KUVEMPU UNIVERSITY

Chairman,
Department of Applied Zoology,
Jnana Sahyadri,
Shankaraghatta-577451

Phone No: 08282 256263
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Ph.D Entrance Examination in Applied Zoology January - 2019

The Ph.D entrance examination for the candidates who have applied for Ph.D in Applied Zoology of this University in response to the Notification (As per the circular of the Kuvempu University No. KU/AC/Ph.D.AC:1&2:4981:2018-19, Dt: 29-10-2018) has been scheduled on Saturday the 19th January 2019. You are requested to go through the following Instructions :

1) *The entrance examination will be held in the **Department of Applied Zoology,** Kuvempu University, Jnanasahyadri campus, Shankaraghatta, Shivamogga on **19.01.2019 at 11:00 AM.***
2) *Duration of entrance test for **3.00 hrs.***
3) *The candidates should report at **10:00 AM on 19-01-2019** along with **2 stamp sized photographs.** The **Admission Tickets** will be issued before the commencement of examination on the same day.*
4) *No **TA/DA or accommodation** will be provided to the candidates by the University for attending the entrance examination.*
5) *Candidates who have not enclosed the P. G Degree Marks cards/Caste certificates (SC/ST/Cat-I/IIA/IIB/IIIA/IIIB) along with their application, should bring a copy of the same while appearing for the entrance examination.*
6) *A copy of the Ph.D entrance exam syllabus along with the model question paper is enclosed for your information.*

Sd/-
Chairman

KUVEMPU UNIVERSITY
DEPARTMENT OF APPLIED ZOOLOGY

Ph.D. Entrance Examination Syllabus 2018-19

Duration of entrance test: 3 Hours.
Maximum Marks: 90

Unit 1: Research Methodology and Instrumentation

Need and importance, characteristics, Review of literature: Sources (Journals, abstracts, and indices), Research problem – Sources, criteria and selection of research problem, statement of problem, research blue print- its components, Presentation of research work: Format, characteristics of research report data analysis structure and organization of scientific papers, dissertation and thesis, Reference writing, methods of citation of journal, articles, books, proceedings, Research methods: Descriptive – surveys, correlation and comparative studies, case studies, development studies- nature and use, steps and interpretation, Experimental – Need and significance, nature, validity- Internal and external, Role of control designs – single groups and rotation groups.
Statistical methods and data interpretation: Notations and classification of data, Population sample, variable, presentation of data, geographical, chronological, qualitative, quantitative, continuous, discrete, overlapping and non-overlapping frequency tables, Sampling methods- Selection of sample, qualitative and quantitative samples, random sample and non-random sampling, Frequency distribution- Class interval, relative frequency, percentage frequency, cumulative frequency, types of frequency distribution, Central tendency- Arthematic mean, geometric mean, median, mode, relation between mean, median and mode. Measures of Dispersion- range, mean deviation, standard deviation, coefficient of variability, standard error, degrees of freedom, confidence limit, Graphic representation of biometric data, Tests of Significance: t- test, z-test, chi square test, Correlation: types of correlation, correlation and reserves, methods of studying correlation, coefficient of determination, significance test for 'r', coefficient of non-determination, coefficient of alienation, partial correlation, multiple correlation, Analysis of Variance, Regression analysis: regression line, regression equation, procedure of regression test, partial, curvi linear and multiple regression.

Instrumentation: Microscopy (Light microscopy, Phase contrast, fluorescence, Confocal, electron microscopy (transmission and scanning), Analytical instruments: Colorimeter, Spectrophotometer, atomic absorption spectroscopy, flame photometer, ESR & NMR Spectrophotometers, UV Spectrophotometer, flow cytofluorimetry, Ultra centrifuge, Densitometer, HPLC and GC, Cryotechniques: cryopreservation for cell, tissues and organisms, Cryotechniques for microscopy, Separation techniques: Chromatography, Electrophoresis, centrifugation, Cell separation by flow cytometry, density gradient centrifugation, Autoradiography & ELISA, Microtomy technique: Freezing, drying embedding, sectioning. Molecular cytogenetic techniques: FISH, GISH, automated karyotyping, chromosome painting, RFLP, chromosome walking, DNA finger printing, DNA sequencing, PCR, Blotting techniques: Southern, Northern, Western.

