

S.R.T.M.U. Nanded

B.Sc. Second Year New Syllabus -2009

Sub : Zoology

GENETICS AND EVOLUTION

Periods: 80

Paper IV

Marks: 100

Unit – I

- | | |
|---|----------|
| I) MENDELISM | 6 |
| i) Mendel's Laws of inheritance | |
| ii) Monohybrid, dihybrid cross and ratio. | |
| iii) Incomplete Dominance. | |
| iv) Back cross and Test cross. | |
| II) INTERACTION OF GENES | 6 |
| i) Complementary factor (9:7) | |
| ii) Inhibitory factor (13:3) | |
| iii) Duplicate genes (15:1) | |
| iv) Supplementary factor (9:3:4) | |
| v) Lethal genes (1:2:1) | |
| III) MULTIPLE ALLELES AND GENES | 5 |
| i) Inheritance of ABO Blood groups in Man. | |
| ii) Rh factor and Erythroblastosis foetalis in Man. | |
| iii) Multiple genes-Skin pigmentation in Man. | |
| IV) LINKAGE AND CROSSINGOVER | 5 |
| i) Linkage –Types, theories and significance | |
| ii) Crossing over- | |
| Mechanism of crossing over, | |
| Factors affecting crossing over, | |
| Significance of crossing over. | |

Unit – II

I) SEX DETERMINATION AND SEX LINKED INHERITANCE

A) Sex determination 6

- i) Autosomes and allosomes (sex chromosomes)
- ii) Chromosomal methods of sex determination – XO, XY (Man and Drosophila), ZZ,ZW.
- iii) Bridge's ratio theory of Genic Balance.

B) Sex linked inheritance

- i) Sex linked inheritance in Drosophila.
- ii) Sex linked inheritance in man – Colourblindness, Haemophilia, Hypertrichosis and Baldness.

II) MUTATION 6

- i) Somatic mutation, germinal mutation, autosomal mutation, chromosomal mutation.
- ii) Chromosomal mutations – structural alternations.
- iii) Numerical alteration-polyploidy.
- iv) Gene mutations – sickle cell anaemia.
- v) Induced mutations w.r.t. CIB in Drosophila and mutagenic agents.

III) HUMAN GENETICS 6

- i) Syndromes – Turner's, Klinefelter's, Down's and Cat – Cry.
- ii) In Born errors of metabolism –Phenylketonuria (PKU), Alkaptonuria, and Albinism.
- iii) Human pedigree analysis with symbols used.

IV) NATURE AND FUNCTIONS OF GENETIC MATERIALS. 6

- i) **DNA** – structure, functions and replications.
- ii) **RNA** – structure, types and functions.
- iii) Protein synthesis.
- iv) Genetic code.

Unit – III

GENETIC ENGINEERING

14

- i) Eugenics.
- ii) Recombinant DNA technology (Principles, methods and tools)
- iii) Cloning techniques, cloning vectors and applications of cloning technologies.
- iv) Transgenesis and transgenic animals.
- v) Human genome and Human genome project (in brief)
- vi) DNA fingerprinting.
- vii) Blotting techniques-Southern, Northern and Western Blotting and uses.

Unit – IV

EVOLUTION

20

- i) Theories of origin of life.
- ii) Theories of organic evolution, Lamarck's, Darwin's and De Vrie's
- iii) Evidences of organic evolution
1) Anatomical 2) Paleontological 3) Embryological.
- iv) Adaptations – Curssorial, Aquatic, Terrestrial, Fossorial and Volant.
- v) Hardy – Weinberg's law.
- vi) Evolution of man.

REFERENCES BOOKS:

