SYLLABUS FOR Ph.D. COURSE WORK
ZOOLOGY

(Under Revised Ordinance 16 notified vide letter no/Acad./2018/1944 dated 24/05/2018)
(Academic Session 2018 – 2019 & Onwards)

SCHEME OF EXAMINATION

Number & Title of the Paper	Credit	End Semester Exam		
		Maximum Marks	Minimum Marks	Total
PAPER I RESEARCH METHODOLOGY	**4**	**100**	**50**	**100**
PAPER II REVIEW OF PUBLISHED RESEARCH IN RELEVANT FIELD (IN THE FORM OF THESIS)	**3**	**100**	**50**	**100**
PAPER III COMPUTER APPLICATIONS	**3**	**100**	**50**	**100**
PAPER IV ANIMAL PHYSIOLOGY	**3**	**100**	**50**	**100**
PAPER V COMPREHENSIVE VIVA VOCE (VIRTUAL CREDITS)	**3**	**100**	**50**	**100**

***SCHEME OF EXAMINATION AS APPROVED BY EXECUTIVE COMMITTEE OF THE UNIVERSITY**

PAPER – I
RESEARCH METHODOLOGY

Unit – I

Sampling technique, sterilization technique, various methods for isolation of pure culture, methods for measurement of microbial growth, manipulation of environment, nutritional and genetic parameters, maintenance and preservation of microbes (pure culture). Introduction to cell & tissue culture. Design & lab setup of tissue culture laboratory, Tissue culture media (Composition preparation), Types of culture.

Unit - II

Chromatographic techniques – Gel filtration, ion exchange chromatography, hydrophobic interaction and reverse phase chromatography, affinity chromatography, gas chromatography, high performance liquid chromatography, fast protein liquid chromatography; Application in separation of proteins.

Unit - III

Molecular Biology and spectroscopic techniques – Comet Assay; Real time PCR; RAPD, RFLP, ARDRA and Fluorescence *in situ* hybridization techniques. Atomic absorption spectroscopy, infrared spectroscopy, nuclear magnetic resonance spectroscopy, mass spectrometry including ESI MS and MALDI-TOF MS and Applications.

Unit - IV

Electrophoretic and centrifugation techniques - SDS and Native PAGE, Agarose gel electrophoresis, isoelectric focusing and two-dimensional electrophoresis, proteome analysis; Differential and density gradient centrifugation, analytical ultracentrifugation, separation of DNA/RNA using ultracentrifugation technique, determination of molecular weight and Sedimentation coefficient.

Unit - V

Quantitative methods; Principles and Designs of Experiments; Tools Parametric and Non~parametric statistics. Confidence interval, Errors. Levels of significance, Regression and Correlation coefficient. Analysis of variance - one way and two way classifications; Multiple Comparisons – Least Significant Difference Test, Duncan's New Multiple Range Test; Factorial Analysis; Analysis of Covariance.

PAPER-II
REVIEW OF PUBLISHED RESEARCH IN RELEVANT FIELD (IN THE FORM OF THESIS)

PAPER - III
COMPUTER APPLICATION

Unit - I

Features and applications related to presentation of text in suitable format and saving the MS WORD data for future applications. Practical knowledge of MS Word to type the script, insert tables, figures and graphs to prepare thesis and research papers in presentable format.

Unit – II

Construction of spreadsheets from the experimental data. MS EXCEL design and application of formula for calculations and their applications to the experimental data. Use of statistical tools, preparation of graphs, histograms and charts.

Unit – III

Preparation of powerpoint presentations based on the topic of research. Insertion of MS power point figures, graphs, charts in presentation. Preparation of scientific posters for presentations. Use of various presentation techniques.

Unit – IV

Method of preparing data sheets and entering the data according to its characteristics. Use of SPSS & various statistical tools on SPSS. Internet Overview of networking, Internet and its

applications. Applications exploring various websites and search engines for collecting quality literature and secondary data related to research work.

Unit – V

Data processing, Data mining; Bioinformatics – concept and applications; Biological databases – Primary and Secondary; Sequence Databases (EMBL, GenBank, DDBJ, SWISS-PROT, PIR, TrEMBL); Protein Family/Domain Databases (PROSITE, Pfam, PRINTS & SMART); Structure Database (PDB); Tools like BLAST, FASTA and EMBOS.

PAPER-IV
ANIMAL PHYSIOLOGY

Unit –I

Structure & Metabolism of Carbohydrate, fats. & Proteins

Nutritional Pattern, Mechanism of feeding and modes of digestion in various: groups of animals. Digestion: Digestive enzymes and their mechanism of action and hormonal regulation of digestion. The sequence of digestion and absorption in mammals. Physiology of respiration, respiratory pigments, oxygen, dissociation curve, chloride shift. Respiratory organs in Invertebrates. Air breathing fishes. Bird respiration. structure of mammalian lungs.

Unit –II

Physiological types of heart structure and working of mammalian heart, cardiac cycle, composition of mammalian blood, coagulation, blood groups and transfusion, characteristics of hemoglobin, functions of plasma proteins, Lymphatic system, various types of leucocytes and their role. Muscles: types, structure and function, Molecular mechanism of muscle contraction, functional architecture of Neuron, membrane and action potential, propagation of nerve impulse, neuro muscular junction, reflex action

Unit –III

Physiology of Excretion in invertebrates, excretion in vertebrates, structure of kidney (nephron), mechanism of urine formation with details of ultra filtration, role of loop of Henle in water conservation**.**

Osmoregulation – biological Significance of water, body compartment, Osmoregulation in different environment. Invertebrate body fluid regulation. Vertebrate body fluid Regulation. Thermoregulation, temprature as an environmental factor, Thermoregulation among vertebrates.

Unit –IV

Receptor Mechanism:- Chemoreceptor Mechanoreceptor Electromagnetic receptor.

Bioluminescence. Colour Change & Choromatophores**.**

Endocrine System: Storage, secretion, regulation and functions of hormones of endocrine glands (pituitary, thyroid & adrenal). Role of hormones in reproduction, physiology of ageing, basic concepts of homeostasis.

Unit –V

Enzymes- Structure and properties. Classification of enzyme. Nomenclature. Co- enzymes and co-factors. Enzyme Specificity. Enzymes action & factors affecting the enzyme action Fisher's lock – key hypothesis and Koshland's induced hypothesis, enzymes inhibitors and enzymes kinetics.

PAPER-V
COMPREHENSIVE VIVA VOCE