Unit 2. Biosystematics, Non-Chordata and Chordata

Definition and role of Systematics in biology, basic concepts of Biosystematics, biological classification - theories and objectives.
Trends in biosystematics:- Biochemical taxonomy, cytotaxonomy and molecular taxonomy. Taxonomic diversity:- Definition and types, origin and extinction, rates causes of extinction, diversification.

Principles of animal taxonomy: Species concept, Classification, Taxonomic keys, types of keys and their significance. b) International Code of Zoological Nomenclature – ICZN: Operative principles, interpretation and application of important rules: Formation of Scientific names of various Taxa. c) Taxonomic procedures: Taxonomic collections, preservation, curetting, process of identification, Monophyly, Polyphyly. d) Vertical and horizontal relationships. e) Ranks of characters. f) New trends in taxonomy.
Molecular phylogeny: Definition and limitations, construction of phylogenetic trees using molecular data, construction of phylogenetic trees by using 16S rRNA gene sequences, molecular divergence and molecular clocks and molecular drive.
Non-Chordata : Major and Minor Phyla, Systematic position of peripatus, Locomotion in Invertebrates, Nutrition in Protozoa, Primitive Nervous Systems: Components of behaviour, nerve net in Coelenterates, Echinoderms.
Chordata: Origin and diversity of Chordates, General characters. Comparative Anatomy, Epidermal Integument or Skin Functions, Structure its Derivatives (Glands, Scales, and scutes, digital cornifications, horns, feathers, hairs), Integument in different classes of Chordates, Endoskeleton in Vertebrates, Digestive System, Respiratory System.

Unit 3. Animal Physiology, Endocrinology, and Developmental biology

Animal Physiology: Digestive enzymes, Mechanisms and stages of digestion, Absorption (Carbohydrates, proteins and lipids). Haemopoesis, Blood coagulation Coagulation factors, anticoagulants, Gas transport, Regulation of respiration, Nitrogenous wastes, Urine formation, water and electrolyte balance, acid-base balance, Impulse conduction, Molecular mechanisms of synaptic transmission of nerve impulse, Neurotransmitters, molecular mechansim of muscle contraction, Actin-myosin system, Physiology of Male and female reproduction, physiological changes during pregnancy and lactation.

Endocrinology: Functional organization of endocrine glands – Pituitary, Thyroid, Adrenal, Pineal, Pancreas, Adrenal, Testes, Ovary and placenta, Neurosecretion in crustaceans and insects, Hypothalamus and its releasing factors, Hormone receptors - Membrane receptors, Second messengers, G-proteins, nuclear receptors, Signal transduction mechanisms, Hormonal disorders.

Developmental biology: Epigenesis Vs Preformation, Cell specification, Morphogensis, fate maps and cell migration, Early development- Cleavage, gastrulation, organizer, Development of tetrapod limbs, Development of neural tube, Regional differentiation of CNS, Cell types of Nervous system, Mesodermal derivatives- Somitogenesis, Myogenesis, Osteogenesis, Urinogenital system, Endodermal derivatives: Differentiation of Heart and aortic arches, blood and blood vessel formation, Mouth, pharynx and lung development, Cell communication-Induction and competence, Receptors and signal transduction, Juxtacrine signaling, Role of cytoplasm and Nucleus in development- Nuclear transplantation experiments in Amphibia and Acetabularia, Genes in Development and Differentiation-Developmental genetics of *C. elegans*, Developmental genetics of *Drosophila*: Early embryonic development, Role of maternal contribution in early embryonic development, Homeotic mutations and Homeobox, Imaginal discs, Metamorphosis and Regeneration, Teratogens.

Unit 4: Genetics, Evolution and Ecology

Genetics: Mendelian principles- Dominance, segregation, independent assortment, Allele, multiple alleles, pseudoallele. Extensions of Mendelian principles: Co-dominance, incomplete dominance, gene interactions, pleiotropy, Genomic imprinting, penetrance and expressivity, phenocopy. Gene mapping: Linkage maps, crossing over and recombination, Coupling and repulsion phases, mapping with molecular markers, mapping by using somatic cell hybrids.