- i) Genetics – P.K. Gupta (Rastogi pub. Meerut)
- ii) Genetics – Verma P.S. and Agarwal V.K. (S. Chand pub. Delhi.)
- iii) Cytology, Genetics and Evolution – P.K. Gupta (Rastogi Pub. Delhi).
- iv) Elementary Genetics – Singlestone.
- v) Genetics – Winchester (Oxford LBH Pub.)
- vi) Genetics and Evolution – A.P. Jha (Macmillon India)
- vii) Concepts of genetics – W.S. Clug (Pearson Education ISBN)
- viii) Genetics – Strickberger (Prentice - Hall)
- ix) Principles of genetics – R.H.Tamarin (Tata Mc Graw Hill Pub. India.)
- x) Concepts of Genetics - R. L. Kotpal (Rastogi Pub.)
- xi) Genetics and Genetic Engineering – Dr. R.P. Meyyan (Saras Pub.)
- xii) Foundations of Genetics – Pai A.C. (Mc Graw Hill Pub.)
- xiii) Molecular Genetics – Gunther, S. Stent. (Macmillon)
- xiv) Principles of Genetics – Sinnott, Dunn and Dobzansky (Tata McGraw Hill Pub. Delhi).
- xv) Genetics – Sarin C. (Tata McGraw Hill Pub. Delhi)
- xvi) Organic Evolution – M.P. Arora (Himalaya Pub. House)
- xvii) Evolution – M.W. Strickberger (CB Publishers)
- xviii) Organic Evolution – N. Armugam (Saras Pub.)
- xix) Principles of Gene Manipulation and Introduction to Genetic Engineering – R.W. Old and S.B. Primerose.
- xx) Text Book of Genetics – H.S. Bhamrah (Amol Pub. New Delhi.)
- xxi) Genetics – M.P. Arora (Himalaya).
- xxii) Genetics and Evolution – N.Armugam (Saras Pub.)
- xxiii) Genetics – Veer Bala (Rastogi Pub.)
- xxiv) Evolution – Moody.
- xxv) Evolution – Gopalkrishnan.
- xxvi) Cytology and Genetics – Dyansagar V.R. (Tata McGraw Hill Pub. 1992 Reprint)
- xxvii) Organic evolution – Harjendra Singh and C.M. Chaturvedi (Amul Pub.)

B.Sc. Second Year
Zoology Paper IV & V Theory

Pattern of Questions Paper

Time: 3 Hours

Marks: 100

- Q.1. Multiple choice questions 10
(Minimum two from each unit).
- Q.2. Long answer questions from unit – I 20
OR
Write notes on :
a) Based on Unit – I
b) Based on Unit – I
- Q.3. Long answer questions from unit – II. 20
OR
Write notes on:
a) Based on Unit – II
b) Based on Unit – II
- Q.4. Long answer question from unit – III. 20
OR
Write notes on :
a) Based on Unit – III
b) Based on Unit – III
- Q.5. Long answer question from unit – IV. 20
OR
Write notes on :
a) Based on Unit – IV
b) Based on Unit – IV
- Q.6. Write shot notes on any two of the following. 10
a) Based on Unit – I
b) Based on Unit – II
c) Based on Unit – III
d) Based on Unit – IV

B.Sc. Second Year
Zoology Practical Paper VI

Genetics and Evolution

Syllabus

Practical : 28

- | | |
|---|----|
| 1) Problems based on monohybrid and dihybrid cross
(Explain with the help of plastic beads) | 02 |
| 2) Problems on modification in ratio due to interaction of genes –
Complementary factors, Supplementary factors, Inhibitory factors,
Duplicate genes (Explain with the help of plastic beads). | 04 |
| 3) Problems on blood group inheritance in man | 02 |
| 4) Problems based on sex-linked inheritance . | 01 |
| 5) Culture of Drosophila and observation of genetic characters in
Drosophila (eye & wings) | 02 |
| 6) Preparation of temporary slides of salivary gland chromosomes from
Chironomous larva | 02 |
| 7) Study of slide of sickle cell anemia. | 01 |
| 8) Study of chromosomes abnormalities in man Down's syndrome,
Klinefelter, Syndrome, Turner, Syndrome with the help of Photograph/
Charts/ Karyotype. | 02 |
| 9) Human pedigree analysis – various symbols used and problems. | 01 |
| 10) Study of blotting techniques for the separation of DNA and mRNA | 02 |
| 11) Study of human genetic traits and application of Hardy- Weinberg principle –
Baldness, length of index and ring finger, attached and free ear lobes, rolling
tongue.
Calculation of frequencies of recessive and dominant genes in a population.
Calculation of Hetrozygotes and Homozygotes in a population. | 04 |
| 12) Study of Evidences. | 02 |
| i) Analogous and Homologous organs. | |
| ii) Connecting links (Peripatus, Archropteryx, Limulus) | |
| iii) Embryological evidences | |
| 13) Study of Adaptation | 03 |
| i) Aquatic ii) Terrestrial iii) Aerial / Volant iv) Cursorial v) Desert | |

B.Sc. Second Year
Zoology Paper VI Practical

(Genetics and Evolution)

