# KUVEMPU UNIVERSITY

## DEPARTMENT OF BIOCHEMISTRY

## Ph.D ENTRANCE EXAMINATION (DECEMBER-2018)

## A. EXAMINATION PATTERN

1. Maximum marks: 90
2. Nature of questions: Objective type and multiple choice, short notes and essay type questions
3. Syllabus for entrance test: Research Methodology and Biochemistry subject
4. Number of Questions: 20 objective questions each carrying one mark, five short notes questions out of eight each carrying six marks, four essay type questions out of six each carrying ten marks – 50% questions from Research Methodology and 50% from the Biochemistry subject.
5. Duration of entrance test: **3 hours.**
6. Date of entrance test**: 11-12-2018 (Tuesday), 1.00 to 4.00 pm**
7. Venue of entrance test**: Dept. of Biochemistry, Kuvempu University, Shankaraghatta**

## B. SYLLABUS

### PART- I: BIOCHEMISTRY

**Organization of life:** Importance of water. Cell structure and organelles.

**Structure and function of biomolecules:** Amino acids, Carbohydrates, Lipids, Proteins and Nucleic acids.

**Bio-analytical techniques:** Biochemical separation techniques and characterization: ion exchange, size exclusion and affinity chromatography, electrophoresis, UV-visible, fluorescence and Mass spectrometry.

**Protein structure, folding and function:** Myoglobin, Hemoglobin, Lysozyme, Ribonuclease A, Carboxypeptidase and Chymotrypsin.

**Enzyme kinetics:** including its regulation and inhibition, Vitamins and Coenzymes.

**Metabolism and bioenergetics:** Generation and utilization of ATP. Metabolic pathways and their regulation: glycolysis, TCA cycle, pentose phosphate pathway, oxidative phosphorylation,

gluconeogenesis, glycogen and fatty acid metabolism. Metabolism of Nitrogen containing compounds: nitrogen fixation, amino acids and nucleotides. Photosynthesis: the Calvin cycle.

**Biological membranes:** Transport across membranes. Signal transduction; hormones and neurotransmitters.

**Molecular Biology:** DNA replication, transcription and translation. Biochemical regulation of gene expression. Recombinant DNA technology and applications: PCR, site directed mutagenesis and DNAmicroarray.

**Immune system:** Active and passive immunity. Complement system. Antibody structure, function and diversity. Cells of the immune system: T, B and macrophages. T and B cell activation. Major histocompatibilty complex. T cell receptor. Immunological techniques: Immunodiffusion, immunoelectrophoresis, RIA and ELISA.

## PART- II: RESEARCH METHODOLOGY

**Introduction**: Scope and significance of research methodology, types of research, Academic, Industrial, clinical, social sciences. Basic research, applied research,

**Review of literature**, identifying the gaps and formulating the hypothesis. Selecting research topics

**Research material**: Use of literature and literature sources. Design of experiments, Factorial experiments, randomization, interaction among factors, Types of studies - Cohort studies, double blind, placebo control, cross over and double dummy, Overview of some studies (e.g., UKPDS, CUPS, Farmington). Clinical studies, Toxicity studies, Good Laboratory practices, Handling of Rodents and non rodents in laboratory experiments, Safe disposal of used and rejected samples and materials. 12Hrs.

**Collection of data**: Relevance of sample size. Sources, methods-questionairs, records, archives, scaling-Likert and Gutman. Validation and standardization of the methods, modification and experimental design. Collection, analysis, statistical inference, presentation of the data. 12 hrs

**Clinical Research:** Introduction to Good Clinical Practices, Clinical Trial Development: Protocol Design and Development; Case Report Form Design and Development; Principals of Data Management; Clinical Trial Management: Maintaining and Managing Essential Documents; Recording and Reporting Non-Serious and Serious Adverse Events.