KUVEMPU UNIVERSITY
Department of Studies & Research in Biotechnology & Bioinformatics

Dr. Santosh Kumar.H.S
Chairman

Jnanasahyadri
SHANKARAGHATTA – 577 451
Shivamogga Dist. Karnataka. INDIA

Date: 05-09-2024.

Ph.D Entrance Examination in Biotechnology, September- 2024

The Ph.D entrance examination for the candidates who have applied for Ph.D in Biotechnology/Bioinformatics of this University in response to the Notification has been scheduled on **Friday** the **20th-September-2024.** You are requested to go through the following Regulations of Kuvempu University;

1. *The entrance examination will be held in the **Department of Biotechnology and Bioinformatics, Kuvempu University,** Jnanasahyadri campus**,** Shankaraghatta, Shivamogga Dist. on **20.09.2024**.*

2. *The examination will commence at **10.30 AM**.*

3. *The entrance test shall be conducted by the Department as per the following norms.*

4. *Duration of entrance test: **3.00 hrs.***

5. *The candidates should report at **10.00 AM on 20-09-2024** along with **2 stamp sized photograph**. The **Admission Ticket** will be issued before the commencement of examination on the same day.*

6. ***No TA/DA or accommodation** will be provided by the University for attending the entrance examination.*

7. *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.*

8. *A copy of the Ph.D entrance syllabus along with the model question paper is enclosed.*

-sd-
Chairman

KUVEMPU UNIVERSITY
Department of Studies & Research in Biotechnology & Bioinformatics
Ph. D Entrance Examination Syllabus.
(December 2018)
Subject: BIOTECHNOLOGY

Unit 1: Biochemistry, Cellular Metabolism and Enzymology:

Biochemistry: Structure and classification of biomolecules- carbohydrates, lipids, nucleic acids and amino acids. Structural hierarchy of proteins and evolutionary strategies. Biomolecules in health and disease.*Cellular Metabolism:* Anabolic and catabolic pathways of carbohydrates, lipids, amino acids and nucleic acids, Regulatory strategies and integration of metabolism. *Enzymology:* Michaelis–Menten and Lineweaver-Burk equations. Active and regulatory sites, Factors influencing catalysis reactions. Types of enzyme inhibition, Theories of Allosteric regulation. Coenzymes, Isoenzymes, Multienzyme complexes, Industrial and Clinical application of enzymes.

Unit 2: Molecular Biology, Microbiology and Immunology:

Molecular Biology: Cell cycle and check points, cell signaling for cell proliferation and cell death. DNA Replication-Steps, Mechanism and enzymes. DNA Repair mechanisms. Transcription–RNA Polymerase, Transcription factors, Regulatory sequences, Posttranscriptional modifications. Translation: Genetic code, RNA-Types, Ribosomes, Prokaryotic and eukaryotic translation factors, Protein synthesis mechanism. Post-translational modifications. Gene Regulation: In prokaryotes – *lac* Operon, *trp* Operon and *gal* Operon models. Gene regulation in eukaryotes. *Microbiology:* Soil Microbiology, Food microbiology, Biofertilizers and Dairy microbiology. Bacterial diseases, Fungal diseases and Viral diseases. *Immunology:* Antibodies/Immunoglobulins, Complement pathways, Hypersensitivity, Tumor Immunology, Genetic basis of antibody diversity, MHC pathway.

Unit 3: Plant Biotechnology and Animal Biotechnology

*Plant Biotechnology***:** Introduction and scope, culture media, Organ culture – types, method and applications; Organogenesis – direct and indirect, Somatic embryogenesis; Androgenesis, significance of homozygous diploids; Protoplast culture and its applications. Cell suspension culture and secondary metabolite production *in vitro;* Secondary Metabolites: classification, isolation, characterization and pharmacological evaluation. Abiotic and biotic methods of gene transformation; Transgenic plants- Golden Rice, Saline Rice, BT Cotton and BT brinjal. Germplasm conservation- *Ex situ*&*in situ*. Cyto-differentiation, Transposons, Plant genome project. *Animal Biotechnology* - Culture media – Types and Composition, Biology of *in vitro* cells, Cell separation methods; Scaling-up methods – Physico-chemical parameters, Bioreactors – types, design and applications. Stem cells – Characteristics, Types and Applications; Cell Transformation- characteristics and alterations. Organ Culture – Methods and applications; Assisted Reproductive Techniques, Transgenic Animals- Methods, Types and Applications. Animal Cloning- Technique and Applications.

Unit 4: Genetic Engineering, Industrial and Environmental Biotechnology:

Genetic Engineering: Introduction, Molecular tools; Cloning vectors, types of promoters, Molecular cloning methods, screening of r-DNA, DNA/RNA probes, DNA libraries, Polymerase Chain Reaction, Blotting techniques, DNA markers-RAPD, RFLP, AFLP and SNP, DNA fingerprinting and DNA sequencing. Marker assisted breeding, reverse transcription, cDNA library construction, *Industrial Biotechnology:*Isolation, screening and development of industrially important microbes; Types of media; Methods of media preparation and sterilization; Inoculum production, pitching; Bioreactor- Types and applications; Down streaming. *Environmental Biotechnology:*Environmental pollution and monitoring; Bioremediation- Types and importance, Bioventing and Biomineralization. Bioleaching of metals; Biodegradable plastics; *IPR*: TRIPs and its provisions; Benefits of IPRs; Indian Legislations; Fundamentals of Patents, Copyrights, Geographical indications, Trade secrets and Traditional knowledge, Trademarks. *Bioethics* - International codes and Declarations, Biotechnology and Society – Social, Legal, Economic and Ethical issues. GMOs. Biopiracy, Human genome project.

Unit 5: Research Methodology:

Foundations of research: Definition, importance and types; Theoretical, empirical, nomothetic, idiographic and probabilistic. Research philosophy. *Analytical Methods and their Applications* – Separation methods - Principle, applications and types of electrophoresis, chromatography and centrifugation. Screening methods – Principle, applications and types of Staining, Microscopy and Spectrophotometry. Sterilization – Types, Methods and applications. *Biostatistics & Bioinformatics:* Measures of Central tendency, Measures of Dispersion, Probability Distribution, Hypothesis testing- t-test, Chi square and F- test, Correlation and Regression, Experimental Designs: Random Block Design, Latin Square Design and ANOVA. Statistical software – SPSS. Classification of Biological databases, Biological Sequence Retrieval systems, Pair wise alignment, BLAST and FASTA, multiple sequence alignment and applications, Protein structure prediction methods, prediction of transmembrane regions, Protein modeling: homology modeling, model refinement, evaluation of the model. Molecular dynamics, simulation methods, drug designing and molecular docking and evaluation.

* * * * *

MODEL QUESTION PAPER

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

Ph. D Entrance Test, September 2024
Subject: BIOTECHNOLOGY

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.

    .

    .

    .

    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.   ---------------------------

                OR

    IV.   ---------------------------

                OR

    V.   ---------------------------

                OR

    VI.   ---------------------------

                OR

        ----

* * * * *