Pattern of Questions Paper

Time: 4 Hours

Marks: 100

- Q.1. Solve one problem from monohybrid cross and one problem from dihybrid cross. 10
- Q.2. Solve one problem based on blood group inheritance. 10
- OR
- Solve one problem based on sex linked inheritance.
- Q.3. Solve any two problems on Interaction of genes. (Complementary, Supplementary, Inhibitory factors, Duplicate genes). 20
- Q.4. Identification of human syndrome (any two) 10
- OR
- Preparation of temporary mount of salivary gland chromosomes of chironomous larvae.
- OR
- Observation of genetic characters of *Drosophila*
- Q.5. Identify and Comments on as per the instruction 10
- a) Humans pedigree analysis (Any five symbols)
- b) Sickle cell anemia – slide/ photograph/charts.
- OR
- Problems based on Hardy – Weinberg Principle for the calculation of

- Q.6. Identify and Comments on as per the instruction 20
- a) Adaptations (Any two) Aquatic, Terrestrial, Aerial/Volant, Curssorial, Desert.
- b) Evidences (Any two) Analogous and Homologous organs, Connecting links, Embryological evidences.
- Q.7. Submission of Record Book 10
- Q.8. Viva – voce and Excursion Report 10

S.R.T.M.U.Nanded
B.Sc. Second year New Syllabus-2009
Sub: Zoology
(Physiology, Biochemistry, Anatomy and Histology)
Paper V

Marks: 100

Periods: 80

UNIT-I

- 1) Introduction And Branches of Physiology**
- 2) Enzymes**
 - i) Nature and classification of Enzymes.
 - ii) Mechanism of Enzyme action.
 - iii) Factors affecting on enzyme activity.
- 3) Nutrition:**
 - i) Physiology of Proteins, Carbohydrates and lipids digestion and absorption of digested food
 - ii) Vitamins- Fat soluble and water soluble vitamins, sources, deficiency diseases and effects of fat soluble and water soluble vitamins
- 4) Respiration:**
 - iii) Types of Respiration (Aquatic and Aerial)
 - iv) Respiratory organs in Man.
 - v) Mechanism of Respiration and transport of O₂ and CO₂.
 - vi) Smoking and its physiological effects.

UNIT-II

- 5) Circulation:**
 - i. Composition and Functions of Blood
 - ii. E.C.G. and Blood Pressure.
 - iii. Blood clotting – Intrinsic and Extrinsic factors.
- 6) Excretion:**
 - i. Structure of Uriniferous tubules.
 - ii. Physiology of urine formation.
 - iii. Composition of Urine
- 7) Nerve and Muscle Physiology:**
 - i. Types of Neurons.
 - ii. Structure of Synapse.
 - iii. Conduction of Nerve impulse.
 - iv. Types of Muscles- Skeletal muscles, Cardiac Muscles, Smooth Muscles.
 - v. Ultra structure of skeletal muscle.
 - vi. Sliding filament theory of muscle contraction.
- 8) Endocrinology and Reproduction:**
 - i. Pituitary,
 - ii. Thyroid,
 - iii. Islets of Langerhans
 - iv. Male and female sex hormones.
 - v. Menstrual cycle.

UNIT-III (Biochemistry)

1) Carbohydrate Metabolism:

- i) Glycogenesis, Glycogenolysis and Gluconeogenesis
- ii) Glycolysis
- iii) Krebs's cycle

2) Lipid Metabolism:

- i) B- Oxidation
- ii) Ketosis, Ketogenesis and Ketolysis.

3) Protein Metabolism:

- i) Deamination and Transamination.
- ii) Ornithine Cycle.

UNIT-IV (Anatomy and Histology)

1) Comparative Anatomy of Integument:

- i) Fish, Amphibia, Reptiles, Aves and Mammals.

2) Comparative anatomy of Heart and Aortic arches in Vertebrates

3) Histology of Mammalian organs and tissues:

- i) Stomach, Intestine, Pancreas, Liver, Kidney, Testes, Ovary and Thyroid gland, Pituitary gland and Adrenal gland

B.Sc. II (Zoology)

Paper VII (Practical)

Marks: 100

Periods: 28

- 1) Qualitative detection of digestive enzymes (Protease, Amylase and Lipase) in Cockroach/ Crab
- 2) Study of detection of human salivary amylase.
- 3) Estimation of Oxygen consumption in fish / Crab or any other suitable aquatic animal
- 4) R.B.C. Counting.
- 5) W.B.C. Counting.
- 6) Estimation of Haemoglobin.
- 7) Detection of Blood groups.
- 8) Qualitative detection of Nitrogenous waste products (Ammonia, Urea, Uric acid) in Birds excreta and urine of Mammals.
- 9) Preparation of Haematin crystals.
- 10) Temporary preparation of squamous epithelium, ciliated epithelium, skeletal muscle fiber and Blood smear.
- 11) Study of Histological structure of following organs- Stomach, intestine, pancreas, liver, kidney, testis, ovary, thyroid and pituitary
- 12) Structure of synapse, structure of neurons (slide / chart)
- 13) Types of nerves- Unipolar, Bipolar, multipolar.(slides)
- 14) Location of endocrine glands through dissection, charts or models.
- 15) Preparation of histological permanent slides by the process of block preparation, section cutting and staining.

