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Public Health Engineering — Complete Syllabus

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

Subject 4.9 (Practicum/Theory) • Total 100 Marks • 2 Credits • L 1 – P 2

Note: The 4th-semester scheme totals imply this subject's 40 internal marks sit under Practical assessment, while its 60 external marks sit under Theory (the extracted table's column alignment is garbled — see NOTES). The lab work listed here is part of subject 4.9 itself.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.9	Public Health Engineering	Practicum/ Theory	1 - 2	2	40	Theory 60 (3 hrs)	100
Public Health Engineering Total				2	40	60	100

What This Subject Aims To Do

To learn the principles for identification of sources of surface and subsurface water, learn calculation of population and requirement of drinking water, understand the plotting of a water supply scheme highlighting different features, and know evaluation of characteristics and treatment of sewage.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
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1	Sources, Demand and Quality of Water	3	20%
2	Purification of Water	3	20%
3	Conveyance and Distribution of Water	2	20%
4	Domestic Sewage and Sewerage System	3	20%
5	Characteristics and Treatment of Sewage	3	20%

Unit 1 — Sources, Demand and Quality of Water (3 Periods, 20%)

Topics: Water supply schemes — objectives, components; sources of water: surface and subsurface sources of water, intake structures, definition and types, factors governing the location of an intake structure, types of intakes; demand of water: factors affecting rate of demand, variations of water demands, forecasting of population, methods of forecasting of population (simple problems on forecasting of population), design period, estimating of quantity of water supply required for city or town; quality of water: need for analysis of water, characteristics of water — physical, chemical and biological, testing of water for total solids, hardness, chlorides, dissolved oxygen, pH, fluoride, nitrogen and its compounds, bacteriological tests, E. coli, B. coli index, MPN, sampling of water, water quality standards as per IS 10500.

Unit 2 — Purification of Water (3 Periods, 20%)

Topics: Purification of water: objectives of water treatment, aeration — objects and methods of aeration, plain sedimentation, sedimentation with coagulation, principles of coagulation, types of coagulants, jar test, process of coagulation, types of sedimentation tanks, clariflocculator; filtration — mechanism of filtration, classification of filters: slow sand filter, rapid sand filter, pressure filter; construction and working of slow sand filter and rapid sand filter, operational problems in filtration; disinfection: objects, methods of disinfection, chlorination — application of chlorine, forms of chlorination, types of chlorination practices, residual chlorine and its importance, flow diagram of water treatment plants; miscellaneous water treatments: introduction to water softening, dechlorination and defluoridation techniques.

Unit 3 — Conveyance and Distribution of Water (2 Periods, 20%)

Topics: Conveyance: types of pipes used for conveyance of water, choice of pipe material, types of joints and types of valves — their use, location and function on a pipeline and other related appurtenances; distribution of water: methods of distribution of water — gravity, pumping, and combined system, service reservoirs — functions and types, layouts of distribution of water — dead end system, grid iron system, circular system, radial system; their suitability, advantages and disadvantages; laying of pipe, testing of pipe lines, building water supply (practical aspect only).

Unit 4 — Domestic Sewage and Sewerage System (3 Periods, 20%)

Topics: Introduction: purpose of sanitation, necessity of systematic collection and disposal of waste, definition of terms in sanitary engineering, collection and conveyance of sewage, conservancy and water carriage systems, their advantages and disadvantages; (a) surface drains (only sketches): various types, suitability; (b) types of sewage: domestic, industrial, storm water and its seasonal variation; sewerage system: types of sewerage systems, materials for sewers, their sizes and joints; appurtenance: location, function and construction features — manholes, drop manholes, tank hole, catch basin, inverted siphon, flushing tanks, grease and oil traps, storm regulators, ventilating shafts; laying and construction of sewers: setting out/alignment of sewers, excavations, checking the gradient with boning rods, preparation of bedding, handling and jointing, testing and back filling of sewers/pipes; construction of surface drains and different sections required.

Unit 5 — Characteristics and Treatment of Sewage (3 Periods, 20%)

Topics: Sewage characteristics: properties of sewage and IS standards for analysis of sewage, physical, chemical and bacteriological parameters; natural methods of sewerage disposal: general composition of sewage and disposal methods, disposal by dilution, self purification of stream, disposal by land treatment, nuisance due to disposal; sewage treatment: meaning and principle of primary and secondary treatment and activated sludge process, their flow diagrams, introduction and uses of screens, grit chambers, detritus tanks, skimming tanks, plain sedimentation tanks, primary clarifiers, secondary clarifiers, filters, control beds, intermittent sand filters, trickling filters, sludge treatment and disposal, oxidation ponds (visit to a sewage treatment plant), oxidation ditch, duckweed pond, vermiculture; building drainage: aims of building drainage and its requirements, different sanitary fittings and installations, traps; introduction to smart water supply and waste water management: a field visit may be planned to explain and show the relevant things.

Practical Work

- Determine pH value of given sample of water.
- Determine the turbidity of the given sample of water.
- Determine residual chlorine in a given sample of water.
- Determine suspended, dissolved solids and total solids of given sample of water.
- Determine the dissolved oxygen in a sample of water.
- Determine the optimum dose of coagulant in a given raw water sample by jar test.
- Determine B.O.D. of given sample of sewage.
- Determine pH value of given sample of sewage.
- Determine suspended solids, dissolved and total solids for sample of sewage.
- Determine the dissolved oxygen in the given sample of sewage.
- Determine C.O.D. of given sample of sewage.
- Prepare a report of a field visit to sewage treatment plant or water treatment plant.

Reference Books (as listed in the syllabus)

- Sharma S.C, Environmental Engineering, Khanna Publishing House, New Delhi.
- Garg, S.K., Environmental Engineering Vol. I and Vol. II, Khanna Publishers.
- Birdie, G. S. and Birdie, J. S., Water Supply and Sanitary Engineering, Dhanpat Rai.
- Gupta, O.P., Elements of Environmental Pollution Control, Khanna Publishing House, Delhi.
- Rao, C.S., Environmental Pollution Control Engineering, New Age International.
- Punmia, B C, Environmental Engineering, vol. I and II, Laxmi Publishers.
- D.V. Gupta, Vikram Singh, Water & Waste Water Engineering, Asian Publishers, Muzaffarnagar, ISBN: 978-93-91541-52-1.
- Peavy H S, Rowe D R, and Tchobanoglous G, Environmental Engineering, McGraw.
- Basak N N, Environmental Engineering, McGraw Hill Publishers.

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Source: BTEUP 2nd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists 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.