

# **CBCS SYLLABUS**

**FOR**

**POST-GRADUATE COURSES**

**SUBJECT-ZOOLOGY**

**SUBMITTED BY**

**UNIVERSITY DEPARTMENT OF ZOOLOGY**

**B.R.A.B.U. MUZAFFARPUR**

## SEMESTER - I

Core Course (CC-1): Functional Biology of Invertebrates and Chordates Full Marks - 70  
Time: 3 hrs

Questions to be set in three parts representing all the five units. Part A will consist of 10 objective questions of 2 marks each. Part B will consist of five short questions (Four to be answered) of 3 marks each. Part C will consist of five long questions (three to be answered) of 10 marks each.

### Unit - I

- 1.1 Organization of coelom and its significance
- 1.2 Patterns of feeding and digestion in invertebrates
- 1.3 Invertebrate larvae: Types and significance

### Unit - II

- 2.1 Respiratory pigments in different phylogenetic groups
- 2.2 Organs of Respiration in Invertebrates: Gills, Lungs and Tracheae
- 2.3 Mechanism of Respiration in Invertebrates

### Unit - III

- 3.1 Organs of respiration in vertebrates: Gills, ABO and Lungs
- 3.2 Principles of gaseous exchange and Fick's modified equation
- 3.3 Transport of gases in blood and body fluid
- 3.4 Regulation of respiration (Neural and chemical control)
- 3.5 Respiratory adaptations at higher altitude and land living animals

### Unit - IV

- 4.1 Patterns of nitrogenous excretion in different phylogenetic groups
- 4.2 Organs of excretion: Coelomodules, nephridia, malpighian tubules and kidney
- 4.3 Mechanism of osmoregulation and excretion in aquatic (freshwater and marine) and terrestrial animals
- 4.4 Mechanism of acid-base balance

### Unit - V

- 5.1 Thermoregulation in vertebrates
- 5.2 Mechanism of energetic of muscle contraction (Skeletal)
- 5.3 Physiology of electrical and chemical transmitters in neurons
- 5.4 Neurotransmitters and their functions
- 5.5 Acoustico-lateral system and electroreception in aquatic vertebrates

## SEMESTER - I

Core Course (CC- 2): Molecular Cell Biology

Full Marks - 70

Time: 3 hrs

Questions to be set in three parts representing all the five units. Part A will consist of 10 objective questions of 2 marks each. Part B will consist of five short questions (Four to be answered) of 5 marks each. Part C will consist of five long questions (three to be answered) of 10 marks each.

### Unit I:

#### (A) Bio membrane

- 1.1 Molecular composition, arrangement and functional consequences
- 1.2 Models of bio-membrane
- 1.3 Transport across bio-membrane: diffusion, active transport and membrane pumps (P-type pump, V-type pump and ABC transporters)
- 1.4 Cotransport by symporters and antiporters

#### (B) Cytoskeleton

- 1.5 Microtubules and microfilaments: Structure and dynamics
- 1.6 Role of Kinesin and Dynein in intracellular transport
- 1.7 Axonal transport and cell movement (with respect to non-muscle motility)

### Unit II: DNA replication

- 2.1 Outline of prokaryotic replication
- 2.2 Replication features of single stranded phage
- 2.3 Mechanism and machinery of replication in eukaryotes
- 2.4 DNA damage and repair mechanisms

### Unit III: Transcription

- 3.1 Outline mechanism of prokaryotic transcription
- 3.2 Organization of eukaryotic transcription machinery
- 3.3 General and specific transcription factors
- 3.4 Regulatory elements & DNA binding domains of transcription apparatus
- 3.5 Processing of primary transcript & RNA editing in eukaryotes

### Unit IV: Translation

- 4.1 Genetic code: Codon assignment and features
- 4.2 Outline of Prokaryotic translation
- 4.3 Eukaryotes translation: machinery (Ribosome & tRNA)
- 4.4 Eukaryotes translation: mechanism (Initiation, elongation and termination)

### Unit V: Intra cellular protein trafficking

- 5.1 Targeting proteins to ER: Signal hypothesis
- 5.2 Co- and post-translational modifications of proteins
- 5.3 Trafficking mechanisms:
  - (a) Vesicular transport
  - (b) Protein sorting
  - (c) Endocytosis and exocytosis

## SEMESTER - I

Core Course (CC- 5): Genetics

Full Marks - 70

Time: 3 hrs

Questions to be set in three parts representing all the five units. Part A will consist of 10 objective questions of 2 marks each. Part B will consist of five short questions (Four to be answered) of 5 marks each. Part C will consist of five long questions (three to be answered) of 10 marks each.

### Unit I: Organization of Chromosomes

- 1.1 Organization of prokaryotic chromosomes
- 1.2 Organization of eukaryotic chromosomes: Nucleosome as functional particle, 30 nm chromatin fibre, higher order structure of chromatin
- 1.3 Organization of centromere and kinetochores, Organization of telomeres and its maintenance
- 1.4 Heterochromatin: Types, organization, formation and significance
- 1.5 Structural organization and functional significance of Polytene and Lampbrush chromosomes.

### Unit II: Microbial genetics

- 2.1 Transformation, conjugation, transduction and co-transduction in bacteria
- 2.2 Construction of linkage map in bacteria
- 2.3 Molecular mechanism of recombination

### Unit III: Cell cycle

- 3.1 Stages and check points in cell cycle
- 3.2 Genetics of cell cycle regulation: Role of cyclins and CDKs
- 3.3 Molecular basis of cellular check points

### Unit IV: Sex determination and dosage compensation

- 4.1 Genetic and Molecular basis of sex determination in *Caenorhabditis elegans*, *Drosophila* & human
- 4.2 Genetic basis of dosage compensation in *Caenorhabditis elegans*, *Drosophila* & mammals

### Unit V: Techniques & Methods in genetics

- 5.1 DNA sequencing: Maxam & Gilbert Method, Sanger's Dideoxycy Method, chain termination method and automated sequencing, pyro-sequencing and whole genome short-gth sequencing.
- 5.2 DNA amplification: Polymerase chain reaction, its application and limitations.
- 5.3 DNA finger printing: VNTR profiling, STR profiling (Autosomal & Y Chromosome), mitochondrial DNA profiling and SNP profiling
- 5.4 Genome expression analysis: Southern, Northern & Western blotting, Reverse transcription, PCR, DNA micro array.

20/15

100/15

20/15

SEMESTER - I

Care Course (CC- 4) Practical

Full Marks - 70 CIA

1<sup>st</sup> Sitting

1. Squash preparation using any of the following:	10	05
(a) Chromosomes/Drosophila larvae for polytene chromosomes		
(b) Onion root tip for mitosis and mitotic index		
(c) Grasshopper testes for meiosis and related features		
2. Experimental demonstration (any one of the following):	10	05
(a) Enumeration of RBC		
(B) Enumeration of WBC (TC and DC)		
(C) Preparation of a histological slide of the given paraffin section/whole mount of an invertebrate larva	05	05
3. Identification and comments upon spots (Cytological slides Nos. 02)	05	05
4. Identification and comments upon spots (Invertebrate slide-03, vertebrate slide-02)	10	05
5. Genetics (any of the following):	10	05
(a) Solving problems on Mendelian principles and sex-linked inheritance		
(b) Preparation of linkage map based on data from Drosophila crosses and analysis in Neurospora		tetrad
(c) Pedigree analysis in human		
6. Class records, charts/ models & field collection	10	
7. Viva-voce	10	05
Total	70	30

Ben  
12-6-18

12-6-18  
12-6-18

12-6-18