marks

SEMESTER – I.

Zoo – 101 (a) : Structure & Function in Invertebrates.

1. Organization and Life :
   Homology and analogy in organization. Diversity of invertebrates, phylogeny of invertebrates.
2. Coelom :
   A coelomates, Pseudocoelomates, Coelomates, protostomia and Deuterostomia.
3. Locomotion :
   Flagella, Ciliary and amoeboid movement in prolozoa.

(1)

4. Nutrition and Digestion :
Patterns of feeding and digestion in lower metazoan filter feeding in Polychaeta, Filter feeding and digestion in Mollusca and Deuterostoma.

5. Respiration :
Organs of respiration : Gills and lophophores, gills and lungs in Mollusca and Gills and tracheae in Arthropoda. Respiratory pigments.

6. Excretion :
Organs of excretion : Coelom , Coelomoducts, Nephridia and Malpighian tubules Excretion of Nitrogen.

7. Nervous System :
Primitive nervous system : Coelenterata and Echinodermata .
Advanced nervous system : Annelida and Mollusca (Cephalopoda). Trends in neural evolution.

8. Invertebrate Larvae : Larval forms of Platyhelminthes; Crustacea, Mollusca and
Echinodermata. Significance of larval forms.

9. Colonial and Social life :
Protozoan colonies, Sponge and Coelenterate colonies and social life in insects.

Reference books for Zoo – 101 (a) structure and function in invertebrates :

1. Hyman L. H. The invertebrates. Vol-1 Protoza through ctenophore. McGraw Hill Co. New york.
2. Barrington E.J.W. Invertebrates. Structure and Function. Thomas Nelson and Sons Ltd., London.
3. Hyman L. H. The invertebrates. Vol-2 McGraw Hill Co. Newyork.
4. Hyman L. H. The invertebrates. Vol-8 McGraw Hill Co. Newyork.
5. Barnes, R.D. Invertebrate Zoology , 3rd Edition. W.B. Saunders Co., Philadelphia
6. Russel Hunter, W. D A biology of higher invertebrates Macmillan Co. Ltd., London.
7. Human, L. H. The invertebrates- smaller coelomate groups vol.5 . McGraw Hill Co. Newyork.

Practical Corresponding to Zoo-101 (a) structure and function in Invertebrates

1. Dissection of grasshopper -- Digestive system, Nervous system and Reproductive system.
2. Dissection of Prawn -- Nervous system and Reproductive system.
3. Mounting : Nephridium an spermatheca in Earthworm.
: Mouth parts and spiracles in Grasshopper.
: Book lungs and pectin in Scorpion.
4. Protozoa : Gregarines, Monocystis, ceratium, Noctiluca, Radiolaria , Opalina.
Porifera : Sectional view of sycon (T.S., L.S.)

Cnidaria: Obelia - polyp and Medussa , Pennaria, Auralia, Virgularia, Zoanthus, Favia.
Helminthes: Ascaris, Taenia solium , Planaria.
Annelida : Eunice, Polynoe, Terebra.
Arthropoda: Cyclops , Daphnia, Lepas, Balanus, Pyona, Hippa, Limulus, Belostoma, Squilla.
Mollusca : Dolobella, Pteria, Ficus, Onchidium, Olvia, Murex , Arca, Cardium.
Echinodermata : Echinodiscus, Holothuria , Antedon.
Larval Forms : Larval forms of Platyhelminthes , Crustacea, Mollusca and Echinodermata

Zoo – 101 (b) Biochemistry

1. Amino acids and proteins : Methods of Isolation and Purification.
2. Carbohydrates : Biosynthesis & degradation of Glycogen. Gluconeogenesis and control of Blood Glucose
3. Lipids : Synthesis of Cholesterol and its control, Factors influencing cholesterol balance in tissue, Clinical aspects of serum cholesterol.
4. Bioenergetics : Concept of free energy, Coupling of endergonic and exergonic reactions, Role of A. T. P. as 'energy currency' of the cell.
5. Techniques and Instrumentation :
   a) Radioactivity determination : Sample preparation for radioactive counting, G.M. counter, Scintillation Counter, Autoradiography, Metabolic labelling, Magnetic Resonance Imaging.
   b) Spectroscopy : UV and visible spectroscopy, Single beam and double beam spectrophotometer, Principles of ESR and NMR spectrometers, Spectroflurometer.
   c) Centrifugation : Basic principles of Sedimentation. Density Gradient centrifugation (Rate Zonal technique and Isopycnic technique) .
   d) Chromatography : Principles of different types viz. HPLC ; GLC, TLC , Gel filtration, Affinity chromatography and Ion-Exchange chromatography.
   e) Electrophoresis : Principles of Gel Electrophoresis viz. SDS-PAGE, IEF & Agarose gel electrophoresis.
   f) Immunochemical Techniques : Principles of RIA , ELISA and I E.
   g) Biosensors : Principles, First-Second-and Third-generation instruments, Cell-based biosensors and Enzyme immunosensors.

