

19

REVISED SYLLABUS 2022

DEPARTMENTAL PROMOTION EXAMINATION FROM RESEARCH OFFICER TO SENIOR RESEARCH OFFICER (GWH / SWH / WATER CHEMIST / HYDRAULICS)

PAPER-I CURRENT AFFAIRS & RULES & REGULATIONS **100 marks**
(Note: Passing in each part is mandatory to clear paper-1) (Pass marks 47)

Part-I Current Affairs **33 marks**
(Pass marks 40%)

Current Affairs paper will be set from leading issues published in the newspaper for the last 3 months. The following books may be consulted.

- Monthly Current Affairs Digest by Tariq Mahmood Dogar
- Monthly Current Affairs Digest by Dr. Safdar Mahmood
- Any other Current Affairs Digest

Part-II Rules and Regulations (Books allowed) **67 marks**
(Pass marks 50%)

- The Pakistan WAPDA Employees (E&D) Rules, 1978
- The Pakistan WAPDA Employees (Retirement) Rules, 1979
- The Pakistan WAPDA Leave Rules for WAPDA Employees 1982
- The Pakistan WAPDA TA Rules 1982
- WAPDA Act
- Conduct Rules
- Medical Attendance Rules

Reference Books

- WAPDA Manual of General Rules amended upto 2014 (including addendums)

PAPER-II TECHNICAL **100 Marks**
(Pass marks 50)

Practices and procedures in operational hydrology/Hydro-meteorology: Instruments and methods of observations: Precipitations general requirements, location, precipitation/rain gauges types and measurements methods and factor affecting measurements, Snow cover, water equivalent, snow courses, snow pillow, snow sampling equipment and procedure, Evaporation and evapo-transpiration-pan evaporation equipment and method of measurements, Solar radiation-solar radiation types, measurement, equipment & procedures, Air temperature - Measurement techniques, methods and considerations, Relative Humidity-vapor pressure, measurement equipment, techniques, methods and general consideration and Wind-measurement equipment, techniques, methods and general considerations.

Purpose of water level observations: Concept & definitions, River gauges-types of gauges, installation of gauges, manual automatic recording, establishment of datum, measurement procedures and frequency of gauge measurement, Discharge measurements General needs & requirements, site selection, equipment for Q-measurements, method of measurements (current meter moving boat, ultrasound etc.) cross-sectional measurements (Width, depths) measurement of flow velocity, computation of discharge, consideration & precaution, measurement of steady flows & unsteady flows, Development of rating curves.

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53

Handwritten signatures and initials.

Water Quality and Sediment Sampling Observations: Sediment sampling-equipment & methods, chemical sampling-equipment & methods, water temperature measurement

Data Processing & Analysis: (a) Meteorological-data WMO-Guidelines: viz precipitation, temperature, wind & evaporation, Interpretation of precipitation data-adjustment of data, standard base period of record, data time series, mass curve, analysis interpolation of data, isohyetal maps, physiographic effects on data, methods for estimation of average precipitation (catchment area) arithmetic mean, polygon, isothermal method) rainfall intensity, aerial and spatial distribution, (b) Hydrological data: Interpretation of data, adjustment of data maximum, minimum, average and mean of daily, monthly and annual flows, Correlation between stations, spatial and temporal distribution of runoff, hydrograph analysis, report and hydrograph, (c) Sediment analysis for grain size distribution and sediment concentration etc.

Water Quality Monitoring/General: Criteria for collection of water samples from the source of Surface Water and Ground water, Sampling procedure, site selection, selection of container, preservation of water samples, handling, transportation, Field testing of water sample i.e. Specific Electrical Conductance (EC), Hydrogen, Ions Concentration (pH), Concept of salinity and Alkalinity, Evaluation of water analysis for Irrigation, (useable, marginal, hazardous), Geo-chemical aspect of ground water, Mixing ratio of different water qualities, Gypsum requirement and Concept of saline, sodic & saline sodic water utilization criteria.

Lab. Work: Determination and estimation of following cations & anions (i) Calcium (ii) Magnesium (iii) Sodium (iv) Potassium (v) Carbonate (vi) Bi-Carbonate (vii) Chloride (viii) Sulphate (ix) Total dissolved solids (TDS), Calculation of Residual Sodium Carbonate (RSC) & Sodium Adsorption Ratio (SAR) Tabulation of analytical work.

Open channel Flow: Wetted parameter and hydraulic radius, steady uniform an continuous flow, energy in an open channel head loss in open channel, the Chezy formula, determination of roughness coefficient, hydraulic jump, position of hydraulic jump in stilling basin, water depth in stilling basin, coefficients of standard weir standard weir standard weir formulas, measurement of heads rectangular contracted weirs, triangular weirs, broad crested weirs submerged weirs, Kenedy Theory, Lacys Theory, Lacys Regime Equation.

Hydraulic Structures: Types of dams, advantages and disadvantage of different dams, designing of canals, Spillways and its types.

Computer (Information Technology): Introduction to Computer System, M.S. Word and M.S. Office: Characteristic of computer, types of computer, computer hardware and software, types of memory and functions, operating systems, input/out and storage devices, main features of utility of MS Word, MS Excel, MS Power Point, Internet and E-mail.

Reference Books

- Groundwater hydrology by David Kaith Tood.
- Guidelines for water well design by Ch. Atta-ur-Rehman – 1979.
- Procedures followed by surface Water Hydrology Project by Khalid Javed.
- Study & Interpretation of chemical characteristics of natural water by John D. Hem.
- Water quality Reports on SCARPS by SMO.
- Methods of collection and analysis of water samples by F.H./Rain Water.
- Standard Method (ASTM).
- Indian practical civil engineering handbook by P.N. Khanna.
- Hand Book of Applied Hydraulic Chief Editor Calvin Victor Davis.

- The Fundamental Principles of Hydraulics (Vol.I) by VB Pridyani.
- Engineering Hydraulics by Hunter Rouse.
- Modeling of Rivers by Hsieh Wedn Sheu.
- Microsoft Office 2007/2010, by Gary B. Shelly, Thomas J. Cashman and Misty E. Vermaat.
- Window 7 Step by Step by Joan Lambert and Joyce Cox (Available Online).

NOTE (1) One question from Computer (Information Technology) is **compulsory** to be included in Paper-II (Technical).

NOTE (2): The paper will be 50% objective and 50% subjective.


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55





