

GUJARAT TECHNOLOGICAL UNIVERSITY
DIPLOMA IN CIVIL ENGINEERING
SEMESTER: V

Subject Name: **Water Resources Management**

Sr. No	Course content	Hours 42
1	Introduction: (Water as Vital Resource and Its Management) 1.1 Scope of W.R.M. 1.2 Necessity of W.R.M. 1.3 Role of various agencies in W.R.M.: - Agriculturists - Meteorologists - Geologists - Industrialists - Scientists - Water quality - Biologists Control (Authority) - Mechanical Engg. - Electrical engg. - Economists - Social workers - NGO's - Politicians - General Public 1.4 Water Resource Projects in Gujarat (Focus on Technical Aspects) -Kalpasar -Sujalam Sufalam -Sardar Sarovar (Narmada Project)	02
2	Hydrology : (Water,its existence, distribution ,and Movement Throughout the Earth) 2.1 Define Hydrology 2.2 Hydrological cycle 2.3 Forms of precipitation 2.4 Precipitation occupancy & its types. 2.5 Measurement of rain fall 2.5.1 Rain gauges. a. Non Recording – Symon’s type b. Recording - Float type automatic rain gauges - Tipping bucket 2.5.2 Methods of determining average rain fall a. Arithmatic average method b. Theissen’s polygon method c. Isohytel method 2.5.3 Determine No. of rain gauges for given catchment area. (Data to be given: (i) C. A. (ii) Coefficient of variance of rainfall (Cv) (iii)E = Allowable percentage error. 2.5.4 Define: Evaporation, Transpiration & Evapo -transpiration 2.5.4.1 Enlist factors affecting evaporation.	09

3	<p>Runoff : (Rainfall Excess on the Surface of Earth)</p> <p>3.1 Compute runoff by various methods.</p> <p>3.2 Factors affecting runoff.</p> <p>3.2.1 (a) Coefficient method/ Rational method</p> <p>(b) Formula</p> <p>(i) Dicken's formula</p> <p>(ii) Ryve's formula</p> <p>(iii) Inglis formula</p> <p>(iv) Nawab – Jung Bahadur formula</p> <p>3.3 Calculate run off by Index. (w-index and -index)</p> <p>3.3.1 Unit Hydrograph</p> <ul style="list-style-type: none"> - Enlist assumptions of unit hydrograph. - Construct unit hydrograph from a given storm hydrograph data (rainfall & stream - flow data) - Construct flood hydrograph from given unit hydrograph for two or more periods of rainfall. <p>3.3.2 Compute flood discharge from unit hydrograph</p>	07
4	<p>Advance Water Application Methods : (Micro Level Irrigation Methods)</p> <p>4.1 (a) Soil water plant relation-ship</p> <p>(i) Classes of soil water</p> <p>(ii) Compute field capacity</p> <p>(iii) Classes of different crops with root-zone depth.</p> <p>(iv) Compute the water requirement of crop with effective root zone depth.</p> <p>(v) Drip irrigation</p> <p>(vi) Sprinkler irrigation</p> <p>(Enlist and briefly explain the suitability, Design layout parameters, components of above (b) & (c) methods, Advantages & Disadvantages of above methods.)</p> <p>4.2 Water logging and drainage.</p> <p>4.2.1 Define water logging and ill effects of water logging.</p> <p>4.2.2 Surface and sub-surface drainage.</p> <p>4.2.3 Salt efflorescence</p>	07
5	<p>Ground Water : (Water Below the Earth Surface)</p> <p>5.1 Importance of ground water and present scenario</p> <p>5.2 Necessity of recharging</p> <p>5.2.1 Artificial recharging as today's need.</p> <p>5.2.2 Types of artificial recharge</p> <p>a. Spreading method.</p> <p>5.3 Pit method / khet talavadi</p> <p>5.4 Induced recharge method</p> <p>5.5 Recharge well method.</p> <p>5.6 Sub surface dam.</p> <p>5.7 Check dam series</p> <p>5.8 Ponds</p> <p>5.9 Unlined canals</p> <p>Case studies for above all.</p>	07

	<p>5.10 Suitability of artificial recharging method w.r.t. different regions in Guj. State.</p> <p>5.11 Methods of water-drawls of various strata</p>	
6	<p>Sea Water Intrusion : (Land Area Under Salinity)</p> <p>6.1 Enlist III effects of sea water intrusion</p> <p>6.2 Discuss following remedial measures to control sea water intrusion.</p> <p>6.2.1 Modification of pumping.</p> <p>6.2.2 Artificial recharge by spreading area.</p> <p>6.2.3 Pumping trough.</p> <p>6.2.4 Pressure ridge.</p> <p>6.3 Compute depth of Interface and draw the sketch</p>	03
7	<p>Watershed Management:(Rainwater + Land + Management)</p> <p>7.1 Explain watershed concept</p> <p>7.2 Characteristics of watershed:- Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology, soil type, hydrology, hydrogeology, socio-economics.</p> <p>7.3 Watershed management & People's participation..</p> <p>7.3.1 Conserving Soil ,Water & Energy</p> <p>7.3.2 Improving ability of land to hold water</p> <p>7.3.3 Rain water harvesting, by</p> <ul style="list-style-type: none"> - Check dams - Nala / Gully plugging - Percolation tank - Khet talawadi - Roof harvesting - Vegetation and plantation <p>7.4 Interlinking of village ponds</p> <ul style="list-style-type: none"> - Dressing of Natural Drains - Check dams at the pond overflow section and within the drains (Physibility, Design and advantages) <p>7.5 Role of co-operative society in watershed management.</p>	07

References Books:

- | | | |
|--|--|--|
| 1. Irrigation, Water Resources & Water Power Engg. | Dr. P.N. Modi | Standard Book House, Delhi. |
| 2. Hydrology & Water Resources | R.K. Sharma | Dhanpat Rai & Sons, Delhi. |
| 3. Ground water | H.M.Ragunath | New Age international Ltd., New Delhi. |
| 4. Ground water assessment, Development & management | K.R. Karanth | Tata Mc Graw Hill Pub. Co. Ltd., New Delhi. |
| 5. Principle & Practice of Irrigation Engg. | S.K.Sharma | S.Chand & Co, Delhi. |
| 6. Hydrology & Water Resources Engg. | S.K.Garg. | Khanna Pub., Delhi. |
| 7. Watershed management in India | J.V.S. Moorthy | Willey Eastern Ltd. New Age international Ltd., New Delhi. |
| 8. Design of small dams. | U.S.B.R. | |
| 9. Irrigation theory & practice | A.M.Mitchel | Vikas Pub. House Pvt. Ltd, Delhi. |
| 10. Water vision 2050 | Narmada, W.R. & water supply deptt., Gandhinagar | |
| 11. Techno economic letter Vol.-107 & 108 | | Gram technology Institute- Gujarat Secort.12, Gandhinagar. |
| 12. Irrigation & water power engg. | B.C. Punmia | |
| 13. Water Resources Engg.- Principles & Practice | C. Satyanarayan Murthy. | New Age International Ltd., New Delhi |
| 14. Relevant IS codes | | |