Reference Books

1. Principles & Techniques of Practical Biochemistry: K. Wilson & J.Walker ISBN Edition /
2. Introduction to Instrumental analysis Robert Braun McGraw Hill Int.Edn.
3. Harper's Biochemistry : Robert K. Murray, D. K. Granner, Peter A. Mayer & Victor W.Rodwell. International 25th Edition.
4. Biochemistry : Lehninger
5. Biochemistry : Stryer
6. Biochemical Methods : S. Sadasivam & A.Manickam. New Age International (P) Limited.

Zoo-105 Practical –II
Practicals corresponding to 101 (b) Biochemistry.

1. Estimation of total free amino acids.
2. Estimation of tyrosine by Folin-phenal method.
3. Determination of concentration of glucose by colorimetric method.
4. Estimation of serum cholesterol.
5. Estimation of Protein by Biuret method.
6. Separation of serum proteins by electrophoresis.
7. Determination of sucrose/glycerol density gradient centrifugation.
8. Colorimetric determination of pK value.
9. Separation of lipids by TLC/Paper chromatography.
10. Determination of Creatinine in blood and urine by Picric acid method.
11. Isolation of Casein from milk by isoelectric precipitation.
12. Estimation of Uric acid from Lizard/Bird excreta.

Zoo – 102 Environmental and Environmental Physiology

1. Review : Biosphere, biotic and abiotic factors, food web and trophic levels, environmental cycles.
2. Succession : Primary, Secondary, Significance.
3. Pollution : Air – Sources hazards prevention and control measures.
   Water - Sources hazards prevention and control measures.
   Radiation- Sources hazards prevention and control measures.
   Noise - Sources hazards prevention and control measures.
4. Energy : Resources, consumption and energy crises.
5. Adaptations (A) Levels of adaptation ; mechanism of adaptations, significance of body size.
   (B) Physiological adaptations to different environments.
   i) Terrestrial (Normal & extreme environment)
   ii) Freshwater
   iii) Marine (Normal & extreme environment)
   iv) Shores and estuaries
   v) Parasitic.
6. Stress Physiology : I) Basic concept of environmental stress and strain : Concept of elastic and plastic strain, stress resistance stress avoidance, stress tolerance.
   ii) Adptation, accilimation and acclimatization.
   iii) Concept of homeostasis
   iv) Physiological adaptation to osmotic and ionic stress, mechanism of cell volume regulation. Osmoregulation in aquatic and terrestrial environments.
   vi) Physiological response to oxygen deficient stress.
   vii) Physiological response to body exercise.
   viii) Meditation, Yoga, and their effects.
7. Population Ecology : I) Demography - Life tables, generation time, Net reproductive rate, reproductive value.
   ii) Population Growth - Growth curves : Exponential growth, Population density, population explosion and its impact on environment.
   iii) Population Control.

8. Conservation of Nature : i) Species and extinction of species – Destruction of habitat, introduction of foreign species , commercial harvest , Predation, Action to save endangered species

ii) Research and documentation habitat preservation and creation of wild life refuge providing critical resources legal actions for the preservation of species, breeding in captivity. Aforestation.

Reference Books

1) Turk and Turk (1983) 4th edition Environmental science. Saunders college Publishing Newyork.

2) Southwick V.H. (1976) Ecology and the quality of environment .Zedu . Van Nostrant Newyork.

3) Sax N. I. : Industrial pollution , Van Nastrand Reinhold Co., Newyork

4) Nelson L.N. : Industrial Water Pollution - origins, Characterstics and treatment . Addison vesley Publishing company.

5) Trivedi R.K., Goel P.K., Trisal C.L. : Practical methods in Ecology and Environmental Science Environmental Publishers, Karad.

6) Bedi : Social and preventive medicine.

7) Odum E.P. Fundamentals of Ecology , W.B. saunders Co.

8) Needham and Needham : A guide to the study of freshwater biology.

9) Eckert R. Anima Physiology : Mechanism and adaptation. W.H. Freeman and Company Newyork.

10) Schiemdt Nielsen. Animal Physiology : Adaptation and Environment . Cambridge.

11) Willmer P.G. stone, and Johnston. Environmental Physiology. Blackwell Science , Oxford, U.K. 644 pp.

12) Newell , R.C. (ed) 1976. Adaptation to environment. Essays on the physiology of marine animals. Butterworths , London , U.K. 539 pp.

13) SAlexander RMN Optima for animals Princeton University Press Princeton. N J.

List of Practicals Zoo-102 Environment and Environmental Physiology.

1 Determination of chlorophyll 'a' and 'b' of terrestrial plants by using acetone method.
2 Estimation of Oxygen and carbondioxide from freshwater samples.
3 Estimation of Oxygen consumption in aquatic animals under various environmental stresses.
4 To study the changes of blood glucose level under various environmental stresses in a vertebrate species.
5 Toxicity Test – L C 50
6 Estimation of total alkalinity , carbonates , bicarbonates , hardness of water samples.
7 Determination of properties of water such as pH , temperature, total solids (TS) Total dissolved solids (TDS), Light penetration by using sachi disc.
8 Qualitiative analysis of zoo-plankton of lotic and lentic ecosystems.
9 Study of morphological , Physiological and protective adaptations of freshwater animals.

