

M. Sc. ZOOLOGY (SEMESTER-II)
Session 2018-19
PAPER I (QUANTITATIVE BIOLOGY AND COMPUTER APPLICATION)

Max. M.-80

NUMBER OF UNITS: IV

UNIT-I

1. Introduction to digital computer and application
 - 1.1 Basic knowledge of hardware and software
 - 1.2 CPU (Central Processing Unit)
 - 1.3 Input and Output devices
 - 1.4 Auxiliary storage system
 - 1.5 Operating system and Binary number system

UNIT-II

2. Computer application
 - 2.1 Introduction to MS office
 - 2.1.1 Word
 - 2.1.2 Excel
 - 2.1.3 Power point
3. Computer application in biostatistics
4. Simple computation and elementary knowledge of flow chart

UNIT-III

5. Types of biological data
6. Representation of data
7. Sample and sampling
8. Measures of central tendency
9. Measures of dispersion
10. Hypothesis testing: Null and alternate hypothesis

UNIT-IV

11. Tests of significance
 - 11.1 Chi-square test
 - 11.2. Student's t-test
12. Analysis of Variance
13. Simple linear regression
14. Correlation
15. Probability distribution: normal and binomial

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PAPER II (GAMETE BIOLOGY AND DEVELOPMENT BIOLOGY)

Max. M.-80

NUMBER OF UNITS: IV

UNIT-I

1. Sex differentiation and development
 - 1.1 Chromosomal (genetic) basis of sex determination
 - 1.2 Gonadal differential
 - 1.3 Phenotype (internal)
 - 1.4 Brain sex differentiation
2. Spermatogenesis
 - 2.1 Spermatogenesis and development of spermatozoa
 - 2.2 ultra structure of sperm
 - 2.3 Capacitation
3. Oogenesis
 - 3.1 Differentiation and growth of oocytes.
 - 3.2 Organization of egg cytoplasm and egg cortex.
 - 3.3 Vitellogenesis

UNIT-II

4. Fertilization
 - 4.1 Biological role of fertilization.
 - 4.2 Basic requirements of fertilization.
 - 4.3 Mechanism of fertilization
 - 4.4 Biochemistry of fertilization
 - 4.5 Post fertilization event
5. Parturition, lactation and hormonal contraception
6. Cleavage -Characteristics and mechanisms of cleavages

UNIT-III

7. Formative movements
8. Fate maps
 - 8.1 Utility and comparative topographical relationship of the Presumptive areas in early embryos of
 - 8.1.1 Amphioxus
 - 8.1.2 Fishes
 - 8.1.3 Amphibian
 - 8.1.4 Birds
9. Differentiation

UNIT-IV

10. Cell and tissue interactions in development
 - 10.1 Primary embryonic induction
 - 10.2 Competence
 - 10.3 Concept of organizer
11. Metamorphosis
12. Teratology

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PAPER III (POPULATION GENETICS AND EVOLUTION)

Max. M.-80

NUMBER OF UNITS: IV

UNIT-I

1. Concepts of evolution and theories of organic evolution: Lamarckism, Darwinism and Synthetic theory of evolution
2. Evidences of evolution: anatomical, embryological, palaeontological, physiological and Bio-chemical

Unit-II

3. Hardy-Weinberg law of genetic equilibrium
4. Detailed account of destabilizing forces.
 - 4.1 Natural selection
 - 4.2 Mutation
 - 4.3 Genetic drift
 - 4.4 Meiotic drive
5. Phenotypic variation

UNIT-III

6. Patterns and mechanisms of reproductive isolation
7. Phylogenetic and biological concepts of species
8. Gene Evolution, Evolution of gene families
9. Factors affecting human disease frequency

UNIT-IV

10. Origin of higher categories
11. Micro-and Macro-evolution
12. Evolution of horse, elephant, camel, man

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PAPER IV (TOOLS AND TECHNIQUES IN BIOLOGY)

Max. M.-80

NUMBER OF UNITS: IV

UNIT-I

1. Principles and application of
 - 1.1 Ultracentrifugation
 - 1.2 Electrophoresis
 - 1.3 Chromatography (various types)
 - 1.4 Lambert-Beers Law and colorimetry and spectrophotometry
 - 1.5 Flow cytometry.

