# ANDHRA PRADESH PUBLIC SERVICE COMMISSION: HYDERABAD NOTIFICATOIN NO.10/2016, Dt.30/09/2016

## ASSISTANT ENGINEERS (ENVIRONMENTAL) IN PUBLIC HEALTH & MUNICIPAL ENGINEERING DEPARTMENT (GENERAL RECRUITMENT)

#### **EDUCATIONAL QUALIFICATIONS:**

Applicant must possess the qualifications as detailed below or equivalent thereto, as per the specifications in the relevant service rules and as per the indent received from the Department as on the date of notification.

SI. No	Name of the Post	Educational Qualifications		
01	Assistant Engineer (Env) in PH & ME Dept.,	A four year Degree in B.E./B.Tech in Environmental Engineering (or) B.E. /B.Tech/AMIE (Civil) from any University established by an Act of Government of India or State Act and recognized by the UGC and approved by AICTE. NOTE: Degree obtained through distance mode is not considered as eligible qualification unless it is recognized by UGC and approved by AICTE.		

## SCHEME AND SYLLABUS FOR THE POSTS OF ASSISTANT ENGINEER (ENVIRONMENTAL) IN A.P. PUBLIC HEALTH & MUNICIPAL ENGINEERING DEPARTMENT

#### **SCHEME**

## **CBT (OBJECTIVE TYPE) EXAMINATION**

PAPER-1 General Studies & mental Ability	150 Marks	150 Questions	150 Minutes
<b>PAPER-2</b> Subject:- Environmental Engineering / Civil Engineering (Degree Standard)	150 Marks	150 Questions	150 Minutes
TOTAL	300 Marks		

# SYLLABUS OF MAIN EXAMINATION FOR THE POSTS OF ASSISTANT ENGINEER (ENVIRONMENTAL) IN A.P. PUBLIC HEALTH & MUNICIPAL ENGINEERING DEPARTMENT

# <u>PAPER -I</u> GENERAL STUDIES & MENTAL ABILITY

- 1. Events of national and international importance.
- 2. Current affairs- international, national and regional.
- 3. Basics of General Science and their relevance to the day to day life. Current developments in science, technology and information technology
- 4. History of Modern India with emphases upon Indian national movement.
- 5. Economic development in India since independence.
- 6. Logical reasoning, analytical ability and data interpretation.
- 7. Basic things about Disaster management (CBSE-VIII & IX Standard).
- 8. Geography of India- with focus on A.P
- 9. Indian Constitution and Polity.
- 10. Sustainable Development and Environmental Protection
- 11. Bifurcation of Andhra Pradesh and its Administrative, Economic, Social, Cultural, Political, and legal implications/problems, including
  - a). Loss of capital city, challenges in building new capital and it's financial implications.
  - b). Division and rebuilding of common Institutions.
  - c). Division of employees, their relocation and nativity issues.
  - d). Effect of bifurcation on commerce and entrepreneurs.
  - e). Implications to financial resources of state government.
  - f). Task of post-bifurcation infrastructure development and opportunities for investments.
  - g).socioeconomic, cultural and demographic impact of bifurcation.

h).Impact of bifurcation on river water sharing and consequential issues.

i). AP REORGANISATION ACT, 2014 on AP and the arbitrariness of certain provisions.

## PAPER-2

#### 1. Water Supply Engineering

Sources of water: surface and sub-surface water, aquifers, yield from wells, Infiltration galleries, types of intakes and design of intakes, collection and conveyance of water; water demand and it's variations, estimation of water demand; quality of water, characteristics, water-borne diseases, water sampling and analysis, water quality standards;

Water Treatment: unit operations and processes for water treatment, sedimentation, coagulation and flocculation, filtration, disinfection, water softening, removal of colour, iron and manganese; aeration, Defluoridation of water, demineralisation of water, R.O. process, principles and design of various water treatment units;

Distribution of treated water, systems of water distribution, layouts of distribution systems, components of distribution systems, valves, analysis and design of the water distribution systems, Storage and distribution reservoirs; leakages and control in water distribution system; Rural water supply;