10. Study of morphological, physiological and protective adaptations of terrestrial animals.
11. Study of instruments used in study of Environmental Biology - pH meter, BOD incubator COD incubator, Colorimeter, spectrophotometer, turbidity meter (Any three).
12. Biological assessment of water pollution (any 3)
    a) Diversity index
    b) Kothe's species deficit index
    c) Odum index
    d) Sequential comparison index (SCI)
13 Measurement of dust fall
14 Field trip to study Provid/Lake/river/esosystem
15 Feled trip to study terrestrial ecosystem.

Zoo – 103 (a) Structure and functions in the vertebates

1: Origin and Phylogeny of Chordates
2: Concept of adaptive radiation and application of chordates : Fish (Elasmobranchii, Osteichthyes), Amphibia, Reptiles, Aves, Mammals.
3: Study of Endoskeleton and joints in any suitable mammal.
4: Comparative anatomy of autonomous nervous system.
5: Comparative anatomy of sense organs-ear and eye.

Practical corresponding to Zoo – 103 (a) Structure and functions in the vertebates

1: Classification of Pisces /Fishes upto order-suborder-Anura- Elamobranchii, Osteichthyes, Dipnoi.
2: Classification of Amphibia upto order-suborder- Anura, Urodela, Apoda
3: Classification of Reptiles upto order-suborder- Anapsida, Diapsida.
4: Classification of Aves upto order-suborder- Palaeognathae, Neognathae.
5: Classification of Mammals upto order suborder- Protheria, Metatheria, Eutheria.
6: Study of Axial skeleton of Rabbit/anhy suitable mammal.
7: Study of Appendicular skeleton of Rabbit/any suitable mammal.
8: Dissection of Rat/any suitable vertebrate to study cranial nerves.
9: Dissection of Rat/ any suitable vertebrate to study autonomous nervous system.
10: Study of eye muscles in any suitable vertebrate.

Reference Books for vertebrates :-

1 Alexander, R.M.: The chordate. Cambridge University press London.
2 Ballairs – Reptiles (Hutchinson)
3 Bourne, G.M.: The structure and functions of nervous tissue. Academic Press, Newyork.
4 Carter, G.S : Structure and Habit in vertebrate evolutions. Sedgwich and Jackson London.
5 Eecles, J.C. : The understanding of the brain. McGraw Hill Co., Newyork.
6. Green : Anatomy of Rat (Hafner)
7. Hyman : Comparative vertebrate Anatomy, University of Chicago Press.
8. Kingsley, J.S. : Outlines of comparitive Anatomy of vertebrates (Central Book Depot, Allahabad)

9. Kent C.G. : Comparative Anatomy of vertebrates.
10. Malcom Jollie : Chordata Morphology, East West Press Pvt.Ltd., New Delhi.
11. Milton Hilderand : Analysis of vertebrate structure. fourth edn. John Wiley and Sons , Newyork
12. Newman – The Phylum chordate (MaCmillan)
13. Noble : The Biology of Amphibia (Dover)
14. Parker and Haswell – Text Book of Zoology Vol-2 (Macmillan)
15. Paranjape S. Y. : The Anatomy of the Gardern Lizzard (Calotes versicolor Boulenger- University of Poona- Pune)
16. Prasad : Vertebrate zoology – Kitab Mahal.
17. Romer : Vertebrate body
18. Smith, H.S. : Evolution of chordata structure . Hold Rinehart and Winstain Inc New york.
19. Sedgwick , A. : A students Text book of Zoology Vol-2
20. Tausley, K. : Vision in vertebrates, Chapman and Hall Ltd. London.
21. Walters, H.E.and Sayles , L.D. : Biology of vertebrates. Macmillan and Co. Newyork
22. Weichert : Anatomy of Chordates.
23. Young, J.Z. : Life of vertebrates . The oxford University Press, London.
24. Young, ss J Z. : Life of mammals , Oxford University Press, London.

