

# DEPARTMENT OF STUDIES IN ZOOLOGY

Syllabus for Ph.D. Entrance Examination

With effect from 2019-2020



**VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY**

**Jnana Sagara Campus, Vinayakanagara, Cantonment**

**Ballari-583105**

**Karnataka, India**

# VIJAYANAGARA SRI KRISHNADEVARAYA UNIVERSITY, BALLARI

## DEPARTMENT OF STUDIES IN ZOOLOGY

### Ph.D. Entrance Test Syllabus (2019-20)

Name of Paper	Marks distribution
Research Methodology	40 marks
Core Syllabus-Zoology	60 marks
<b>Total</b>	<b>100 marks</b>

### Part A: Research Methodology

#### UNIT-1

##### RESEARCH DESIGN AND DATA COLLECTION

**Marks: 10**

Research methodology- definition, different types of research design. Basic principles of experimental designs. Sampling design- sample survey, steps in sample design, criteria of selecting a sampling procedure and different types of sample designs. Methods of Data Collection: Primary and secondary data.

Literature collection and citation, bibliography. Writing skills - Preparation of research report, presentations, and writing scientific paper. Impact factor, Citation factor, patents, copyright, Plagiarism, ISBN, ISSN, preparation of research proposals, funding agencies: UGC, DBT, ICMR, CSIR, DST.

##### Reference Books:

1. Kothari C.K. (2004) 2/e, Research Methodology – Methods and Techniques (New Age International, New Delhi).
2. Krishnswamy, K.N., Shivkumar, Appa Iyer and Mathiranjana M. (2006) Management Research Methodology; Integration of Principles, Methods and Techniques (Pearson Education, New Delhi).

#### UNIT-2

##### HISTOLOGY AND HISTOCHEMISTRY

**Marks: 10**

Fundamentals of histology- Epithelial, connective, muscular, nervous and other specialized tissues. Tools in histology- Principles, design and functioning of microtome and cryostat. Techniques in histology- Sample preparation, obtaining tissue samples, handling reagents,

fixatives (types of fixatives and effect on tissue ), processing of fixed samples, dehydration (procedure and significance), embedding, block making, staining( staining methods histochemical and immunohistological methods), dyes and dye binding reactive groups, mordants and mordanting, temporary and permanent preparations, whole mount preparation.

**Reference Books:**

1. Text book of Histology Roland lesson DL. WB Saunders Company, Tokyo.
2. Histochemistry Vol. I II III A G E pearse Churchill Livingstone NY.

**UNIT-3**

**INSTRUMENTATION**

**Marks: 10**

Description and principles of 1) Electrophoresis 2) PCR 3) Laminar flow 4) Ultracentrifuge 5) Autoclave 6) Immuno-electrophoresis-Southern, Northern and Western Blotting 7) Light and electron microscopy, chromatography and HPLC, Handling of instruments and precautions.

**Reference Books:**

1. Biophysical& Biochemical Techniques, Wilson K and Walker J.M.
2. Principles and Techniques of Biochemistry and Molecular Biology, Wilson K and Walker J.M., Cambridge University Press.

**UNIT-4**

**ANIMAL ETHICS AND SAFETY MEASURES**

**Marks: 10**

Concepts of animal welfare and its significance in animal science research, Institutional Animal Ethics Committee (IAEC), animal husbandry-caging of animal systems, food, bedding, water, sanitation and cleanliness of animal house. CPCSEA guidelines for laboratory animal facility.

Lab safety measures: Introduction, code of conduct-while entering in the lab, while working with the chemicals, while disposal of chemicals, storage and disposal of chemical wastes-aqueous waste, organic waste, radioactive waste, human contribution to reduce hazardous wastes.

**Reference Books:**

1. Thomas J.A., Fush R.L., (2002), Biotechnology and safety Assessment (3rd Edn.), Academic press.

2. Fleming D.A., Hunt D.L., (2002), Biological safety Principles and practices (3rd Edn.) ASM Press, Washington.
3. Biotechnology- A Comprehensive treatise (Vol. 12), Legal economic and ethical Dimensions VCH.
4. Singh K, Intellectual Property Rights on Biotechnology, BCIL, New Delhi.

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## **Part B: Core Syllabus- Zoology**

### **UNIT-1**

#### **MOLECULAR GENETICS**

**Marks: 10**

History and scope of molecular genetics, Identification of DNA as genetic material. Properties, storage and transmission of genetic information. DNA Replication: Semi conservative of double stranded DNA. DNA polymerase and ligases. Transcription: Prokaryotic transcription, RNA polymerases, transcription signals, classes of RNA molecules-messenger, soluble, ribosomal and transfer. Translation: The genetic code, transfer RNA and aminoacyl synthetases, initiation, elongation and transfer factors, the Wobble hypothesis, polycistronic mRNA, overlapping genes, ribosomes.

#### **Reference Books:**

1. Karp G (2010) Cell and Molecular Biology: Concepts and Experiments. 6th Edition, John Wiley and Sons Ltd. New York.
2. Snustad DP and Simmons MJ (2011) Principles of Genetics. 6th Edition John Wiley and Sons.
3. Atherly AG, Girten JR, Mcdonald JF. The Science of Genetics. Saunders College, 1999.
4. Gardner EJ, Simmons MJ and Snustad DP. Genetics III Ed. John Willy and Sons, New York, 1990.

