

SRI VENKATESWARA UNIVERSITY
B.Sc. DEGREE COURSE IN ZOOLOGY
III - SEMESTER
(under CBCS W.E.F. 2021-22)

**PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY
AND EVOLUTION**

HOURS: 60 (5X12)

Max. Marks: 100

Unit – I Cell Biology

- 1.1. Definition, history, prokaryotic and eukaryotic cells, virus, viroids, microplasma
- 1.2. Electron microscopic structure of animal cell.
- 1.3. Plasma membrane – Models and transport functions of plasma membrane.
- 1.4. Structure and functions of Golgi complex, Endoplasmic Reticulum and Lysosome
- 1.5 Structure and functions of Ribosome, Mitochondria, Nucleus, Chromosomes

(Note: 1. General pattern of study of each cell organelle – Discovery, Occurrence, Number, Origin, Structure and Functions with suitable diagrams)

2. Need not study cellular respiration under mitochondrial functions)

Unit – II Genetics - I

2. 1 Mendel's work on transmission of traits
2. 2 Gene Interaction – Incomplete Dominance, Co dominance, Lethal Genes
2. 3 Blood group inheritance
2. 4 Sex determination (Chromosomal, Gene Balance, Hormonal, Environmental and Haploid - diploid types of sex determination)
2. 5 Sex linked inheritance (X-linked, Y-linked & XY-linked inheritance)

Unit – III Genetics – II

- 3.1 Mutations & Mutagenesis
- 3.2 Chromosomal Disorders (Down's syndrome, Edwards, syndrome, Patau syndrome, Turner's syndrome and Klinefelter syndrome)
- 3.3 Human Genetics – Karyo typing, Pedigree Analysis (basics)

UNIT IV Molecular Biology

4.1 Central Dogma of Molecular Biology

Basic concepts of -

- a. DNA replication – Overview (Semi-conservative mechanism, Semi discontinuous mode, Origin & Propagation of replication fork)
- b. Gene Expression in eukaryotes

Unit - V

5.1 Origin of life

5.2 Theories of Evolution: Lamarckism, Darwinism, Germ Plasm Theory, Mutation Theory

5.3 Neo-Darwinism: Modern Synthetic Theory of Evolution, Hardy-Weinberg Equilibrium

5.4 Forces of Evolution: Isolating mechanisms, Genetic Drift, Natural Selection, Speciation

Co-curricular activities (Suggested)

Model of animal cell

Working model of mitochondria to encourage creativity among students
Photo album of scientists of cell biology

Charts on plasma membrane models/cell organelles

Observation of Mendel an / Non-Mendel an inheritance in the plants of college botanical garden or local village as a student study project activity

Observation of blood group inheritance in students, from their parents and grand parents

Kayo typing and preparation of pedigree charts for identifying diseases in family history

Charts on chromosomal disorders

Charts on central dogma/lace operand/genetic code

Model of semi-conservative model of DNA replication

Model of tuna and translation mechanism

Power point presentation of transcription or any other topic by students

Draw geological time scale and highlight important events along the time line

Chart on industrial melanoma to teach directed selection, Darwin's finches to teach genetic drift, collection of data on weight of children born in primary health centres to teach stabilizing selection etc.

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**PAPER-III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND
EVOLUTION**

Time : 3 hrs

Max. Marks : 75

I. Answer any FIVE of the following :

5x5=25

Draw labeled diagrams wherever necessary

1. Eukaryotic Cell
2. Golgi Complex
3. Co-dominance Down Syndrome
4. Kayo typing
5. Multiple Alleles
6. lissome
7. lethal genes
8. isolating

II. Answer all the following:

5x10=50

Draw labeled diagrams wherever necessary

9. A) Explain about electron microscope structure of animal cell.

OR

- B) Describe about Plasma membrane.

10. A) Explain about Mendel's experiments.

OR

- B) Describe about color blindness

11. A) Write about Mutations.

OR

- B) Describe about chromosomal disorders.

12. A) Describe about central dogma of molecular Biology.

OR

- B) Explain DNA replication in brief.

13. A) Explain about Neo Darwinism.

OR

- B) Write about isolating mechanisms.

Verified by Dr. M. Vani, Hod of Zoology, S.V.Arts College, Tirupati, BOS Chairperson.



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PRACTICAL PAPER CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION

Periods: 24

Max. Marks: 50

Learning Objectives:

Acquainting and skill enhancement in the usage of laboratory microscope Hands-on experience of different phases of cell division by experimentation Develop skills on human karyotyping and identification of chromosomal disorders

To apply the basic concept of inheritance for applied research

To get familiar with phylogeny and geological history of origin & evolution of animals

I. Cell Biology

1. Preparation of temporary slides of Mitotic divisions with onion root tips
2. Observation of various stages of Mitosis and Meiosis with prepared slides

II. Genetics

1. Study of Mendel's inheritance using suitable examples and problems
2. Problems on blood group inheritance and sex linked inheritance
3. Study of human karyotype (Down's syndrome, Edwards, syndrome, Patau syndrome, Turner's syndrome and Klinefelter syndrome)

III. Evolution

1. Study of fossil evidences
2. Study of homology and analogy from suitable specimens and pictures
3. Phylogeny of horse with pictures
4. Study of Genetic Drift by using examples of Darwin's finches (pictures)
5. Visit to Natural History Museum and submission of report

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PRACTICAL PAPER – III :CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY & EVOLUTION

MODEL QUESTION PAPER

- | | |
|----------------------------------------------------------------------------------------|-----------|
| 1. Observe the various stages of Mitosis / Meiosis
marks | 15 |
| 2. Identification of Mendel problem / Blood group problem / Syndrome one each
marks | 3 x 5 =15 |
| 3. Identification of any two evolution charts
marks | 2 x 5 =10 |
| 4. Certified Record
marks | 10 |
| | 50 marks |

Note: Without submission of a certified record student should not be allowed to write the examination.