Zoo-103 (b) Biostatistics

1. **Introduction to Statistics :**
1.1. **Meaning of Statistics.**
1.2. **Its Uses in Biological Sciences.**
2. **Collection of Statistical Data –**
2.1 **Concept of population, Sample, parameter, statistics primary and secondary data.**
2.2 **Sampling procedures, Purpose of sampling.**
2.3 **Sampling methods – SRSWOR, SRSWR, Stratified random sampling. Systematic sampling. (Mathematical derivations not expected)**
3. **Classification:**
3.1 **Meaning, objects of classification.**
3.2 **Class, Class limits, Class boundires, Mid points, class interval, Frequency, Cumulative frequency.**
3.3 **Frequency distributions, Cumulative frequency distributions.**
3.4 **Numerical Problem.**
4. **Mensures of Central Tendency and Despersion.**
4.1 **Concept of Central Tendency and Despersion.**
4.2 **Mean, Median, Standard deviation, Definitions, Computations for grouped and ungrouped data. (by direct method using formulae)**
4.3 **Coefficient of variation : Definition, Computation and its uses.**
4.4 **Numerical problems.**
5. **Correlation and Regression –**
5.1 **Meaning of correlation and types of correlation Karl person's coefficient of Correlation. Definition, Interpretation, Computation for grouped and ungrouped data.**
5.2 **Meaning of regression, statement of regression equations, for two variables, regression coefficient, computations of Regression equation from raw data and Summarised data, Relation between Regression Coefficeient and Correlation Coefficient.**

(7)

5.3 Simple Numerical Problems

6. Testing of Numerical Problems.

6.1 Meaning of Hypothesis, Null Hypothesis, Alternative Hypothesis, finding of standard values from the statistical table.

6.2 Test based on Normal distribution (two tailed tests)
Large sample tests for testing mean, Difference of means, proportion and difference between the proportions.

6.3 Test based on distribution , Testing the mean, Difference in the means Paired t-test.

6.4 Test based on ψ^2 (Chi-Square)distribution Test of goodness of fit, Test of independence of attributes.

6.5 Test based on F-distribution for testing the variances.

6.6 Simple Numerical Problems.

7. Design of Experiments.

7.1 Concept and Meaning of design of experiments, Randamization, Replication, Local control.

7.2 Brief and elementary explanation of CRD and RED

7.3 Numerical Problems.

REFERENCE BOOKS FOR BIOSTATISTICS :

1) Statistical Methods : G. W. Snedecor and W.C. Cochran.
2) Vital Statistics : M. Orkin and R. Drogin.
3) Statistical Methods : W. S. Dixon and F. Massey.
4) A short text book of Medical Statistics : A Bradford Hill.
5) Fundamentals of Biometry : L. N. Balaam

Practical corresponding to Zoo -- 103 (b) BIOSTATISTICS

1) Formation of Frequency distribution and Computation of central Tendency and Dispersion.
2) Drawing a random sample from the population by using Random Number table.
3) Computation of Regression equations.
4) Determination of Regression equations.
5) Test of Significance (Large sample tests)
6) Test of Significance (Small sample tests)
7) Analysis of CRD and RED and its interpretation.

SEMESTER-II

Zoo-201 (a) General Physiology

1. Excretion : Physiology of Excretion w.r.t. desert animals.
2. Respiration : Blood pigment Haemoglobin and its Metabolism.
3. Circulation : Laws of Heamodynamics, Blood coagulation, ECG Normal and abnormal, its significance.
4. Muscle Contraction : Types muscle contractions – Simple muscle, twitch, isometric and isotonic contraction.
5. Temperature relations : Adaptations to temperature in poikilotherms and thermal acclimatization.
6. Pineal gland structure and function.
7. Physiology of Tactile, Gustatory and Olfactory receptors.
8. Electro Encephalogram (EEG) – Its significance sleep, Memory.
9. Immune System in Human.

Zoo 201 (b) Writing Scientific Reports and Oral presentation in English

1. Compilation of Experimental Record:
   Writing helps you remember, observe and think,
   Writing an account of an experiment during its progress,
   Writing a progress report.
2. Communication : Internal reports, letters and memoranda, Communication as part of science.
3. How Scientist should write :
   Explanation, clarity, completeness, impartiality, order, accuracy, objectivity, simplicity, appropriateness, balance, brevity, consistency, control interest, persuasiveness, precision, sincerity, unity.
   How to write instructions
   Unscientific writing examples
4. Programme of writing :
   Thinking and planning – information, ideas, topic, outline, order of paragraph writing, revising.
5. Use of Vocabulary :
   Meaning of words, precise usage, tautology, synonyms, unnecessary qualification of word, ambiguity.
   Technical terms, nomenclature, Context, superfluous words, circumlocution, reason for verbosity.
6. Use of good English :
   Noun, pronoun, verb, adverb, adjective, conjunction, articles, tenses, spelling etc.
7. Helping the reader :
   Decide what the reader needs to know,
   Write for easy reading (how to begin, control, explain, sentence length, rhythm, style)
   Capture and hold reader's interest
   Obstacles to effective communication.
8. Numbers contribute to precision :
   The use of numbers.
   The use of tables.
   The use of graphs and diagrams.

9. The art of illustration, ink drawing, photography.
   Writing the legend or caption.
   Completed illustration.
10. Reading :
   How to read, making notes as read, writing a book review.
11. The part of research report :
   Introduction, M/M, Results, Discussion, Summary, Acknowledgement, Reference.
12. The part of thesis and project reports :
   Preparing the manuscript.
   Preparing the typescript.
   Preparing the index.
   Preparing the typescript for the printer
13. Editing and correcting :
14. Technique of Oral Presentation :
   Preparation of summary notes, choice and use of audiovisual techniques, Voice, pronounciation, punctuation articulation, speed of delivery, Justification, interest, brevity, directness, sequence emphasis, citations, tautology.
   The time factor.
   Hypothesis/analysis and synthesis.
   Questions and answers – Listening, attentiveness, circumlocation.

