

<b>Design of Water Distribution Systems</b>				Course :Title	
Manda- tory	Type of :Training	<b>Job-specific</b>	:Course Type	<b>2491</b>	Course :Code
		<input checked="" type="checkbox"/> Proficiency- Research	<input checked="" type="checkbox"/> Profi- ciency	<input checked="" type="checkbox"/> Skill	Course :Level

Behavioral objectives of the course	No.
Participants learn the principles of design and calculation formulas in the network and apply them in calculations.	<b>1</b>

Knowledge objectives of the course	No.
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<b>48</b>	:Sum	<b>0</b>	:Practical	<b>48</b>	:Theoretical	Course duration
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\_\_\_\_\_:Prerequisite

Headlines and Contents	No.
<b>Chapter 1:</b>	<b>1</b>
Introduction	<b>2</b>
Recalling the continuity equation and energy-momentum and their application in flow pressure	<b>3</b>
The difference between free flow and pressure flow in terms of effective force	<b>4</b>
Classification of the flow based on Reynolds number	<b>5</b>
<b>Chapter 2:</b>	<b>6</b>
Formulas to calculate pressure drop	<b>7</b>
Proving Darcy-Weisbach equation	<b>8</b>
Explaining Moody diagram and relationship between Darcy-Weisbach friction factor (F) and Reynolds number and relative roughness (eD) in different flows.	<b>9</b>
Explaining Swamee equation to calculate F in urban water	<b>10</b>
Empirical formula to calculate pressure drop in pipes	<b>11</b>

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Formulas to calculate local pressure drops for different fittings in the network	12
Applying the Darcy-Weisbach equation for pressure flows	13
<b>Chapter 3:</b>	14
Criteria and principles of urban water distribution system design	15
Study on population forecast	16
Determination of the amount of water consumption (household, public, industrial, and losses)	17
Determination of maximum and minimum coefficients of water consumption	18
Different pipes and regulations of diameter selection	19
Criteria for location of the neighborhood fire hydrants and control valves	20
Maximum and minimum velocities	21
Criteria to determine the maximum and minimum pressure on the networks	22
<b>Chapter 4:</b>	23
Water storage tanks	24
Types of water storage tanks (ground tanks, elevated earth tanks, and water towers)	25
Criteria to design water tanks in terms of hydraulics	26
How to calculate the volume of water tanks (with flowrate, fixed flow, or pumping)	27
Discussion about the standards of the Ministry of Energy of Iran for determination of water tank volume	28
<b>Chapter 5:</b>	29
Various types of water distribution systems	30
Branched network and its hydraulic calculations	31

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Looped networks	32
Criteria to determine output flowrates of the nodes in branched and looped water networks	33
Different formulation of branched	34
How to formulate urban water systems where there are water tanks, booster pump, and pressure breaker valves	35
<b>Chapter 6:</b>	36
Methods of calculation for looped water distribution networks	37
Hardy Cross method	38
Linear theory method	39
Newton–Raphson method	40

	: Course resources
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