#### 2.(i) Wastewater Engineering

Systems of sewage collection, conveyance, and disposal; estimation of quantity of sewage and storm water, sewerage systems, sewer appurtenances, material for sewers, laying of sewers, Design of sewers, operation and maintenance of sewerage systems; pumping of sewage; Characteristics of sewage, sampling and analysis of sewage, unit operations and process for wastewater treatment, aerobic, anaerobic, facultative and anoixic processes, principles and design of various wastewater treatment units, principles and design of septic tanks, disposal of septic tank effluent; Common Effluent Treatment Plants, Zero liquid discharge;

Disposal of products of sewage treatment; Sludge handling, treatment and disposal; self purification of streams; Building drainage, Plumbing Systems; Rural and semi-urban sanitation;

Urban storm water management, Impact of storm water, Management of storm water runoff, design of storm water drainage systems;

#### ii) Air and Noise Pollution

Air pollution, classification of air pollutants, sources and effects of air pollution, Factors influencing air pollution, air quality standards; Meteorology and air pollution; Wind roses, lapses rates, mixing depth, plume behaviour, effective stack height; Monitoring of air pollution; air pollution dispersion, estimation of ground level concentration of air pollutants; Engineered systems for air pollution control: control of particulate matter and gaseous pollutants;

Noise pollution, characteristics, sources of noise pollution, measurements of noise, impacts of noise pollution; Noise pollution monitoring, standards; control measures;

#### 3.(i) Solid Waste Management

Sources of solid waste, classification, characteristics, generation, on-site segregation and storage, collection, transfer and transportation of solid waste; principles and engineering systems for solid waste management, treatment and processing of solid waste; landfills and their classification, principles, design and management of landfills; Leachate management, disposal of solid waste;

Hazardous waste characteristics, handling, storage, collection and transportation, treatment and disposal; e-waste: sources, collection, treatment and reuse;

#### ii) Environmental Impact Assessment (EIA) and Sustainable Development

Objectives and concepts of EIA, types of EIAs, components of EIA, framework of EIA, policies and legal provisions of EIA in India; Planning of EIA studies, methodology for identification of impacts on environment; Environmental settings, indices, prediction and assessment of impacts, mitigation aspects; Environmental Impact Statement; Environmental Management Plan, preparation, implementation, and review; public participation in EIA, review and evaluation of EIA; Environmental audit; Environmental protection acts of India.

Ecosystems, classification of ecosystems, structural and functional interactions of environmental ecosystems; Ecosystem stability, biogeochemical cycles, nutrient cycles, ecological niche and ecotone, pesticides and bioaccumulation, water pollution, soil pollution, wetlands, methods for conservation of biodiversity;

Sustainable Development, objectives and principles of sustainable development, indicators of Sustainability; Strategies and barriers to sustainability, clean development mechanism, carbon credit, carbon sequestration, carbon trading, Life Cycle Assessment (LCA), Elements of LCA;

Global environmental issues, climate change and its impact on environment; mitigation of impacts; adaptability and climate resilience; ecological foot print, major environmental problems related to the conventional energy resources

# 4. WATER RESOURCES ENGINEERING

## i) Fluid Mechanics and hydraulic Machines

Physical properties of fluids, fluid statics; fluid flow concepts, Kinematics of flow, continuity, momentum and energy principles and corresponding equations; Flow measurement; dimensional analysis and hydraulic similitude; flow through pipes and open channel hydraulics; Hydraulic jump, Surges and Water hammer;

Basic principles of hydraulic machines, turbines and pumps, types, selection, performance parameters, controls, scaling, pumps in parallel; Hydraulic ram;

## ii) Hydrology

Hydrological cycle, precipitation and its estimation, evaporation and transpiration, runoff estimation; hydrographs;

Floods estimation and routing, flood management; streams and their gauging; capacity of Reservoirs. Watershed management and rainwater harvesting; ground water hydrology: steady state well hydraulics and application of Darcy's law, recuperation test for well yield, ground water management;