Zoo –201 (b) Economic Zoology

Study of the following topics in relation to their economic importance.

Protozoa . i) Parasitic protozoa – E. Histolytica, Trypanosoama, Leishman a and Malarial parasite.
ii) Soil protozoa – Psentomonas , Euglena, their role in agriculture .

Porifera: Sponge culture and its importance in industry and commerce.

Coelenterata : Coral reefs as barriers their industrial and medicina uses.

Annelida : Economic importance of Earthworms :
i) Worm framing , ii) Vermi compost, iii) Natural ploughing

Arthrpoda :
i) Prawn fisheries, ii) Silk worm ,
iii) Honey bees iv) Lac insects
iv) Termites v) Ticks and mites ,
vii) Insect Vectors viz. Heas, Housefly, Mosquitoes Culex, Anopheles.

Mollusca :
i) Pearl Industry, ii) Ornamental value of Mollusca
iii) Shell industry, iv) Food sources
iv) Role as intermidiate hosts (Bionomics not needed)

Echinodermata :
Harmful role of star fishes in Oyster farming Ornamental value.

Cyclostomes and Fishes :
i) Parasites and Predators ii) Food value
iii) As fertilizers iv) Fish glue
v) Oil vi) Medicinal uses
vii) Ornamental uses.

Amphibia :

i) As Biological control agents.
ii) Food value
iii) Role as experimental animals for research

Reptiles :

i) Role of Snakes as biological control agents.
ii) Antivenom production.

Aves :

i) Poultry birds
ii) Birds as pests.
iii) Birds as pollinators
iv) Birds as Biological Control Agents
iv) Nuisance value in aviation

Mammals :

i) Dairy industry
ii) Piggery
iii) Hide, ivory, wool, bone industries
iv) Goatary
v) Mammalian pests - Pigs, rats, Bandicoots, Squirrels, bats, mammls viz.
vi) Role of Guineapigs and Monkey as animals for research.

Reference Books – Zoo 201 (a) General Physiology

1. K. Schmidt – Nielsen (1979) – Animal Physiology: Adaptation and environment, Cambridge University Press.
2. C.L. Ralph (1978) - Indroductory animals Physiology, McGraw Hill. N.Y.
3. E. Baldwin (1964) – Introductions to Comparative Biochemistry, Cambridge University Press.

Reference Books – Zoo 201 (b) Writing Scientific Reports and Oral Presentation in English.

1. Scientist must write. R. Narrass, (1978), Chapman and Hall ; John Wiley and Sons, N.Y.
2. Writing Scientific papers in English (1975), Maeve O' Connor and F. Peter Woodford, Elsevier, Excerpta Medica, North- Holland.
3. The art of plain talk. Flesch, R F. (1962), Collier – Macmillan, London, N.Y
4. Guide for preparation of scientific paper for publication and Guide for preparation of author's Abstract for publications. UNESCO (1968) SC/MD/5, Vallians G.H. (1964) Good English : How to write it.
5. Grogan D. J., Science and Technology : An introduction to the literature 2nd edition, Bingley Publication London.
6. Elements of English grammer
7. Oxford and Webster's English Dictionaries.
8. English in basic Medical Science by Joan Maclean (1978) Oxford Uni. Press
9. English in Education, by Elizabeth Laird (1977), Oxford Uni. Press

Reference Books – Zoo 201 (b) Economic Zoology

1. Economic Zoology – Srivastava, Commercial Pub. brue, New Delhi.
2. Economic Zoology – Fred V. Theobald
3. Economic Zoology – Vishwapremi K. K. Akashdeep Publishing House, New Delhi.

4. Parasitology – K. D. Chatarjee.
5. Parasitology – Kudo
5. Useful & Destructive Insects – Metrull and Tenni
7. Hyman Series – Comman Birds - Salim Ali
8. Indian Birds - Salim Ali
9. Indian Snakes – Dr. Deoras
10. Fishes of India - Dry Faucis
11. Zoology of Phylum Series – Kotpal R. L.
12. Life of Mammals – Young

Syllabus for M.Sc Part-I Zoology Practical

Zoo-205 : Practical Corresponding to Zoo 201 (b) Writing Scientific reports and oral presentation in English.