### **UNIT-II**

#### **DEVELOPMENTAL BIOLOGY**

**Marks: 10**

Concept of embryology, gametes-types of sperms and eggs; Fertilization; Early development-cleavage, patterns of cleavage, chemical changes during cleavage, formation of blastula. Gastrulation-fate map. Morphogenetic movements-epiboly and emboly. Neurulation-mechanism of neural tube formation.

Organogenesis in vertebrates-derivatives of ectoderm, mesoderm and endoderm. Development of brain, eye, heart, reproductive system, alimentary canal. Regeneration-

mechanism of regeneration in salamander limb, factors affecting regeneration. Metamorphosis in amphibians, insects, hormonal regulation of metamorphosis.

**Reference Books:**

1. Gilbert SF. Developmental Biology, IV Ed. Sinauer Associates Inc. Publishers, Massachusetts, 2000.
2. Rao KV, Developmental Biology: A modern synthesis. Oxford and IBH Publishing Co. Pvt. Ltd., 1993.
3. Subramanian T. Developmental Biology, Narosa Publishing House, 2002.

**UNIT-3**

**AQUATIC AND ENVIRONMENTAL BIOLOGY**

**Marks: 10**

Introduction to aquatic biology and concepts. Physical characteristics of water: light, temperature, turbidity, density, pressure. Chemical properties of water: Hydrogen-ion-concentration dissolved oxygen, free carbondioxide, total alkalinity, chloride, sulphate, BOD, COD, NOD.

Ecosystem-Ecosystem concepts, energy flow in ecosystems, trophic structures. Ecological pyramids- food chain, food web and their significance. Environmental pollution- types of environmental pollution and their biological effects, air pollution, soil and water pollution-causes, effects and control.

Environmental disaster and management-effect of climate change, global warming and its effect on living organisms.

**Reference Books:**

1. Tonapi GT. Fresh water animals of India. Oxford and IBH publishing company, New Delhi, India.
2. Blakey DR and Hrusa DC. Inland aquaculture development handbook. Fishing News Books Great Britain.
3. Mckinney ML and Schoch RM. Environmental Science: Systems and solutions. Jones and Bartlett Publishers, 1998.
4. Cunningham WP. Environmental Science, V Ed., WCB McGraw Hill, 1999.
5. Chakraborti NK. Environmental Protection and Law, 1994.

## **UNIT-4**

### **REPRODUCTIVE BIOLOGY AND ENDOCRINOLOGY**

**Marks: 10**

Male reproduction- Histoarchitecture of testis, biology of spermatozoa, spermatogenesis, hormonal control of spermatogenesis. Female reproduction- Histoarchitecture of ovary, folliculogenesis, ovulation. Implantation- types of implantation, sequence of events during implantation, delayed implantation, hormonal regulation. Pregnancy-corpora luteum, endocrine control of pregnancy in rat. Parturition-factors involved in parturition. Lactation-morphological and functional development of mammary gland and milk ejection. Reproductive technologies- In vitro fertilization, gamete intrafallopian transfer, surrogate pregnancy, fertility control in male and female.

Pituitary gland- comparative morphology, chemistry and biological actions of anterior and posterior pituitary hormones. Hormones of GI tract and pancreas, chemistry and physiological actions of GI hormones, insulin and glucagon.

#### **Reference Books:**

1. Knobil E and Neill JD. (Eds.). The Physiology of Reproduction II. Vol. 1 and 2, Raven Press Ltd., 1994.
2. Austin CR and Short RV. Reproduction in Mammals, Books 1-5, Univ of Cambridge.
3. Hogarth PH. Biology of Reproduction. Blackie and Son, Glasgow, London.
4. Degroot LJ and Neill JD. (Eds.) Endocrinology. Vol. I-III, W. B. Saunders Co. 2001.

## **UNIT-5**

### **ANIMAL BEHAVIOUR**

**Marks: 10**

Classification and analysis of behaviour patterns, tools and techniques in behaviour study, neural and hormonal control of behaviour, communications in animals, neural basis of learning, memory, cognition, sleep and arousal, development of behaviour, social communication. Mating systems, parental investment and reproductive success, parental care, aggressive behaviour, migration, orientation, domestication and behavioural changes.

#### **Reference Books:**

1. David McFerland, Animal Behaviour, Pitman Publishing Limited, London, UK.
2. Manning A and Dawkins MS. An Introduction to Animal Behaviour. Cambridge, University Press, UK.

## **UNIT-6**

### **BIOLOGY OF CHORDATES AND NON-CHORDATES**

**Marks: 10**

Origin of chordate in the light of recent theories, Reptilia- Origin and evolution of temporal acrales and fossae, extinct reptiles, adaptive radiation in living reptiles, poisonous and non-poisonous snakes in India. Aves-Aerial adaptations and mechanisms of flight, courtship and breeding behaviour, migration.

Principles of hydrostatic movements, amoeboid and flagellar movements and locomotion in arthropods. Filter feeding in polychaeta, mollusc and echinodermata, symbiotic nutrition. Pattern of reproduction in invertebrates.

#### **Reference Books:**

1. Barrington EJW. Invertebrate structure and function. Nelson, London, 1967.
2. Hyman LH. The Invertebrates. Vol. I-VI. McGraw-Hill, New York, 1940-67.
3. Marshall AJ and Williams WD. (Ed.). Textbook of Zoology:Vertebrates-VII Ed. Vol. II. AITBS Publishers and Distributers, 1995.

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#### **Note:**

1. Ph. D. Entrance test is for 100 marks (1 marks each) and MCQ type.
2. Research methodology (Part A) carries 40 marks core subject (Part B) carries 60 marks.