## iii) Irrigation

Water resources of the earth, irrigation systems, advantages and disadvantages of irrigation, duty, delta, crop water requirements; Water logging and drainage, Design of canals, head works, canal distribution works, falls, cross-drainage works, canal lining; Sediment transport in canals;

## 5. SURVEYING

Principles of surveying, classification of surveys; Measurement of distances and directions, direct and indirect methods; optical and electronic devices; chain and compass survey; levelling and trigonometric levelling, Contours; Theodolite and tachometric survey; Total station, triangulations and traversing; measurements and adjustment of observations, errors and their adjustments, computation of coordinates; minor instruments; area and volumes; curve setting, horizontal and vertical curves;

Digital elevation modelling concept; basic concepts of remote sensing, GIS and global positioning system;

## 6. SOIL MECHANICS and FOUNDATION ENGINEERING

Physical and index properties of soil, classification and interrelationship; Permeability and seepage, Darcy's law; flow nets, uplift pressure, piping; Compressibility and consolidation; Compaction behaviour, methods of compaction and their choice; Shear strength of soils, stresses and failure, Mohr's circle; Earth pressure theories, stability analysis of slopes, retaining structures, stress distribution in soil; site investigations and sub-surface exploration;

Types of foundations, selection criteria, bearing capacity, effect of water table, settlement, laboratory and field tests; principles and design considerations of shallow and deep foundations; Types of piles, their design and layout, pile load tests, Caissons, Foundations on expansive soils, swelling and its prevention;

# 7. TRANSPORTATION ENGINEERING

Planning and development of highway, classification of roads, highway alignment and geometric design, cross-sectional elements, sight distance, horizontal and vertical alignment, grade separation; Highway materials, their properties and quality tests, construction of earthen, W.B.M., Bitumen and cement concrete roads; bitumen mix design; Maintenance of all types of roads, disposal of muck, highway drainage, Street lighting; design of flexible and rigid pavements using IRC recommendations; Traffic engineering, traffic characteristics, traffic surveys, traffic control devices, intersections, signaling; Mass transit systems, accessibility, traffic control, emergency management.

Airports, layout and orientation, site selection; runway and taxiway design; drainage management; Zoning laws; Helipads, Airport obstructions, Visual aids and air traffic control;

## 8. SOLID MECHANICS and ANALYSIS OF STRUCTURES

#### i) Solid Mechanics

Simple stress and strain relationships, Bending moment flexural and shear stresses in statically determinate beams; Elastic theories of failure; Torsion of circular and rectangular sections and simple members; buckling of column, combined and direct bending stresses.

## ii) Structural Analysis

Analysis of statically determinate and indeterminate structures by force/ energy methods; Method of superposition; Analysis of trusses, arches, beams, cables and frames; Analysis of thin and thick cylinders; Slope deflection, moment distribution, and Stiffness and flexibility methods of structural analysis; Influence lines;

## 9. DESIGN OF STRUCTURES

## i) Reinforced Concrete Structures

Concepts of working stress, limit state and ultimate load design methods; IS code specifications for design of beams, slabs, columns, footings, and walls; design of beams, slabs, columns; Analysis of beam sections at transfer and service loads; Design of wall footings, foundations, retaining walls, and water tanks Principles of prestressed concrete, methods of prestressing; design of simple members; Design of brick masonry

## ii) Steel Structures

Concepts of Working stress and Limit state design methods; Design of tension and compression members, beams, columns and column bases; Connections - simple and eccentric, beam-column connections, plate girders and trusses;

## 10. BUILDING MATERIALS and CONSTRUCTION PRACTICE

Building Materials: composition and properties of timber, bricks, cement, concrete, structural steel, plywood; mix design, short-term and long-term properties of concrete and mortar; Bitumen; Brick masonry, influence of mortar strength on Importance of W/C Ratio, Strength, masonry strength. ingredients including admixtures, workability, testing for strength. elasticity, nondestructive testing, mix design methods in concrete; Green building concepts construction Management: Types of construction projects; Concreting Equipment, Earthwork Equipment, Tendering and construction contracts; Rate analysis and standard specifications; Cost estimation; Project planning and network analysis: PERT and CPM, Resource allocation.

Sd/-SECRETARY