1) Prepare a protocol of any Molecular Biology/ Genetics/Biochemistry experiments. Give 1) Principle, 2) Requirement 3) Procedure , 4) Observation, 5) Tables and 6) Inference.
2) A close study of research article published in any of the foreign research journals with reference to i) Title, ii) Abstract, iii) Introduction , iv) Materials and Methods, v) Observations/result, vi) Tables, Graphs, histograms and their interpretation, vii) Discussion, Viii) References , ix) Summary.
3) Preparation of Tables, Graphs, histograms from the given hypothetical data.
4) Communication Skill – Narration of any Scientific news from any science report or any scientific journal. Sequence of facts, results , conclusions, Group discussion.
5) Effective reading – Read a passage . Pay attention to stress, pause, rhythms and style.
6) Paragraph Writing – Characteristics of good paragraph, study of some good paragraph having some scientific information. Find out difficult words and know their meanings. Underline the Key sentences. Give abstract of the passage. Suggest suitable title to the passage.
7) Vocabulary – Study of words sense as words with similar meaning/opposite meaning.
8) Grammar topics i) Articles , ii) Tenses , iii) Parts of Speech , iv)Concord

Zoo-205 . Practical Corresponding to Zoo 201 (b) Economic Zoology

1) Study of Protozoons – Useful and harmful.
   Study of Economic importance of different sponges.
   Study of Economically important Annelids
2) Study of Useful and Harmful Arthropods.
   Study of Molluscs for economic importance.
   Study of economic importance of Echinoderms.
3) Study of economic importance of Cyclostomes, fishes & Amphibians.
4) Study of economic importance of Reptiles, Birds & Mammals.
5) Study of Life Cycles of some parasitic protozoons & Heliminthes,
6) Visit to some dairy industry, Piggesy, Goatary.
7) Study of some useful animal products to mankind
8) Visit to some agricultural or veterinary institute to study various aspects of different groups of animals.

Practicals 201 (a) General Physiology.

1) To determine the chlorides in the blood of human and crab.
2) Determination of nitrogenous excretory products. (Urine sample of cow, excreta of cockroach , Lizard, bird)
3) To make a muscle nerve preparation to record muscle twitch in suitable animals.
4) Effect of temperature on oxygen consumption in crab.
5) To estimate the amount of chloride present in the urine of a mammal .(Cow)
6) Effect of adrenaline on liver and muscle glycogen of Rat
7) Preparation of neuro-motor end plates in any suitable animal.
8) Study of reflex action in any suitable animal.
9) Circulatory response in Human skin.
10) Quantitative estimation of blood sugar level, before and after insulin treatment.

Zoo : 201 (b) ENDOCRINOLOGY

1) Phylogenic aspects of endocrine systems.
2) Histology of endocrine glands.
3) Hormones, hormone receptors & Mechanisms of hormone actions.
4) Neuroendocrine relationships , neurosecretion in the vertebrates and the invertebrates.
5) Chemistry of invertebrate hormones and their role and mode of action in the control of metabolism tanning , Salt and Water balance , Reproduciton , Moulting metamorphosis and chromatophores.
6) Hypothalomic control of endocrine functions in vertebrates.
7) Chemistry, function and mdoe of action of Pituitary thyroid, Parathyroid, Pancreatic, adrenal, gonadal & Pinea. hormanes in vertebrates.
8) Hormonal control of digestion and renal funciton.
9) Hormonal control of amphibian metamorphasis.
10) Pheromones.

Zoo 201 (b) Practicals corresponding to Endocrinology.

1) Dissection of any suitable vertebrate animal pertaining to endocrine glands.
2) Dissection of any suitable invertebrate animal pertaining to endocrime glands.
3) Effect of background adaptation in Chromatophores of fishes/Prawns.
4) Eye stalk ablation to show the effect on the body colouration on Prawns/Crabs.
5) Histology of endocrine glands : Pitu tary, Thyroid, Adrenal and Gonads.
6) Demonstration of Neurosecretory granules in Cockroach.
7) Study of Oestrous cycle in rat.
8) Study of Secondary sexual characters.
9) Submisision of 5 permanent slides of endocrine glands of Rat/Crab/Prawn/Cockroach

Reference Books on Endocrinology

1) E. J. W Barrington : General and Comparative Endocrinology, Oxford, clarendon Press.
2) P. J. Bentley : Comparactive Vertebrate Endocrinology , Cambridge University Press.

3) W. J. Burdetter, Ed.(1974) : Invertebrate Endocrinology & Hormonal heterophyily, Springer-Verlag.
4) C. R. Martin : Endocrine Physiology Oxford University Press.
5) A. Gorbman et al. : Comparative Endocrinology, John Wiley & Sons.
6) R. Nagbhushanam , Kodarkar M. S., R. Sarojini, 2nd Edn., 1995, Text book of Animal Physiology, Oxford , I.B.H. Publishing Company.
7) R. H. Willsons : Text Book of Endocrinology, W. B. Saunders.