Extra chromosomal inheritance-Mitochondrial and cytoplasmic inheritance, maternal inheritance. Examples: Chlamydomonas, Neurospora, Paramoecium, Yeast and Drosophila. Sex determination and Dosage compensation in *Caenorabditis elegans*, *Drosophila* and Man, Fine Structure of the gene- Classical concept, bar eye and Lozenge loci in Drosophila, Pseudoallelism, Benzer's work on rII locus in T-4 phages, concept of cistron, recon and muton, Split genes. Chromosomal and Gene mutations: Chromosomal mutations: Deletion, Duplication, Inversion, Translocation and their genetic implications. Genes mutations: Types and Molecular mechanisms of mutations. Structural mutations: Point mutations – Silent, missense, and nonsense mutations. Functional mutations: Loss-of-function and Gain-of-function mutations. Causes of mutations. Mutational analysis *in vitro* and *in vivo*.

Evolution: Emergence of evolutionary thoughts: Lamarck; Darwin–concepts of variation, adaptation, struggle, fitness and natural selection; Origin of cells and unicellular evolution: Origin of basic biological molecules; abiotic synthesis of organic monomers and polymers; concept of Oparin and Haldane; experiment of Miller (1953); the first cell; evolution of prokaryotes; origin of eukaryotic cells; evolution of unicellular eukaryotes. Paleontology and evolutionary history: The evolutionary time scale; areas, periods and epoch; major events in the evolutionary time scale; origins of unicellular and multicellular organisms; major groups of animals; stages in primate evolution including Homo-sapiens.Molecular Evolution: Concepts of neutral evolution, molecular divergence and molecular clocks; molecular tools in phylogeny, classification and identification; protein and nucleotide sequence analysis; origin of new genes and proteins; gene duplication and divergence. Mechanisms of Speciation: Population genetics – populations, gene pool, gene frequency; Hardy-Weinberg law; concepts and rate of change in gene frequency through natural selection, migration and random genetic drift; adaptive radiation and modifications; Isolating mechanisms; speciation; allopatricity and sympatricity; convergent evolution; sexual selection; co-evolution.

Ecology: Basic concepts of Ecology: Definition, branches of ecology, structure of ecosystem, Functioning of ecosystem, energy flow and nutrient cycles, food chains, food webs, trophic levels. Habitat and niche: Concept of habitat and niche; niche width and overlap; fundamental and realized niche; resource partitioning; character displacement. Ecological succession: Types; mechanisms; changes involved in succession; concept of climax. Community ecology: Nature of communities; community structure and attributes; levels of species diversity and its measurement; edges and ecotones. Species interactions: Types of interactions, interspecific competition, herbivory, carnivory, pollination, symbiosis. Population ecology: Characteristics of a population; Population growth curves; population regulation; life history strategies (r and K selection); concept of metapopulation – demes and dispersal, interdemic extinctions, age structured populations. Species intercations: Types of interactions, intrespecific competeion, herbivory, carnivory, symbiosis and Mutualism. Biogeography: Major terrestrial biomes; theory of island biogeography; biogeographical zones of India.

Unit 5: Aquaculture and Sericulture

Aquaculture: Culturing of fishes: Indian major & minor carps, catfishes, ornamental fishes, prawns, pearl oysters, Breeding and seed production techniques of fishes, Aquaculture systems: Inland farms, tanks, pens and cages, Nutrition and feeds, Fish diseases and their control, Biotechnology in Aquaculture, transgenic fish, cryopreservation of gametes, Farm

management and economics- Hatcheries, Nurseries, rearing ponds, and stocking ponds.

Sericulture: Global silk production, Classification of sericigenous insects. Morphology and life cycle of *Bombyx mori.* Structure and functions of Silk glands, Silkworm genetics. Linkage, selective sex rearing. Silkworm as a laboratory tool for mutagenicity studies, Vermicomposting techniques, agents and management, Silkworm rearing technology- grainage activity, egg production, incubation, artificial hatching, seed organization, seed area spacing, feeding, bed cleaning and bivoltine rearing, Silkworm pests and Predators, Silkworm diseases: Protozoan, Fungal, Viral and Bacterial diseases and their control measures, Non-mulberry silkworms.

