SCHEME AND SYLLABUS FOR THE POST OF *TECHNICAL ASSISTANTS (GEOPHYSICS)* IN A.P. GROUND WATER SUB-SERVICE

SCHEME

(Degree standard)

PART – A WRITTEN (Objective Type) EXAMINATION				
PAPER-1	General Studies	150 Marks	150 Qns.	150 Minutes
PAPER-2	Geophysics	150 Marks	150 Qns.	150 Minutes
PART – B - INTERVIEW:		30 Marks		

SYLLABUS

PAPER-I: GENERAL STUDIES

General Science

Current Events of National and International Importance.

History of India and Indian National Movement. India and World Geography.

General Mental Ability.

Questions on General Science will cover General appreciation and understanding of science including matters of every day observation and experience, as may be expected of a well educated person who has not made a special study of any particular scientific discipline. In current events, knowledge of significant national and international events will be tested. In History of India, emphasis will be on broad general understanding of the subject in its social, economic and political aspects. Questions on Indian National Movement will relate to the nature and character of the nineteenth century resurgence, growth of Nationalism and attainment of independence. In geography emphasis will be on geography of India. Questions on geography of India will relate to physical, social and economic geography of the country, including the main features of the Indian agricultural and natural resources. On general mental ability, the candidates will be tested on reasoning and analytical abilities.

PAPER-2: GEOPHYSICS

BASICS : Occurrence of water in different forms, water cycle and water balance and factors contributing to the distortion of water balance.

Geo-Hydrology: Concepts of Geo-Hydrology and Hydro-Geology, Ground Water Aquifers – Definition of acquifer, aquiclude, aquited and aquifuge, concepts of confined, unconfined and leaky aquifers – Water bearing properties of aquifers – Storage properties – Definition of porosity, specific yield, specific retention factors influencing porosity of rocks – Determining porosity of rocks in field and in laboratory. Definition of permeability, transmissivity and storage coefficients – Ground Water Movement - Darcy's Law, distribution and concurrence of ground water. Dependency of ground water quality and yield on the recharge, Lithology and structural features. Ground water in hard rock, soft rock and coastal aquifers – Application of geological, geochemical and remote sensing methods in ground water exploration.

PRINCIPLES OF GEOPHYSICAL PROSPECTING OF GROUND WATER: Physical properties of rocks and ground water – Electrical resistivity, polarisability, dielectric permeability, thermal conductivity, density, magnetic susceptibility, elastic modulus and wave velocities in different media. Effect of porosity, mineral composition grain size, packing, temperature and pressure conditions water content, salinity etc., of the rocks and saturating fluids on the physical properties of rocks and Electrical resistivity method as employed in ground water problems. Various electrode configurations their applications and merits and demerits – VES and profiling methods – Interpretation – Tracing leteral and vertical boundaries of strata. Determining hydro geological properties of strata from electrical resistivity method – Principles and application of S.P., I.P. and E M methods in solving ground water problems especially in tracing the fracture and joint pattern of rocks.

Electromagnetic frequency sounding and applications – Seismic prospecting methods – Reflection and Refraction and Interpretation of seismic data in ground water problems – Gravity and magnetic methods – their role in ground water exploration, Geothermal methods – principle and application in solving ground water problems – Remote sensing and Airborne geophysical methods for assessing ground water potentialities on regional basis.

GEOPHYSICAL WELL – LOGGING METHODS: Consideration and specification for solving ground water problems. Principles and role of resistivity, S.P. Nuclear and thermal logging methods. Sonic, density and magnetic susceptibility logging for determining formation characters – Geophysical methods in estimating aquifer and reservoir conditions.

APPLICATION OF GEOPHYSICAL METHODS FOR SOLVING HYDROGEOLOGICAL PROBLEMS IN :

(i) Soft Rock areas – Sedimentary and alluvial
(ii) Hard Rock Areas – Granites, metamorphics etc
(iii) Karst areas
(iv) Coastal areas – Salt water intrusion in fresh water aquifers and their boundary determination
(v) Prediction of hydraulic properties of granular aquifers
(vi) Tracing buried river valleys
(vii) Ground Water reservoir studies
(viii) Studying valley fill areas.

HYDRODYNAMIC INVESTIGATIONS OF AQUIFERS AND WELLS: Hydro geological parameters of aquifers. Systematic pumping tests in steady and unsteady state conditions and methods of Theis and Jacob and Theis recovery method.

FORMATION DRILLING AND WELL CONSTRUCTION: Types of wells – Dug, Dug-cum-bore, shallow bore-wells, Tube Wells and Redial wells, Infiltration Galleries. Their advantages and disadvantages for discharging ground water, Methods of drilling and Percussion and Rotary – their advantages and disadvantages. Well construction-well design, well casing, Grouting and installation of well screens. Development of wells, surging, compressed air, high velocity setting, back washing, Over pumping, well efficiency and maintenance – causes of failure of wells and remedial measures pumps – shallow and deep well, hand pumps, vertical turbine pumps, submersible pumps, centrifugal pumps, jet pumps.

ANALYTICAL STUDY OF GEO-HYDROLOGICAL DATA: Flow nests – Graphical construction, analog simulation, numerical simulation, saturated and unsaturated flow nest and well hydrographs and their analysis. Ground water modeling scope and utility. Types of models – Physical, analog, digital and hybrid models. Advantages and disadvantages; determining norms for safe yield in a basin by various methods. Ground water investigation in environmental and eco-balance studies.

1. Concept of programming languages Computer operating system like MS Dos, MS Windows, Unix.
2. Interpretation of Geophysical data by using computer techniques.
3. Artificial recharge Methods, conservation.
4. Ground Water Management, Ground Water Budget.
5. Ground Water pollution, landfills, waste disposal, Mining, water logging, reclamation – case studies.
6. Geographic Information system related to Ground water.

Sd/- Secretary
01/07/2008