- 16) Compulsory educational excursion tour to visit various zoological important centers.

REFERENCE BOOKS:

(Physiology)

- 1) Eckert R. Animal Physiology (W.H. Freeman)
- 2) A textbook of Animal Physiology- K.A. Goel and K.v. Shastri (Rastogi Pub.)
- 3) A textbook of Practical Physiology- V.G.Ranade (P.V.G. Prakashan Pune.)
- 4) Animal Physiology- A Maria Kyttikan and N.Armugam (Saras Pub.)
- 5) Biochemistry- Arumugam et.al. (Saras Pub.)
- 6) Clinical Pathology and Haematology.- Nanda Baheti(Kanhaiya Pub.)
- 7) Comparative Animal Physiology C. Ladd Prosser.
- 8) Experimental Physiology – S.C.Rastogi (Wiley Eastern Ltd. London)
- 9) Human Physiology Vander A.J., Sherman J.H. and Luciano D.S. (McGraw Hill London)
- 10) Medical laboratory Techniques- Ramni sood, Jaypee Brothers medical Pub. Pvt. Ltd. New Delhi.
- 11) Principles of Anatomy and Physiology – Tortora G.H. and Grabowasky S.R. (Harper Collins college Pub.)
- 12) Text Book Of animal Physiology- A.K. Berry (Emkay Pub. Delhi)
- 13) Principles of Animal Physiology – Wood D.W.
- 14) Physiology- Guyton and Hall

(Histology)

- 1) Bailey's Text Book of Histology – Williams and Wilkins Baltimore and scientific Book Agency, Culcutta Copenhaver W.M.
- 2) Text Book of Histology – Bloom W. and Fawcett D.W.
- 3) Histology of mammals- Athavale M.V. and Latey A.N.
- 4) Histology- Greep R.O. and Well L.
- 5) Histology- Lippinocott,Han A.W.
- 6) Human Histology –Leslie Brainerd Arey (Khosla Pub. House, Delhi)

(Anatomy)

- 1) Comparative Anatomy of Vertebrates – Kent C.G.
- 2) Outlines of comparative Anatomy of Vertebrates- Kingsley C.G. (central Book Depot Allahabad)
- 3) An Introduction of Vertebrates Anatomy- Messers H.M.
- 4) Comparative Anatomy – Montagna W., John Wiley and Sons Inc.

(Biochemistry)

- 1) Tools of Biochemistry – T.G.Cooper.
- 2) Biochemistry –C.B.Powar (Himalaya Pub.)
- 3) Outline of Biochemistry – Conn. E.E. and Stumpf P.V.

- 4) Biochemistry –Leninger A.L.
- 5) Biochemistry –Das.
- 6) Text Book of Biochemistry- Rao K.R.
- 7) Text Book of Biochemistry West E.S., Todd W.R., Mason H.S. and Van Bruggen J.T.

B.Sc. II (Zoology)
Paper VII (Practical)
(Physiology, Biochemistry, Anatomy and Histology)

Pattern of Question paper

Time: 4 Hours

Marks: 100

- 1) **Qualitative detection of digestive enzymes (Protease, amylase and lipase) In
Cockroach/ Crab** **15**

Or

Detection of Human Salivary amylase.
- 2) **Estimation of O₂ consumption in fish/crab/ or any suitable
aquatic animal** **15**

Or

**Detect any two nitrogenous waste products from given sample provide and
report the test, observation and result.**
- 3) **Estimate the haemoglobin percentage in a given sample of blood** **10**

or

Measurement of Blood Pressure in man.
- 4) **Counting of R.B.C./W.B.C. in blood sample provided** **10**

Or

Prepare Haematin crystals from Blood sample provided.

Or

Detection of Blood groups from given sample.
- 5) **Dissect Rat/Frog/Fish so as to expose any two endocrine glands .** **10**

Or

Identify any two endocrine glands in charts/ model provided.

Or

Stain & Identify given Histological tissue ribbon (Mammalian)
- 6) **Identify and describe the four Histological slides** **20**
- 7) **Submission of any five slides & Excursion Report** **10**
- 8) **Viva-voce and Record Book** **10**

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NANDED**

B.Sc. Zoology Second Year

New Syllabus

w.e.f. June 2009