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Water Resource Engineering — Complete Syllabus

BTEUP Diploma in Civil Engineering • 4th Semester • Session 2026-27

Subject 4.8 (Theory) • Total 100 Marks • 2 Credits • L 2

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.8	Water Resource Engineering	Theory	2 - 0	2	Theory 40	Theory 60 (3 hrs)	100
Water Resource Engineering Total				2	40	60	100

What This Subject Aims To Do

To learn estimation of hydrological parameters, understand water demand of crops and provisions to meet the same, know planning of reservoirs and dams, and design irrigation projects, canals and other diversion works.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Hydrology	5	20%
2	Crop Water Requirement	6	20%
3	Methods of Irrigation	5	20%
4	Diversion Head Works & Canals	6	20%

5	Dams and Spillways and River Training Works	6	20%
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Unit 1 — Introduction to Hydrology (5 Periods, 20%)

Topics: Hydrological cycle: rainfall, definition, rain-gauges — automatic and non-automatic, methods of estimating average rainfall, advantages of keeping rainfall records (arithmetic system); catchment area, runoff, factors affecting runoff, hydrograph, basic concept of unit hydrograph.

Unit 2 — Crop Water Requirement (6 Periods, 20%)

Topics: Principal crops in India and their water requirements, crop seasons — Kharif and Rabi; soil water, soil crop and crop water relationships, duty, delta and base period, their relationship, gross commanded area (GCA), culturable commanded area (CCA), intensity of irrigation, paleo irrigation, Kor, crop ratio, crop period, base period, duty, delta; relation between duty-delta and base period; definition of water logging — its causes and ill effects, detection, prevention and remedies, surface and sub-surface drains and their layout.

Unit 3 — Methods of Irrigation (5 Periods, 20%)

Topics: Definition of irrigation, necessity of irrigation, role of irrigation in country's economy; history of development of irrigation in India, major, medium and minor irrigation projects of India; flow irrigation — its advantages and limitations; lift irrigation — tubewell, submersible and well irrigation, advantages and disadvantages; sprinkler irrigation — conditions favourable and essential requirements for sprinkler irrigation, sprinkler system — classification and component parts; drip irrigation, suitability of drip irrigation, layout, component parts, advantages; tubewell irrigation comparison with canal irrigation; tubewells, explanation of terms: water table, radius of influence, depression head, cone of depression, confined and unconfined aquifers; types of tubewells (cavity type, strainer type and slotted type) and their choice; method of boring, installation of well assembly, development of well, pump selection and installation and maintenance; water harvesting techniques: need and requirement of various methods, run-off from roof top and ground surface, construction of recharge pits and recharge wells and their maintenance.

Unit 4 — Diversion Head Works & Canals (6 Periods, 20%)

Topics: Canals: factors to be considered in canal alignment; functions/purpose of various components of canal; classification of canals and their functions, sketches of different canal cross-sections; various types of canal lining — their related advantages and disadvantages, sketches of different lined canal cross-sections; breaches — causes, method to plug canal breaches and their control, maintenance of lined and unlined canals; canal head works and regulatory works: choice of location of canal head works, definition, object, general layout, functions of different parts of head works; difference between weir and barrage; cross drainage works: functions and necessity of cross drainage works, types of cross drainage works: aqueduct, super passage, level crossing, inlet and outlet, sketches of the above cross drainage works; introduction of Kennedy and Lacey theory.

Unit 5 — Dams and Spillways and River Training Works (6 Periods, 20%)

Topics: Dams: classification of dams; earthen dams — types, causes of failure; cross-section of homogeneous, zoned and diaphragm type earthen dams, method of construction; gravity dams — types, cross-sections of a dam, method of construction; concept of small and micro dams, concept of spillways and energy dissipators; river training works: various river stages, purpose/functions of river training works, meandering of rivers, methods of river training, guide banks, marginal embankment, retired (levees) embankments, groynes and spurs, pitched island, cut-off.

Reference Books (as listed in the syllabus)

- Punmia, B.C., Pande, B, Lal, Irrigation and Water Power Engineering, Laxmi Publications.
- Subramanian, Engineering Hydrology, McGraw Hill.
- D.V. Gupta, Vikram Singh, Irrigation Engineering, Asian Publishers, Muzaffarnagar, ISBN: 978-93-5502-115-1.
- Mutreja K N, Applied Hydrology, McGraw Hill.
- Sharma, R.K. and Sharma, T.K., Irrigation Engineering, S.Chand.
- Basak, N.N., Irrigation Engineering, McGraw Hill Education.
- Asawa, G.L., Irrigation and water resource Engineering, New Age.
- Dahigaonkar, J.G., Irrigation Engineering, Asian Book Pvt. Ltd., New Delhi.
- Garg, S K, Irrigation and Hydraulic Structures, Khanna Publishers, Delhi.
- Priyani V.B., Irrigation Engineering, Charotar Book Stall, Anand.

follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.
Please confirm with your own polytechnic for any local changes.