202 Cellular and Developmental Biology

1) Plsma membrane -- Structure Chemical nature, models,passive and active transport junctions, changes in membrane due to fertilization..
2) Chloroplast :- Ultrastructure and functions.
3) Lysosome :- Ultrastructure and functions.
4) Ribosomes :- Ultrastructure and functions.
5) Cell cycle :- Concept, various stages, control of cleavage pattern during development.
6) Mitotic apparatus, centricles, synaptonemat complex.
7) Concept of Growth – at cellular level, at organ level.
8) Cytoplasmic determinants and autonomous cell specification.
   a. Cell commitment and differentiation.
   b. Cell specification in nematodes
   c. Germ cell determinants.
   d. Germ cell migration.
   e. Progressive cell-cell interaction and cell specification, fate.
9) Tetrapod limb development, and limb regeneration.
10) Eye morphogenesis.
11) Nucleocytoplasmic interactions, somatic cell hybridization , clanning.
12) Cellular Immunity.
13) Cell ageing and cell death, Bone marrow tansplant.

References Zoo 202 Cellular and Developmental Biology

1) Cell Biology -- De Roberts et.al 1975
2) Cell and Molecular Biology : Du Praw E. J.
3) Gene Expression : Lewin B.
4) Molecular Biology of the Gene : J. D. Watson
5) Mitochondria : Lehniger B.
6) Cell Fusion : Harris
7) Cytological technique : J. R. Baker 1966
8) Atlas of fine structure : Fawcett D. W.
9) Development aspect of cell cycle : Cameron I. L.
10)Lysosomes and cell function : Fit:
11)Developmental Biology by Gilbert

Practicals of Zoo 202 : Cellular and Developmental Biology

1) Study of electron micrographs of various cells organelles
2) Study of Principles of phase contrast, electron microscopy
3) Study of Mitosis in onion root tip
4) Study of meiosis in grass hopper testes
5) Detection of Carbohydrates by PAS reaction.
6) Detection of Protein by Bromophenol blue method.
7) Detection of DNA by Feulgen reaction.
8) Detection of mitochondira in tissue section by suitable staining method

9) Detection of RNA by Methyl Green pyronin method.
10) Temporary preparation of chick embryo
11) Permanent preparation of chick embryo
12) Study of different of types of eggs.
13) Study of different animal's eggs
14) Study of cleavage pattern in Amphioxus, fish, snail, frog, bird and mammals
15) Study of gastrulae in Amphioxus, fish, frog, bird and mammal.

Zoo 203 (a) Molecular Biology and Biotechnology

1) Organisation of Eukaryotic genes :- Haemoglobin, IgG, Organisation of transcriptional unit in bacteriophage T7 and eukaryotes.
2) DNA replication :- Mechanism of DNA replication, Enzymes and accessory proteins involved in DNA replication.
3) Post – transcriptional modification in RNA :- 5' - Cap formation, Transcription termination, 3' – end processing & polyadenylation, Splicing, Editing, Nuclear Export of mRNA, in RNA stability.
4) Antisense and Ribozyme Technology :- Molecular mechanisms of antisense molecules, Inhibition of splicing, polyadenylation and translation, Disruption of RNA structure and capping, Biochemistry of ribozyme-hammerhead, hairpin & other ribozymes, Application of antisenese and ribozyme technologies.
5) Recombination and Repair :- Holiday junciton, gene targetting, gene disruption, FLP/FRT and Cre/lox recombination, Rec A and other recombinases, DNA repair mechanisms.
6) Biotechnology :- Definition, Scope and importance, Recombinant DNA and Gene cloning, Chimaeric DNA, Molecular Probes and Gene Libraries.
7) PCR and Gene Amplification :- Basic PCR, Inverse PCR, Anchored PCR, PCR for mutagenesis, Asymmetric PCR, Application of PCR in Biotechnology & Genetic Engineering.
8) Animal Tissue culture Techniques and their applications.

Reference Books

1) Molecular Biology of the Gene : J. D. Watson, N. H. Hopkins, J.W. Roberts, J. A. Steitz & A. M. Weiner California
2) Molecular Biology of the Cell : B. Alberts, D. Bray, J. Lewis, M. Raff, K. Roberts & J. D. Watson, New York
3) Gene VI :- Benjamin Lewin, U. K.
4) Molecular Biology and Biotechnology : R.A. Meyers (Ed.) New York.
5) Molecular Cloning : A Laboratory Manual :- J. Sambrok, E. F. Fritsch & T. Maniatis, New York
6) Introduction to Practical Molecular Biology :- P. D. Dabre, John Wiley & Sons Ltd., New York.

Zoo 204 Practical-I
Practical of Molecular Biology and Biotechnology

1) Estimation of total protein content in different cell fractions (Nuclear, Crude, Mitochondrial) by Lowry's method.
2) Isolation of DNA/RNA from biological source.
3) Estimation of DNA by Diphenylamine reaction from different cell fractions.
4) Estimation of RNA by Orcinol reaction in given cell fractions.

3) W. J. Burdetter, Ed.(1974) : Invertebrate Endocrinology & Hormonal heterophylly, Springer-Verlag.
4) C. R. Martin : Endocrine Physiology Oxford Universiy Press.
5) A. Gorbman et al. : Comparative Endocrinology, John Wiley & Sons.
6) R. Nagbhushanam , Kodarkar M. S., R. Sarojini, 2nd Edn., 1995, Text book of Animal Physiology, Oxford , I.B.H. Publishing Company.
7) R. H. Willsons : Text Book of Endocrinology, W. B. Saunders.