Unit 6: Animal Behavior and Wildlife Studies

Ethology: Approaches to the study of behaviour, ethograms, Reflexes and complex behaviours, Instinctive behavior- Fixed action patterns, Learning and imprinting, Imprinting, Memory- Short term memory and long term memory, loss of memory, drugs and memory, Biological communications, forms and signals-Vision, audition, chemical, pheromones in insects and mammals (Lee -Boot's effect, Whitten effect, Bruce effect, Coolidge effect, Castro and enbergh effect), Sexual behavior, courtship signals, sexual selection (male choice and female choice), Social organization in insects and primates, Territoriality, Biological rhythms, biological clocks and their significance.

Wildlife studies: Important wildlife species of India, Causes for depletion of wild life, Wild life categories- Endangered , Threatened, Vulnerable, rare, Red data book, Protected area network: Biosphere reserves, National parks, Wildlife sanctuaries and wild life corridors with special reference to Karnataka and India, Wild Life census- Census Methods, Wildlife conservation- Methods and strategies, In-situ and Ex-situ conservation, Project tiger, Lion, elephant, Musk deer, Thiamin Deer, Crocodile and Great Indian Bustard, Wild life management-types and management, Gudavi and Mandagadde bird sanctuary, Bhadra wild life sanctuary, Wild life-Human conflicts - Elephant, wolf and tiger, Bird migration- Exploratory migration, seasonal and ontogenetic migration, orientation and navigation, physiological preparation for migration, environmental factors, Nesting and roosting, Wild life protection act 1972 and its amendments Wildlife schedules, Wildlife Crimes and their control in India.

Unit 7: Entomology, Parasitology and Biodiversity

Applied Entomology: Classification upto orders with suitable examples, Insect Morphology, Insect Anatomy, Agricultural Entomology- Pests, and predators of major cereals (Rice, sorghum, ragi, wheat), Commerical crops (Sugarcane, cotton), Oil seeds (groundnut, sunflower, safflower)Vegetables (Brinjal, Ladys finger, cabbage, field beans), Crops (coconut Arecanut, coffee, cardamom) and stoired pests, integrated pest management, Bioluminescence, defense mechanism in insects.

Parasitology: Classification, Distribution, and types of parasites, Parasitic diseases of human importance, pathogenicity and control of protozoan parasites- Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Cryptosporidium, Helminths-Nematoda- Ascaris, Ancylostoma, Strongyloides, Trichuris, Enterobius, Waucheraria, Loa, Onchocarca, Mansonella, Trematoda- Schistosoma, Fasciola,Cestoda-Taenia, Echinococcus, Hymenopilis, Diphyllobothrium, Ectoparasites- Fleas, Mites, Ticks, Lice, Host- Parasitic relationship, Parasitoids.

Biodiversity: genetic and species diversity, ecosystem diversity, Indian and Global Biodiversity, General theories of species diversity- Santa Rosalia and Hutchinson approach,

species richness between and within habitat, diversity clines with latitude, productivity hypothesis, time stability hypothesis, Hot spots of Biodiversity- fauna of Western and Eastern Ghats, Himalayas, Loss of Biodiversity- causes, threats, extinction of species and patterns of Extinction, Biodiversity Conservation: In situ and ex-situ conservation, Gene Bank, gene banks at global level, sperm banks and their utility, Wet land Biodiversity, Ramsar wetlands, threats and conservation methods, Intellectual property rights (IPR), patents and Bio-safety protocol related to biodiversity, Rangelands.

