

ASSAM PUBLIC SERVICE COMMISSION

অসম লোকসেৱা আয়োগ

ASSISTANT ENGINEER (CHEMICAL)

SYLLABUS

(Degree Standard)

Syllabus for Screening Test for Recruitment to the Post of Assistant Engineer (Chemical) under Public Health Engineering (PHE) Department of Govt. of Assam. The Educational Qualification is Degree Standard.

General Studies :-

Full Marks :- 100 Marks.

Time : Two Hours

Multiple Choice Objective Type Question

- (i) Current Events of National & International importance.
- (ii) History of India & History of Assam.
- (iii) World Geography including India & Assam.
- (iv) Indian Economy, Indian National Movement.
- (v) Mental Ability.
- (vi) Role and Impact of Science and Technology in India.
- (vii) Indian Polity, Political System in India.
- (viii) Indian Culture.

Chemical Engineering :-

Full Marks :- 100 Marks.

Time : Two Hours

Multiple Choice Objective Type Question

- CEMENT – Types, Portland cement and special types of cement
- PROCESSES AND PROCESS VARIABLES- mass and volume, mole and molecular weight, choosing a basis, flow rate , chemical composition, density and specific gravity, concentration, pressure temperature
- PROPERTIES AND CORROSION OF MATERIAL: Electrical and magnetic properties of materials- Chemical, thermal and technological properties of materials - corrosion, theories of corrosion - control and prevention of corrosion.
- METALS: Engineering materials - ferrous metals - Iron and steel, Iron-carbon equilibrium diagram. Non ferrous metals and alloys - Aluminium, copper, zinc, lead, nickel and their alloys with special reference to the application in chemical industries.
- FLUID FLOW PHENOMENA : Velocity field, laminar flow, velocity gradient and rate of shear, Eddie viscosity, viscosity and momentum flux, shear stress field, Newtonian and non- Newtonian fluids, Bingham model, Ostwald-de Waele model of non-Newtonian fluid, turbulent flow, Reynold's experiments, flow in boundary layer, laminar and turbulent flow in boundary layer, transition from laminar to turbulent flow – Reynold's

number, boundary layer separation and wake formation.

- BASIC EQUATION OF FLUID FLOW :Stream lines and stream tubes, average velocity, mass velocity, integral equation of flow – Euler’s equation of motion, momentum equation for one dimensional flow under steady state condition, the Bernoulli’s equation, its application to pumps, blowers, turbines etc.
- FLOW OF INCOMPRESSIBLE FLUID IN CONDUITS :Flow of incompressible fluids in pipes, boundary layer formation in straight tube, laminar flow of Newtonian fluids, Hagen- Poisseuille equation, laminar flow of non-Newtonian fluids, velocity distribution for turbulent flow, average velocity, relation between maximum and average velocity, application of dimensional analysis to fluid flow problems – friction factor, pipe roughness, loss of head due to friction, bends, fittings etc.
- SEDIMENTATION: Gravitational sedimentation – Fine suspensions – Coarse suspensions – Solids flux in batch sedimentation – The Kynch theory of sedimentation – thickner, Centrifugal separation – behavior of liquids in centrifuge basket – fluid pressure – sedimentation in a centrifugal field – separation of two immiscible liquids – centrifugal equipment.
- FILTRATION: The theory of filtration – relation between thickness of cake and volume of filtrate-flow of liquid through the cloth-flow of filtrate through the cloth and cake combined, compressible filter cakes, Filtration practice-The filter medium- blocking filtration, effect of particle sedimentation on filtration-delayed cake filtration- preliminary treatment of slurries before filtration-washing of filter cake, Filtration equipment, Filtration in a centrifuge, Filtration calculations.
- MIXING AND AGITATION: Agitation of liquids – Purpose of agitation-agitation equipment-Impellers-Flow patterns in agitation vessels-circulation rate- velocity gradients in agitated vessels-power correlations for specific impellers-effect of system geometry-calculation of power consumption.

WATER POLLUTION :

(A)

- (i) Regulations on the discharge of industrial pollutants in water, threshold limits.
- (ii) Types of waste water, sources of pollutants, classification of pollutants.
- (iii) Site selection, sampling, preservation, water quality parameters and significance, monitoring, determination of BOD and COD.
- (iv) Dissolved oxygen balance in water, self purification of a water system (Critical deficit of a runoff).

B. Some fundamental aspects of microbiology as applied to pollution control.

C. Control of Water Pollution :

- Basic approach to solve the problem.
- Primary, secondary and tertiary treatment of waste water, clariflocculation, sludge disposal.
- Treatment of phenolic waste water and also water containing N and P.
- Control of heavy metal ions, As, Hg, Cr.

SOLID WASTE MANAGEMENT : Types of solid wastes, sources and composition,

methods of waste management – sanitary landfill, composting, incineration, pyrolysis, anaerobic digestion, concepts of recycling.

- Design of lagoons, oxidation pond, activated sludge process units, gravity settler, Rotating Biological Cyclone (RBC) separators, anaerobic digester, and stack for emission control.

DESIGN OF PIPE FITTINGS AND JOINTS: Design and schematic of simple bolts and screws. Riveted joints. Design & Draw of shafts and couplings.

DESIGN OF STORAGE TANK: Design and schematic of storage tank, (vertical and horizontal) supports.

HYDROELECTRICITY – its production and future prospects in India.

RESERVOIR CONSIDERATION: Hydrocarbon properties of oil & gas, Characteristics of reservoir rocks, porosity, permeability, resistivity etc, Fluid flow in the reservoir, Reservoir drive mechanism, reservoir homogeneity.

DRILLING TECHNOLOGY: Methods of Drilling, Rotary Drilling rig, Rotary rig circulation system, Basic operation in drilling, the drill stem, Introduction to offshore drilling, types of offshore rigs,

WELL COMPLETION: Casing and Cementation, Well Head, Production Techniques

PROBLEM WELL ANALYSIS: Low reservoir pressure, Low reservoir permeability, plugging, high viscosity oil, Removal of wax deposits etc.



Principal Controller of Examinations,
Assam Public Service Commission,
Jawaharnagar, Khanapara, Guwahati -22.