202 Cellular and Developmental Biology

1) Plsma membrane -- Structure Chemical nature, models,passive and active transport junctions, changes in membrane due to fertilization..
2) Chloroplast :- Ultrastructure and functions.
3) Lysosome :- Ultrastructure and functions.
4) Ribosomes :- Ultrastructure and functions.
5) Cell cycle :- Concept, various stages, control of cleavage pattern during development.
6) Mitotic apparatus, centrices, synaptonemat complex.
7) Concept of Growth – at cellular level, at organ level.
8) Cytoplasmic determinats and autonomous cell specification.
   a. Cell commitment and differentiation.
   b. Cell specification in nematodes
   c. Germ cell determinants
   d. Germ cell migration.
   e. Progressive cell-cell interaction and cell specification,fate.
9) Tetrapod limb development and limb regeneration.
10) Eye morphogenessis.
11) Nucleocytoplasmic interactions, somatic cell hybridization , clanning.
12) Cellular Immunity.
13) Cell ageing and cell death, Bone marrow tansplant.

References Zoo 202 Cellular and Developmental Biology

1) Cell Biology -- De Roberts et.al 1975
2) Cell and Molecular Biology : Du Praw E. J.
3) Gene Expression : Lewin B.
4) Molecular Biology of the Gene : J. D. Watson
5) Mitochondria : Lehniger B.
6) Cell Fusion : Harris
7) Cytological technique : J. R. Baker 1966
8) Atlas of fine structure : Fawcett D. W.
9) Development aspect of cell cycle : Cameron I. L.
10)Lysosomes and cell function : Fi:
11)Developmental Biology by Gilbert

Practicals of Zoo 202 : Cellular and Developmental Biology

1) Study of electron micrographs of various cells organelles
2) Study of Principles of phase contrast, electron microscopy
3) Study of Mitosis in onion root tip
4) Study of meiosis in grass hopper testis
5) Detection of Carbohydrates by PAS reaction.
6) Detection of Protein by Bromophenol blue method.
7) Detection of DNA by Feulgen reaction.
8) Detection of mitochondira in tissue section by suitable staining method.

5) Agarose gel electrophoresis of DNA
6) Protease activity in liver homogenate & sub-cellular fractions.
7) Absorption spectrum of DNA/RNA.
8) Isolation of DNA fragments from gels.
9) Visit to a biotechnology lab/tissue culture lab.

Zoo-203 (b) –Genetics

Recapitulation of principles of genetics
Pleiopropism , position effect , penetrance and expressivity and concept of dominance, Balanced lethal systems.
Inbreeding and heterosis
Genes in population, gene frequencies, genetic diversity, Hardy-Weinberg law, changes in gene frequencies in population due to mutation and migration. Effect of non-random mating inbreeding and genetic and drift.
Role of Mutation in speciation.
Conjugation and transformation in bacteria.
Structure and lifecycle of a bacteriophage (T2 and T4) ,virulant and temperature phages, lysogeny, transduction and zygotic induction.
Phase Mutants and their importance , fine structure of gene with reference to rII region
RNA phages and tumor viruses and their lifecycles
Lifecycle of Neurospora , Tetrad analysis.

Reference Books - Zoo 203 (b) Genetics

Dobzhansky , T : 1970 , Genetics of the Evolutionary process, Columbai Univeristy Press, N. Y.
Falconer , D. S. : 1964, Introduction to Quantitative Genetics, Longman , London
Fincham , J. R. S. And Day : Fungal Genetics
Hayes, W. : 1975 , The Genetics of Bacteria and Viruses Studies in Basic Genegites and Molecular Biology, Blackwell, Scientific Publications, Oxford.
Lewin, B. : 1973 , Gene Expression, Vol.1 & 3, Wiley and 1978 , Interscience Publication.
Shorrock, B : 1978, The Genetics of Diversity, Holder and Stoughton , London

Strickberger, M. W. : 1976, Genetics Macmillan , New York.
Whitehouse, H.L.K. : Towards an Understanding of the Mechanism of Heredity

The English language book Society and Edward Arnold.

Practicals of Zoo - 203 (b) Genetics

1) Study of external morphology and sexual dimorphism of Drosophila malanogaster – normal and mutants.
2) Study of monohybrid cross and ration in D. Malanogaster.
3) Calculation of gene frequency of PTC testing in the given human population and study of its pedgree.
4) Study of some sex linked characters of D. Melanogaster –white eye, bar eye.
5) Study of genetic diversity in some morphological characters of D. Malanogaster.
6) Calculation of gene frequency of A , B, O blood group in the given human population.
7) To detect synaptic pairing of chromasomal abberation in meiotic stages (Prophase-I) of Gasshopper/testes.