



## **ANDHRA PRADESH STATE COUNCIL OF HIGHER EDUCATION**

(A Statutory body of the Government of Andhra Pradesh)

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### **REVISED SYLLABUS OF B.Sc. (ZOOLOGY) UNDER CBCS FRAMEWORK WITH EFFECT FROM 2020-21**

#### **PROGRAMME: THREE-YEAR B.Sc.**

(Zoology)

*(With Learning Outcomes, Unit-wise Syllabus, References, Co-curricular Activities &  
Model Q.P.)*

*For Fifteen Courses of 1, 2, 3 & 4 Semesters)*

**(To be Implemented from 2020-21 Academic Year)**

**Structure of ZOOLOGY Syllabus**

**(Under CBCS for 3-year B.Sc. Programme)**

**(With domain subject covered during the first 4 Semesters with 5 Courses)**

YEAR	SEM	PAPER	TITLE	MARKS (100)		CREDITS
				MID SEMESTER	END SEMESTER	
I	I	I	Animal Diversity – I Biology of Non-Chordates	25	75	04
			Practical - I	25	75	01
	II	II	Animal Diversity – II Biology of Chordates	25	75	04
			Practical - II	25	75	01
II	III	III	Cell biology, Genetics, Molecular Biology & Evolution	25	75	04
			Practical - III	25	75	01
	IV	IV	Physiology, Cellular Metabolism & Embryology	25	75	04
			Practical - IV	25	75	01
		V	Immunology & Animal Biotechnology	25	75	04
			Practical - V	25	75	01

**AP STATE COUNCIL OF HIGHER EDUCATION**

w.e.f. 2020-21 (Revised in April, 2020)

**ZOOLOGY – SEMESTER III**

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

**HOURS:60 (5X12)**

**Max. Marks:100**

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**Course Outcomes:**

The overall course outcome is that the student shall develop deeper understanding of what life is and how it functions at cellular level. This course will provide students with a deep knowledge in Cell Biology, Animal Biotechnology and Evolution and by the completion of the course the graduate shall able to –

- CO1** To understand the basic unit of the living organisms and to differentiate the organisms by their cell structure.
- CO2** Describe fine structure and function of plasma membrane and different cell organelles of eukaryotic cell.
- CO3** To understand the history of origin of branch of genetics, gain knowledge on heredity, interaction of genes, various types of inheritance patterns existing in animals
- CO4** Acquiring in-depth knowledge on various aspects of genetics involved in sex determination, human karyotyping and mutations of chromosomes resulting in various disorders
- CO5** Understand the central dogma of molecular biology and flow of genetic information from DNA to proteins.
- CO6** Understand the principles and forces of evolution of life on earth, the process of evolution of new species and apply the same to develop new and advanced varieties of animals for the benefit of the society

## **Learning Objectives**

- To understand the origin of cell and distinguish between prokaryotic and eukaryotic cell
- To understand the role of different cell organelles in maintenance of life activities
- To provide the history and basic concepts of heredity, variations and gene interaction
- To enable the students distinguish between polygenic, sex-linked, and multiple allelic modes of inheritance.
- To acquaint student with basic concepts of molecular biology as to how characters are expressed with a coordinated functioning of replication, transcription and translation in all living beings
- To provide knowledge on origin of life, theories and forces of evolution
- To understand the role of variations and mutations in evolution of organisms

**ZOOLOGY SYLLABUS FOR III SEMESTER**  
**PAPER – III: CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND**  
**EVOLUTION**

**HOURS: 60 (5X12)**

**Max. Marks: 100**

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**Unit – I      Cell Biology**

- 1.1 Definition, history, prokaryotic and eukaryotic cells, virus, viroids, mycoplasma
- 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 Lysosomes
- 1.5 Structure and functions of Ribosomes, 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, Codominance, Lethal Genes
- 2. 3 Polygenes (General Characteristics & examples); Multiple Alleles (General Characteristics and Blood group inheritance)
- 2. 4 Sex determination (Chromosomal, Genic Balance, Hormonal, Environmental and Haplo-diploidy 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 (Autosomal and Allosomal)
- 3.3 Human Genetics – Karyotyping, Pedigree Analysis (basics)
- 3.4 Basics on Genomics and Proteomics

**UNIT IV:      Molecular Biology**

- 4.1 Central Dogma of Molecular Biology

#### 4.2 Basic concepts of -

- a. DNA replication – Overview (Semi-conservative mechanism, Semi-discontinuous mode, Origin & Propagation of replication fork)
- b. Transcription in prokaryotes – Initiation, Elongation and Termination, Post-transcriptional modifications (basics)
- c. Translation – Initiation, Elongation and Termination

#### 4.3 Gene Expression in prokaryotes (Lac Operon); 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 Mendelian / Non-Mendelian 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
- Karyotyping and preparation of pedigree charts for identifying diseases in family history
- Charts on chromosomal disorders
- Charts on central dogma/lac operon/genetic code
- Model of semi-conservative model of DNA replication
- Model of tRNA 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 melanism 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.

## REFERENCES:

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8. Snustad, D.P., Simmons, M.J. (2009). Principles of Genetics. V Edition. John Wiley and Sons Inc.
9. Klug, W.S., Cummings, M.R., Spencer, C.A. (2012). Concepts of Genetics. X Edition. Benjamin Cummings.
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20. Jan M. Savage. Evolution, 2nd ed, Oxford and IBH Publishing Co., New Delhi.
21. Gupta P.K., 'Genetics



**ZOOLOGY MODEL PAPER FOR III SEMESTER**

**ZOOLOGY - PAPER - III**

**CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION**

**Time : 3 hrs**

**Max. Marks : 75**

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**I. Answer any FIVE of the following :**

**5x5=25**

**Draw labeled diagrams wherever necessary**

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.

**II. Answer any FIVE of the following:**

**5x10=50**

**Draw labeled diagrams wherever necessary**

- 9.

OR

- 10.

OR

- 11.

OR

- 12.

OR

- 13.

OR

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## **ZOOLOGY PRACTICAL SYLLABUS FOR III SEMESTER**

### **ZOOLOGY - PAPER - III**

#### **CELL BIOLOGY, GENETICS, MOLECULAR BIOLOGY AND EVOLUTION**

**Periods: 24**

**Max. Marks: 50**

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#### **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
3. Mounting of salivary gland chromosomes of *Chironomus*

#### **II. Genetics**

1. Study of Mendelian inheritance using suitable examples and problems
2. Problems on blood group inheritance and sex linked inheritance
3. Study of human karyotypes (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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