UNIT-II

2. Principles and Application of
 - 2.1 Light Microscopy and micrometry
 - 2.2 Phase Contrast microscopy
 - 2.3 Interference microscopy
 - 2.4 Fluorescence microscopy
 - 2.5 Transmission Electron microscopy.
 - 2.6 Scanning Electron microscopy.

UNIT-III

3. Assay
 - 3.1 Chemical assays
 - 3.2 Biological assays-in vivo and in vitro
4. Principles of cytological and cytochemical techniques
 - 4.1 Fixation: chemical basis of fixation by formaldehyde, gluteraldehyde, chromium salts, mercury salts, osmium salts, alcohol and acetone
 - 4.2 Chemical basis of staining of carbohydrate, protein lipids and nucleic acids.

UNIT-IV

5. Principle and techniques of
 - 5.1 Nucleic acid hybridization and cot curve
 - 5.2 Sequencing of proteins and nucleic acids
6. Freeze techniques
7. Media preparation and sterilization
8. Inoculation and growth monitoring

M. Sc. ZOOLOGY (SEMESTER-II)
Session 2018-19
Practical- I

I. Quantitative biology and computer application

1. Preparation of frequency tables and graphs.
2. Calculation of standard deviation, variance and standard error of mean.
3. Calculation of probability and significance between means using t-test, Chi-square test, ANOVA
4. Calculation of correlation, regression and probability distribution.
5. Computer software use for computational tasks, data presentation, design task and communication
6. Other exercises related to theory paper.

II. Development biology

1. Study of slides of development of frog.
2. Study of development of Hen's egg, by cover glass window method, staining and mounting of blastodisc.
3. Study of caudal regeneration in Teleost (Meal time effect).
4. Study of embryological slides: spermatogenesis, oogenesis, histology of gonads.
5. Study of effect of NaF on growth of fish fingerlings.
6. Study of effect of thyroid hormone on metamorphosis of tadpole
7. Other exercises related to theory paper

Scheme of Practical Examination:

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|---|-------------------|
| 1. Exercise based on Biostatistics. | 20 marks. |
| 2. Two exercises based on Computer application. | 20 marks. |
| 3. Experiments based on Developmental Biology. | 40 marks. |
| 4. Viva-voce | 10 marks. |
| 5. Sessional | 10 marks. |
| Total Marks | 100 marks. |

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Practical- II

III. Population genetics and evolution

1. Problems on genetics (complete and incomplete linkage; dominance, sex-linked inheritance) Demonstration of Hardy-Weinberg law
2. Preparation of human chromosomes map, demonstration of chromosomal deficiencies.
3. Experiments based on population genetics, pedigree analysis.
4. Study of evolution of horse by way of models.
5. Study of evolution through homologous and analogous organs.
6. Other exercises related to theory paper.

IV. Tools and techniques in biology

1. Parts study, principles and use of following instruments for different techniques:
 - a. pH meter: Determination of pH of different soil and water samples.
 - b. Spectrophotometer: Preparation of absorption spectrum.
 - c. Chromatography: Paper and thin layer chromatography.
 - d. Centrifuge: Extraction proteins and carbohydrates from tissues.
 - e. Electrophoresis: Paper and gel electrophoresis.
 - f. Microscope: Parts study and principles of various microscopes.
 - g. Demonstration of cryostat.
2. Other exercise related to theory paper.

Scheme of Practical Examination:

- | | |
|---|-------------------|
| 1. Experiment based on Population Genetics. | 20 marks. |
| 2. Experiment based on Evolution. | 20 marks. |
| 3. Amino acid separation by Chromatography | 10 marks. |
| 4. Determination of pH | 04 marks. |
| 5. Spectrophotometer/electrophoresis experiment. | 10 marks. |
| 6. Parts study and principle and application of various studied instruments | 16 marks |
| 7. Viva-voce | 10 marks. |
| 8. Sessional | 10 marks. |
| Total Marks | 100 marks. |

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