Unit 8: Cell biology, Molecular Biology and Biological Chemistry

Origin and evolution of prokaryotic and eukaryotic cells, Membrane Structure and Function- ultra structural organizations of the membrane and models, membrane transport of molecules. Structural organization and functions of intracellular organelles- The nucleus, Mitochondria, Lysosomes, Peroxisomes, Golgi apparatus, endoplasmic reticulum,
Ultra structural organization of eukaryotic chromosomes, Cell cycle and Cell division, Ultrastructrure of centrosome, Chemistry and organisation of microtubules, Metaphase and anaphase movements. Protein sorting- Organelle biogenesis and protein secretion, synthesis and targeting of mitochondria, peroxisomal proteins, translational modification in the ER. Intracellular traffic, vesicular traffic in the secretary pathway, protein sorting in the Golgi, traffic in the endocytic pathway, exocytosis. Cell Communication: General principles of cell communication, gap junctions, extracellular matrix, Collagen and Non-collagen component of the extracellular matrix, integrins. Cell Signaling: Overview of the extracellular signaling, Cell surface receptor, Signaling through G-protein coupled receptors, signal transduction pathways, second messengers, Interaction and regulation of signaling pathways. Programmed Cell Death a) Apoptosis v/s necrosis b) Discovery of cell death genes in *C.elegans* & homologous pathway in mammals. Aging : a) Concept of aging- organismal b) cellular changes during aging (DNA damages, shortened telomere, mitochondrial mutations, Oxidative stress) c) Theories of aging. Methods in Cell biology: Microscopy: light microscopy; fluorescence microscopy; Phase contrast microscopy; Electron microscopy, Purification of cells and their parts, Cell separation and culture, flow cytometry, Fractionation of cell contents, Tracing cellular and imaging molecules with radioactive isotopes and antibodies. **Stem cell biology:** Introduction to concepts in stem cell biology, definition of terms (renewal, potency etc), properties of stem cells, stem cell niche. Molecular mechanisms of self-renewal, pluripotency, multipotency and lineage differentiation, stem cell niche. Embryonic stem cells: Generation and manipulation of embryonic (Mouse and human) stem cells. Adult stem cells- Neural stem cells, Hematopoietic stem cells, Epithelial stem cells(skin, intestine, breast), Cancer stem cells. Stem cells and regeneration. Stem cell therapy and Ethical issues associated with stem cell biology.

Molecular biology: Central dogma of molecular biology, DNA replication: DNA replication, Mechanics of DNA replication in Prokaryotes and eukaryotes, Transcription: Prokaryotic and Eukaryotic transcription, transcription factors, Post – transcriptional modifications in RNA, Regulation of gene expression, Genetic code, Prokaryotic and eukaryotic translation, Genetic Repair mechanisms: damage and Types of DNA repair mechanisms: Photoreactivation, excision repair, SOS repair, adaptive response, post-replication repair.

Biological chemistry: Chemical bonds- covalent, coordinate, ionic and hydrogen bonds. Vander-Waal's forces, hydrophobic interactions, normality and molarity of solutions, Nucleic acids- chemistry, synthesis and metabolism, Carbohydrates- Metabolism; Embden-Meyer pathway, Glycolysis, Citric acid cycle, Glyconeogenesis, Glycogenolysis, Glycogen synthesis, Inborn errors associated with carbohydrate metabolism. Proteins-Metabolism-

Transamination, Deamination, oxidative deamination, Urea cycle and Transmethylation, Lipids- Metabolism- Oxidation of fatty acids, Prostaglandins, Cholesterol, Hypercholesterolemia, Lipoproteins, Atherosclerosis, Disorders of lipid metabolism, Enzymes-Enzyme Kinetics, Isozymes, Regulatory enzymes.

Unit 9: Advanced Genetics, Biotechnology, Genomics and Proteomics

Applied Genetics: Radiation Genetics: Actions of ultraviolet radiations on biomolecules & their biological Effects, ionizing radiations, Radioisotopes, Gene mutations: Types and Molecular mechanisms of mutations, Structural mutations: Point mutations – Silent, missense, and nonsense mutations, Functional mutations: Loss-of-function and Gain-of-function mutations, Causes of mutations, Mutational analysis techniques, Cancer Genetics: types of cancer, Characteristics of cancer cells - Behavioral, biochemical & cytogenetical. Causes of cancer, Cancer as a cellular disease, Genetic basis of Carcinogenesis - Proto-oncogenes, Oncogenes, viral carcinogenesis, Neurogenetics**:** Genetics of neural development: Axon guidance and pathfidning, Axonal transportation, neuromuscular junctions, synaptic plasticity, Molecular basis of neurological diseases: Alzheimer's, Parkinson's and Huntington's diseases,
Animal models to study neurological diseases – *C. elegans, Drosophila*, Mouse, Biochemical Genetics**:** Isozymes, Isozymes of LDH, ontogeny of LDH isozymes, Isozymes as genetic markers. Quantitative Genetics: Genetic variability, Mendelian populations and founder effect, Genotype and phenotype distribution, multifactor hypothesis, polygenes, Heritability of a trait, quantifying heritability, Speciation – isolating mechanisms, Allopatric and sympatric speciation.
Factors affecting gene frequencies, Human Genetics: Mendelian pedigree patterns and construction, genetic screening, Identifying human disease genes: position-independent strategies, positional candidate strategies(candidate genes), Organization of the Human genome: distribution of genes, gene families, Human genome project, Genome Projects of Model Organisms: *Drosophila C. elegans* and Mouse genome projects.

