GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : V

ENVIRONMENTAL SCIENCE AND ENGINEERING

Subject Name: Biodegradation and Bioremediation
Subject Code:153701

Teaching Scheme				Evaluation Scheme			
Theory	**Tutorial**	**Practical**	**Total**	**University Exam(E)**	**University Exam(P)**	**Mid Sem Exam(Theory) (M)**	**Practical (Internal)**
3	2	0	5	70	0	30	50

Sr No	Course Contents
1	**Environmental Biotechnology:** An overview, concept, scope and market Biological control of air pollution. Bacterial examination of water for portability. Testing of water for physiochemical parameters including BOD & COD.
2	**Biotechnology and Waste water:** Origin, composition and treatment. Physical, chemical and biological treatment of waste water. Aerobic processes: activated sludge, oxidation ponds, trickling filter towers, and rotating discs. Anaerobic processes: anaerobic digesstors, anaerobic filters and up flow sludge blanket reactors. Microbiology and biochemistry of aerobic and anaerobic waste water treatment processes. Treatment of industrial effluents: distillery effluent, paper and pulp mill effluent, tannary effluent, textile dye effluent, removal of heavy metals from waste waters.
3	**Bioremediation:** Introduction, Bioremediation, Constraints, advantages and applications, Types of bioremediation (definition)- Natural (attenuation) and engineered, ex-situ and in-situ, Bioaugmentation and biostimulation, solid phase and slurry phase bioremediation, Oxygen delivery for Bioremediation. Bioremediation of fuel oils and lubricants in soil and water. Degradation of sulphur compounds present in coal and petroleum. Microbial degradation of xanobiotics, genetic engineering of biodegradation pathways.
4	**Biodegradation** Biodegradation, Acclimation, detoxification activation, bio-availability, effect of chemical structure on biodegradation, recalcitrance, predicting products of biodegradation, cometabolism and biotransformation. Factors affecting biodegradation.

TEXT BOOKS:

1. Introduction to Biodeterioration. D. Allsopp and K.J. Seal, ELBS/Edward Arnold.
2. Environmental Biotechnology. Agarwal S. K. (1998), APH Publishing Corporation, New Delhi.
3. Bioremediation Protocols. David S. (1997), Humana Press, New Jersey.
4. Environmental Science and Technology. Stankey E.M. (1997), Lewis Publishers, New York.
5. Microbial Biotechnology. Glazer and Nikaido (1998), WH Freeman & Company, New York.
6. Biodegradation and Bioremediation : Soil Biology. Singh A. and Ward O.P. (2004), Springer