



MIZORAM STATE POLLUTION CONTROL BOARD

SYLLABUS FOR WRITTEN EXAMINATION FOR THE POSTS OF AEE AND TA

UNDER MPCB TO BE HELD ON 21st JANUARY 2023

A. Paper 1 (2 hours)

- i) General English - 25 marks
- ii) General Knowledge - 25 marks
- iii) Aptitude Test - 25 marks
- iv) Basic Computer knowledge - 25marks

Total - 100 marks

Questions will be of Multiple Choice Questions(MCQ) carrying 1 mark each

B. Paper 2 (2 hours)

- i) Multiple choice questions - (15x1 mark) = 15 marks
- ii) Very short answer questions - (10x2 marks) = 20 marks
- iii) Short answer questions - (4x5 marks) = 20 marks
- iv) Long answer questions - (3x15 marks) = 45 marks

Total = 100 marks

Detailed Syllabus for Paper 2:

1. Assistant Environmental Engineer (AEE)

Environmental Hydrology

Hydrologic cycle, Measurement of precipitation, Rainfall variability, Disposal of rainfall on watershed. Evaporation and Infiltration.

Surface Runoff: Hydrologic losses and Rainfall Excess, Rainfall Runoff analysis using Unit Hydrograph approach, Soil Conservation Systems (SCS) Curve number method of estimation, urban hydrology.

Groundwater: Sources and Quality, Occurrence of water in the aquifers, Groundwater Flow, Equilibrium and Non-Equilibrium analysis of wells, Interference of Wells, Groundwater Contamination, Recharge and Recovery of aquifer, Well construction and Well maintenance.

Self purification of surface water bodies – Dilution, Sedimentation and Resuspension, Filtration, Gas transfer, Heat Transfer. Dissolved Oxygen Sag Curve – Streeter Phelp's Equation.

Environmental Quality monitoring

General principles for collection of representative sample, frequency of sampling, validation, interpretation and analysis of data, various statistical techniques, quality control, assessment and management, Water quality standards. Gravimetric methods for water and wastewater, determination of various physicochemical parameters, working principles of electrodes, different types of electrodes. Biochemical oxygen demand (BOD), MPN test for microbial pollution, plate counts; confirmatory tests for various microbiological agents. Principles, techniques and

applications of spectrophotometry, fluorimetry, nephelometry and turbidimetry, Atomic Absorption Spectrometry, Atomic Emission Spectrometry, Inducted Coupled Plasma (ICP) – TOC Analyzer.

Drinking Water Treatment Systems

Quantity of Water and Sewage: Rate of demand, variation in demand, Estimation and forecasting of population. Sources of sewage, fluctuation in sewage flow.

Unit Operation and Processes in surface and sub-surface water treatment. Principles, functions and design of Aeration unit, Flash Mixers, Flocculators, Sedimentation tanks, Sand filter and Disinfection processes. Removal of Iron and Manganese, De-flouridation, Water Softening. Layout of drinking water treatment plant.

Waste Water Treatment Systems

Layout of wastewater treatment plant. Primary Treatment: Principles, functions and design of Screen, Grit Chamber, Primary Sedimentation tank.

Secondary Treatment: Design, functions and operation of Activated Sludge Processes (ASP), Processes variation and design consideration in ASP. Other Treatment method: Trickling Filters, Rotating biological contactor, Stabilization ponds, Sequencing bioreactor (SBR), membrane bio-reactor (MBR), Septic tanks, Sludge treatment - thickening–stabilization–conditioning–dewatering–oxidation- incineration-ultimate disposal and utilization of Solids.

Solid Waste Management

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization; Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects; Public awareness; Role of NGOs; Legislation.

Solid waste processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis, E-waste, Hazardous waste and Biomedical waste overview - options under Indian conditions. Dumping of solid waste; sanitary landfills – site selection, design and operation of sanitary landfills – Leachate collection & treatment

Air and Noise Pollution

Air pollutants, Sources, classification, Combustion Processes and pollutant emission, Effects on Health, vegetation, materials and atmosphere, Reactions of pollutants in the atmosphere and their effects, Smoke, smog and ozone layer disturbance, Greenhouse effect. Air sampling and pollution measurement methods, principles and instruments, ambient air quality and emission standards, Air pollution indices, Air Act.

Control principles, Removal of gaseous pollutants by adsorption, absorption, reaction and other methods. Particulate emission control, settling chambers, cyclone separation, Wet collectors, fabric filters, electrostatic precipitators and other methods

Noise pollution: Basics of acoustics and specification of sound; sound power, sound intensity and sound pressure levels; plane, point and line sources, multiple sources; outdoor and indoor noise propagation; psychoacoustics and noise criteria, effects of noise on health, Noise indices, Noise control methods.

Environmental Impact Assessment

Basic Concepts of Environmental Impact Assessment: Description of the project and the environmental setting-identification of impacts- measurement and monitoring. Environmental Impact Assessment Methodologies: Checklists- matrices- networks and overlays

Prediction and Assessment of Impact on the physical environment- on the resources- and on the socio-economic-Environmental cost benefit analysis Sustainable development. Life Cycle Assessment -Environmental Risk Analysis.

EIA related to the following sectors - Infrastructure - construction and housing Mining – Industrial - Thermal Power-River valley and Hydroelectric Acts: Water act- Water Cess act- Air act- Environment Protection act and their amendments.

2. TECHNICAL ASSISTANT (TA)

Environment and Natural resources

Natural Resources - forest resources - use, exploitation, deforestation, effect on forests. Water resources - use of surface and subsurface water; effect of floods, drought, water conflicts. Food resources and security. Energy resources - need to develop renewable energy, land resources - Land degradation, soil erosion, desertification & case studies.

Environmental pollution and control

Sources and types of air pollution; Effects of air pollutants on the environment and human health; Control measures of air pollution; Air pollution sampling and monitoring; Air quality standards (NAAQS); Sources and types of water pollution; Surface and groundwater pollution; Impact of water pollution on humans, animals and vegetation; Problems of pesticides and chemical fertilizers; Measurement of water quality parameters; Standards for drinking water; Sources of noise pollution; intensity of noise and its measurements; hazardous effect of noise pollution; abatement measures of noise pollution; Radioactive pollution- sources of exposure to radiation; Effects of radioactive pollution; Management of radioactive waste. Biotechnological approach of environmental pollution abatement.

Solid and Hazardous waste management

Types and sources of solid waste; Solid waste characteristics, generation rates, solid waste components, Elements of solid waste management- Solid waste collection and transportation, recycling, electrical energy generation from solid waste, composting and vermicomposting, disposal, incineration; Current management practices; Integrated waste management; Concept of hazardous and biomedical waste; Treatment methods of hazardous waste.

Water Supply and Treatment Systems

Quantity of Water and Sewage: Rate of demand, variation in demand, Estimation and forecasting of population. Sources of sewage, fluctuation in sewage flow.

Unit Operation and Processes of water treatment. Principles, functions of Aeration unit, Flash Mixers, Flocculators, Sedimentation tanks, Sand filter and Disinfection processes.

Waste Water Treatment Systems

Layout of wastewater treatment plant. Primary Treatment: Principles, functions Screen, Grit Chamber, Primary Sedimentation tank. Secondary Treatment: functions and operation of Activated Sludge Processes (ASP)

Other Treatment method: Trickling Filters, Rotating biological contactor, Stabilization ponds, Sequencing bioreactor (SBR), membrane bio-reactor (MBR), Septic tanks etc. Sludge treatment and disposal.