Biotechnology: Genetic engineering: Restriction enzymes, DNA ligase and DNA polymerase in genetic engineering, Cloning Vectors: Plasmids, Phages, Cosmids and Phagemids, Artificial chromosomes (YAC, BAC, HAC), animal viruses and Expression vectors, Genomic and cDNA libraries, Selection and screening of Recombinants: Genetic selection, Use of chromogenic substrates, Insertional activation, Analysis of cloned genes: Restriction Mapping, Gene identification, southern hybridization, Polymerase chain reaction, DNA sequencing, Hybridoma Technology: production of Monoclonal antibodies and its applications, Antisense and ribozyme technology: RNA interference, antisense molecules, ribozyme: hammerhead, Application of antisense and Ribozyme technologies, Animal cell and Tissue culture: Principles of cell culture, cell and tissue types, cell lines, transformation, Cell and tissue culture media: Natural and defined, role and component of serum in culture, Applications of tissue culture: Tissue culture in biomedical research, karyological studies, amniocentesis, mutagenesis, Cytotoxicity assays,
Transgenic Animals: *Drosophila*, fish, and mouse, Applications of Biotechnology: Production of medicinally important products – Insulin, vaccines, hormones, Gene therapy, AIDS therapy, Biofertilizers, biopesticides, antibodies, silkworm cloning.

Genomics and Proteomics: Shot gun sequencing, gene annotation, gene family, clusters, orthologs and paralogs, Micro-array technology, transcriptomes, Comparative Genomics : Size and structure of Genomes in different organisms, Single nucleotide polymorphism, Pharmacogenomics, GenBank, Genomics tools and databases, Protein domains identification and comparison, Protein structure determination, Protein – protein interaction, protein folding, , Protein arrays, Two dimensional polyacrylamide gel electrophoresis for proteome analysis, proteomic tools and databases.

Unit 10: Microbiology and Immunology

Microbiology: Isolation and culture of microorganisms, technique of Isolation, microbial nutrition (type of microbial culture and microbial media), microbial Biomass, Sterilization techniques: Physical methods (Dry and wet), Radiation (ionizing and non ionizing), Filtration (porcelain, sintered glass and membrane filters), Chemical methods (Asepsis, disinfection), Viruses: Structure and classification, replication, bacteriophages, life cycle of phage, Viroids and prions, Mycoplasma, Rickettsia, Chlamydia and Yeast: Structure, classification, culture and economic importance, Industrial microbiology: production of alcohol, microbial pesticides, antibiotics and enzymes.

Immunology: Innate and acquired immunity, Antigens and antigenicity, Primary and secondary immune responses, Cell and organs of immune system Cells: Lymphocytes (T & B cells), Phagocytic cells, monocytes, eosinophills, basophylls and mast cells, Organs: Thymus, spleen, Bone marrow, Lymph node, cast and mast; primary and secondary lymphoid tissues, Cytokines, Immunoglobulins: Structure of antibody, Classes of Immunoglobulins, Purification of Immunoglobulins, Complement system: Proteins of complement system, Classical pathway, Alternate pathway, Quantification of complement activity and complement Proteins, Antigen- antibody reactions and techniques: Agglutinations, Precipitation, Complement fixation, Immunofluorescence, Radio immunoassay, ELISA, Electrophoresis and western blotting preparation of polyclonal antibodies, Major histocompatibility complex, transplantation and graft rejection, Major histocompatibility antigens, Immunological tolerance, Hypersensitivity, Immunopathology: Immunodeficiency, Autoimmunity, Immunotherapy, Vaccines and Vaccination: Kinds of Vaccines, Adjuvants, Vaccine delivery systems. Immune response against Bacterial, Viral, mycotic and parasitic infections.

