



CENTRAL UNIVERSITY OF HIMACHAL PRADESH

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Syllabus for PhD admission Test in the Dept of Chemistry and Chemical Sciences

Bioresources and Environmental Biotechnology

Bioresources- importance of bacteria, fungi as bioresources; their beneficial effect and mechanism of action; Introduction to Environmental biotechnology- definition, scope; role of biotechnology in development and sustainability;

Bioremediation: Environmental Xenobiotics and human health; principles of bioremediation; TOL plasmid pathway; aerobic and anaerobic microbial degradation processes; degradation of benzene, toluene, xylene, biphenyl, and degradation pathways. Bioremediation of low and high molecular weight PAH (naphthalene, phenanthrene, pyrene, fluoranthene, anthracene, benzo (a) pyrene) with detail discussion of enzymatic degradation pathway. Analysis technique and experimental procedure. Bioremediation of organophosphorus pesticides including biodegradation and biosorption techniques. Mechanism of remediation techniques and analytical procedure.

Recombinant DNA technology: Early discoveries, restriction endonucleases, ligases, modification enzymes, DNA and RNA markers, cloning and expression vectors (plasmids, bacteriophage, phagmids, cosmids, artificial chromosomes), selection of recombinant clones, CDNA synthesis and cloning (mRNA enrichment, reverse transcription, DNA primers, linkers, adaptors and their chemical synthesis, library construction and screening).

Genetic engineering: Release of genetically engineered microorganisms, genetically modify corps-safety and environmental risks.

Analytical Techniques

Introduction to Chromatography: Basic principle of Analytical techniques. Different types of Chromatography techniques and their applications. Thin layer Chromatography – Basic principle, methodology, application.

High Performance Liquid Chromatography: Basic Principle, Methodology, Application. Discussion with examples based on published research papers.

Gas Chromatography: Basic Principle, Methodology, Application. Discussion with examples based on published research papers.

Liquid and Gas Chromatography-Mass spectrometry: Basic Principle, Methodology, Application. Discussion with examples based on published research papers.