DIPLOMA IN WATER QUALITY ASSESSMENT

(Non-Semester)

(With effect from the academic year 2013-14)

Eligibility for the Course

Candidates for admission to Diploma in Water Quality Assessment could posses a A pass in Higher Secondary level with Biology/ Physics/ Chemistry/Biochemistry/Microbiology

Duration of the Course

One year Diploma in Diploma in Water Quality Assessment course non-semester for One Year duration

Examination

All the theory paper are of 3hours duration each for maximum of 100 marks with passing minimum of 35 marks Practical examinations are also for 3 hours duration for a maximum of 100 marks and passing minimum of 35 marks.

Question Paper Pattern

Maximum marks: 100 Time: 3 hours

Part A (5 x 3 = 15)

Five short answer questions (One question from each unit)

Part B (5 x 8 = 40)

Paragraph questions (Total questions 8, out of which answers are to be given for any five questions;

Part C (3x 15 = 45)

Total questions 5, out of which answers are to be given for any Three questions;

S.No	Theory & Practicals	Maximum Marks	Minimum Marks
1.	Introduction to Water Quality Parameters	100	35
2.	Water Pollution and Management	100	35
3.	Water Analysis	100	35
P1	Practical Analytical Methods	100	35

Paper I: Introduction to Water Quality Parameter

Unit: 1 Introduction to Hydrology

World water resource; water resources of India - Different ecosystem of Hydrology- Riverine, Estuarine and marine - Status of water quality in India.

Unit: 2 Water Quality

Water quality parameters and their interaction- physical and chemical characteristics - turbidity, color – temperature - chemical constituents, taste, color, acidity, alkalinity - Co2, hardness, pH – Methods of testing.

Unit: 3 Fresh Water Ecosystem

Characteristic of Fresh water ecosystem- Chemistry of lakes, rivers, ponds and streams- Biological methods of Zonation- Microbial load and Aquatic biota- complete analysis- Approaches- Water cycle.

Unit: 4 Marine Water Ecosystem

Characteristic of Marine water ecosystem- Chemistry of lagoons, estuaries and oceans- Zonation in marine ecosystem - marine biota- Types and methods of analysis.

Unit: 5 Hydrological Cycle

The hydrological cycle, Precipitation- causes, variation and measurement - Infiltration and soil water processes- factors affecting its movement through soils and estimation of infiltration rates- Evapotranspiration- evaporation process - evapotranspiration from soil and plants- measurement of evaporation and evapotranspiration - estimating of evaporation and evapotranspiration.

Reference :

1. Hydrology – Principles, analysis and Design- H.M Ragunath, New age International Publications.(1996)
2. Ocean Management, Rakesh Kapoor- Book Enclave(2009)
3. Marine Environment – Ravi Mishra, Anumol Publications(2002)

Paper II: Water Pollution and Management

Unit: 1

Environmental pollution - Definition-Types – Water pollution- Causes- Industrial and Domestic effluents –Pesticides –Health Hazards- Control measures- Abatement.

Unit: 2

Municipal and sewage and Waste Industrial effluent - Primary treatment- Screening, equalization, coagulation, etc. Secondary treatment- Trickling Filter, Activated sludge process-Aerobic and Anaerobic treatment, Sludge treatment and Disposal-Tertiary Treatment – Evaporation, Reverse Osmosis, Dialysis, Ion Exchange, Biofilter, Adsorption and Absorption.

Unit: 3

Treatment Method- Waste Water composition – Characteristics: COD, BOD, Turbidity, Microbial contamination. Physical Unit Operation, Chemical precipitation and Biological Treatment- Physical unit operation- Screening , Grit and Detritus removal, Solid Removal through sedimentation- aerobic and anaerobic ponds- low cost treatment ponds.-Fish Culture – Composite fish culture- stocking density, growth, harvesting.

Unit: 4

Bioremediation technique- Soil and ground water remediation, Site characterization, containment, removal and treatment- Factors influencing bioremediation and optimization of remediation- Biomethanation: Feed stocks -composition - factors influencing gas production , biogas application design consideration.

Unit: 5

Agencies of water quality testing- TWAD – Pollution Control Boards (State and Central) – Duties and Responsibilities – Soil Testing Labs- Environmental Law: Concepts

Reference:

1. Low cost waste water treatment technologies-R.K Trivedy and Siddharth Kaul
2. Pollution and Bioremediation- P.C Trivedi
3. An Introduction to Environmental pollution- B.K.Sharma and H.Kaur

Paper III: Water Analysis

Unit: 1

Water Composition analysis- Composition- Hardness testing- Chromatographic analysis- pH – Salinity testing- Ionic composition – Minerals- Pollutants – DO_2, BOC, COD, EC, DTC – Nutrient Parameters – Portability of Water.

Unit: 2 Usage of Toxicity Testing

Forensic chemical toxicology – Dose and toxicity- Toxicity of metabolite- Sampling and Testing of toxins- Detection and Classification- Invitro Toxicology – Methods and Assays used in invitro toxicology- Global classifications of toxicity- Health Hazards – Acute Toxicity- Environmental Hazards- Factors influencing Toxicity – Toxicogenomics

Unit: 3 Microbial testing

Microbiological testing- Coli forms- Culture Identification- MPN test- Microscopy: Principles and Practices- Staining Methods- Water borne pathogen: Types and Detection

Unit: 4 Heavy Metal Testing

Types of Heavy metals- Toxicity testing- Biological methods-Chemical Methods- Microscopical methods- AAS- Spectrophotometer- CPES-Flame Photometer- Hydrocarbon testing(PAH)

Unit: 5 Toxicity Testing

framework of environmental toxicity-toxicity testing – dose response curve, standard methods, classification of toxicity tests-design parameters for single -species toxicity tests, overview of available statistical methods for the evaluation of single- species toxicity tests-the design of Multi - species toxicity tests, review of typical toxicity test methods.

Reference

1. Chemical Toxicology – Zulfikar S Patel, Dominant Publishers and Distributors (2011)
2. Principles and Practice of Analytical Chemistry- Fifield and Kealey, Blackwell publishers (2000)
3. Introduction to environmental toxicology – Impacts of Chemicals upon Ecological Systems, W.G Landis and Ming – Ming – Ho Yu, (2003). Lewis Publishers, Boca Raton.

Paper IV: Practical Analytical Methods

1. Testing of Hardness
2. Testing of pH
3. Testing of BOD and COD
4. Testing of Heavy Metals
5. Microbiological Analysis
6. MPN analysis
7. Serial Dilution Method
8. Chromatographic analysis of water