Unit 11: Environmental Pollution and Toxicology

Environmental pollution: Concept of Biosphere, hydrosphere, atmosphere,
and lithosphere, Water pollution, effects, Wastewater treatment, Air pollution: Biological effects of Nox, SOx, SPM, Hydrocarbons, acid rain, global warming, photochemical smog and ozone depletion, Solid waste and Hazardous waste management, Biomedical waste, Noise Pollution: biological effects, Radiation pollution: types, effects, Soil Pollution: Soil pollutants and their effects, Environmental impact Assessment, : Basic elements, Methods and criteria for industrial, Aquaculture, transport and water related EIA, Environmental Auditing and Case studies: Konkan Railway and Bhopal Tragedy, Environmental education and awareness, Legal aspects

Toxicology : Fundamentals and scope of toxicology, Bioassay methods, Acute, chronic and reproductive toxicity, Factors and dose response relationships, factors effecting toxicity, 3. Mechanisms of Bio-accumulation and Bio-transformation, Detoxification, Bio-monitoring, Pesticides (Xenobiotics): classification, basic aspects of pesticide toxicity, metabolism (DDE, parathion, carbaryl), Metals – Survey, effects and management(Arsenic, Cadmium, Lead, and Mercury), Cosmetic toxicity: Types, cosmetic products, Cosmetic chemistry, Exposure and risk assessments of cosmetics, Cosmetic regulations, Natural toxicants: Animal venoms and poisons, Toxins produced by fishes, Microbial (Algal and bacterial) and plant toxins, Food toxicants and adultrant: Microbial toxins, toxic food constituents, food contaminants, food adulterations and health hazards, Safety standards and regulatory provisions.

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MODEL QUESTION PAPER

(As per the circular of the Kuvempu University No. KU/AC/Ph.D.AC:1&2: 4981:2018-19, Dt: 29-10-2018)

Ph. D Entrance Test, January - 2019

Subject: Applied Zoology

Time: 3 hrs **Max. Marks: 90**

Instructions to candidate*: Answer all questions.*

Illustrate wherever necessary

I. Select the most appropriate answer from the options given: **1 x 20 = 20**

(*Answer all 20 Multiple Choice questions from 1-20)*

1.
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20.

II. Write short note on any **FIVE** of the following: **5 x 6 = 30**

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

Answer the following questions (Essay type): **4 x 10 = 40**

(Answer all the 04 questions and every question will be with an internal choice)

III. _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

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IV. _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

OR

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V. _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

OR

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VI. _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _

OR

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KUVEMPU UNIVERSITY

DEPARTMENT OF APPLIED ZOOLOGY

Candidate Appearing for Ph.D Entrance Exam

Sl. No.	Name of the Candidate	Reg. No.
1)	ANURADHA S.,	ETAZ1801
2)	ASWINI K S.,	ETAZ1802
3)	DEEPU D.M.,	ETAZ1803
4)	KAREEMA AMBAREEN.,	ETAZ1804
5)	KRISHNAKUMAR.,	ETAZ1805
6)	MANJU P.,	ETAZ1806
7)	SANGEETHA P.K.,	ETAZ1807
8)	SHAMAPARI R.,	ETAZ1808
9)	SINDHU N. NAIK.,	ETAZ1809
10)	SOWMYA D.,	ETAZ1810
11)	SUNIL B.,	ETAZ1811
12)	SUPRIYA B.M.,	ETAZ1812
13)	SUSHMITHA RAI K.B.,	ETAZ1813
14)	TARA T.,	ETAZ1814
15)	V. HAMSALEKHA.,	ETAZ1815
16)	VIJAYALAKSHMI N WARI.,	ETAZ1816
17)	YOGESH K.,	ETAZ1817

Sd/-
Chairman