COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ENVIRONMENTAL CHEMISTRY	CE-107	**Min "D"**	**Min "D"**	**5.0**

ENVIRONMENTAL CHEMISTRY

UNIT – I Basic Concepts from General Chemistry :
Chemical equations, weight relationship, oxidation-reduction equations, gas laws, equilibrium and Le-Chateliers principle, activity and coefficients, ionization, solubility product.

UNIT – II Basic Concepts from physical Chemistry :
Thermodynamics, vapour pressure, surface tension, solutions of solids in liquids, osmosis, dialysis, principles of solvent extraction electrochemistry, conductivity, current and chemical change, types of electrode, electrochemical cell chemical kinetics. Temperature dependence of reaction rates catalysis.

UNIT – III Basic concepts from equilibrium chemistry :
Ion activity coefficients, solution to equilibrium problems, acids and bases, the pH and P(X) concepts, logarithmic concentration.

UNIT – IV Elementary biochemistry of carbohydrates, proteins, fats and oils :
General biochemical pathways, biochemistry of changes in organic matter taken as food.

UNIT – V Basic Concepts from Nuclear Chemistry
Neutron-proton concept of nuclear structure, isotopes, stable and radioactive nuclides, nature of radiations (alpha, beta, and gamma) energies of radiations, unity of radioactivity, use of radioactive materials as tracer, effect of radiation on man.

UNIT – VI Water & waste water analysis-
Colorimetric measurements of impurities, lamberts law. Beers law, use of colorimeters and spectrophotometer for measurement. Turbidity & its measurement. Theory of Acidity, alkalinity, hardness, chloride, residual chlorine & chlorine demand test. Dissolved oxygen measurement by instrumental method, measurement of Ammonia and Sulphate determination.

References :

1. Chemistry for Environmental Engineering By – Clair N. Sawyer & Perry L. Mccarty. (Tata McGraw-Hill Edition)
2. Environmental Chemistry & Pollution Control By – S.S. Dara (S.Chand & Co.Ltd.)
3. Environmental Chemistry By – Anil Kumar De Wiley eastern Ltd.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	MICROBIOLOGY	CE-108	**Min "D"**	**Min "D"**	**5.0**

MICROBIOLOGY

UNIT – I

The scope of Microbiology, characterization and classification of micro organisms. Characteristic of Bacteria : Anatomy of Bacteria, Cultivation of bacteria, production and growth, pure cultures and growth characteristics ; bacterial metabolism.

UNIT – II

Micro organisms other than bacteria; Fungi, Molds and Yeasts, Algae, protozoa, viruses, general characteristics, virus's infection of plants and animals.

UNIT - III

Control of micro organisms, Micro organisms and diseases pathogens, virulence and infection, Resistance and community, various communicable diseases. Air borne infections of man, Food and water borne infections.

UNIT – IV

Bacteriology of water, indicator organism, presumptive test, confirmed test completed tests, Differentiation of coliform groups of Bacteria, Imvic Test Membrane filter technique, M.F. test for Fecal pollution of water, Bioassay test for acute toxicity.

UNIT – V

Role of micro organisms in wastewater treatment. Aquatic microbiology : Microscopy of water plankton. Phytoplankton Zooplankton indicators of stream pollution. Sampling techniques for microscopic examination of water. Problems caused by Algae control of algae.

References :

1. Introduction to Environmental Microbiology by – Ralph Mitchell
2. Microbiology by Michad J. Pelezar & Roper D.Reid.
3. Environmental Microbiology by – P.D. Sharma (Narosa Publisher House)

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	WATER TREATMENT -I	CE-109	Min "D"	Min "D"	5.0

WATER TREATMENT - I

UNIT – I

Process Dynamics, Mechanics of mass transport, Reactor Engineering process design.

UNIT – II

Water quantity and concepts of beneficial use, water quality criteria and drinking water standards.

UNIT – III : Sedimentation :

Settling velocity of discrete particle, hindered settling of discrete particles, settling of flocculent suspensions, efficiency of an ideal settling basin, size weight composition and removal, reduction in settling efficiency by currents, short circuiting and basin stability, elements of tank design, general dimensions. Inlet and outlet hydraulics, common tank loadings.

UNIT – IV : Coagulation and flocculation :

Objectives, coagulation mechanisms mixing and stirring devices (Gravitational and mechanical) Flocculator loading and performance, up flow classification.

UNIT – V : Filtration :

Granular water filters, granular filtering materials, grain size and size distribution, grain shape and shape variation, preparation of filter sand hydraulics of filtration, hydraulics of stratified, unstratified and fluidized beds. Removal of impurities, kinetics of filtration, hydraulics of back washing of filter.

References :

1. Physiochemical Processes for treatment of Water By – W.J. Weber
2. Environmental Engineering By – H.S. Peary, DR. Rowe & G. Tehobanoglous
3. Manual on water Supply & Treatment CPHEEO, Min of Urban Development, New Delhi.
4. Water Supply & Sewerage By – Ernest W. Steel (Mc-Graw Hill Book Co.)

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	WASTE WATER TREATMENT - I	CE-110	**Min "D"**	**Min "D"**	**5.0**

WASTE WATER TREATMENT - I

UNIT – I

Physical, chemical and Biological Characteristics of sewage.

UNIT – II

Wastewater treatment objectives, classification and application of wastewater treatment methods Elements of plant analysis.

UNIT – III

Physical units operations : Screening, flow equalization, Mixing, flocculation, sedimentation. Chemical Precipitation.

UNIT – IV : Disposal of Sewage :

(A) Land treatment systems – Fundamental consideration. Irrigation systems – Design objectives, site selection, pre-application treatment, loading rates, land requirements. Crop-selection, distribution systems.

Rapid – infiltration systems, over land flow systems, land application of sludge.

(B) Effluent disposal and Reuse : Receiving water standards. Effluent standards, Disposal by dilution. Disposal into lakes. Disposal into rivers, Reoxygenation in rivers. Deoxygenation in rivers. Oxygen sag mode. Disposal into estuaries. Disposal into ocean Direct and indirect reuse of wastewater.

UNIT – V :

Hydraulic design of sanitary and storm sewers

References :

1. Waste Water Engineering Treatment & Reuse by – Metcalf & Eddy (Tata Mc-Graw Hill)
2. Water & Wastewater Technology by – Mark J.Hammer (Prentice – Hall of India)
3. Manual on Sewerage & Sewage Treatment CPHEEO, Min of Urban Dev. New Delhi.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	HYDRO-GEOLOGY	CE-111	**Min "D"**	**Min "D"**	**5.0**

HYDRO-GEOLOGY

UNIT – I

Elements of Geohydrology : Classification of water, composition of water. Hydrological cycle. Natural reservoirs. Occurrence and distribution of ground water, sources of ground water. Geologic Control of Ground Water : Types of openings in rocks, Geologic processes which create and destroy openings in rocks. Pore patterns in alluvial and sedimentary materials. Free and confined water. Principal Hydrological properties of water bearings materials.

UNIT – II

Water table in granular pervious materials - interpretation of water level is shallow wells and Bore holes. Water table, water table maps and their interpretations. Effects of Topography. Grounds water trenches. Ridges and mounds.

UNIT – III

Influent seepage and water spreading. Factors controlling influent seepage. Artificial recharge of ground water reservoirs. Different methods.

UNIT – IV

Confined Water Conditions : Artesian wells : Artesian pressure, cone of pressure relief. Effect of pressure relief on confined and unconfined aquifers. Comparative study of pumping of confined and free ground water.

UNIT – V

Ground water Inventory : Development of Inventory methods. Discussions of different methods Management of ground water resources Budgeting for ground water on a regional basis, case histories. Ground Water Provinces of India : Ground water prospeeting surface and geophysical method. Criteria for location of sites for ground water exploitation in different terrains. Different drilling methods for deep & shallow wells, and their merits and demerits. Development of wells. Design of strainer & testing of yields from wells.

References :

1. Ground Water Hydrology by – David Keith Todd
2. Quantitative Hydrogeology : Ground Water Hydrology for Engineers by De Marsily G. (Academic Press)

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	ADV. ENVIRONMENTAL LAB – I	CE-112L	Min "D"	Min "D"	5.0

ADV. ENVIRONMENTAL LAB – I

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

(Suggested Exercise)

1. Determine the "Optimum Dose of Coagulant" (Alum) by "Jar Test".
2. Determine "percentage Available Chlorine" in a given sample of "bleaching Power."
3. Determine the "Dissolved Oxygen" content in a given sample of water.
4. To obtain "Filter Sand" from a given sample of "Stock Sand".
5. Find out the clay content in a given sample of filter sand.
6. Find out the ignition loss in a given sample of the filter sand.
7. Find out M.P.N. in a given sample of water by :
   (A)Multiple Tube Technique
   (B)Membrane Filter Technique
8. Find out iron content in a given sample of water.
9. Find out fluoride content in a given sample of water.
10. Find out chloride content in a given sample of water.

COURSE CONTENT & GRADE (w.e.f. July 2010)

Branch	Subject Title	Subject Code	Grade for End Sem		CGPA at the end of every even semester
			T	P	
	FIELD TESTING LAB – I	CE-113L	Min "D"	Min "D"	5.0

FIELD TESTING LAB – I

The exercises in this component shall be designed to demonstrate the basic principles outlined in different units of the theory paper. After completing the exercises the student should have developed a good grasp of the practical utilities of the theory content.

(Suggested Exercise)