

WATER RESOURCE ENGINEERING - I



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MARKING SYSTEM (TOTAL -150 MARKS)



OBJECTIVES OF STUDYING

- To study various types of irrigation projects.
- To study and understand the various techniques and methods of irrigation.
- To understand the irrigation requirements of crops.
- To calculate storage capacity of reservoirs.
- To study the elements of hydrologic cycle and calculate catchment yield.
- To study the hydraulics of wells and ground water exploration methods.

MODULES

- ▶ **UNIT I - INTRODUCTION**
- ▶ **UNIT II – IRRIGATION METHODS AND MANAGEMENT**
- ▶ **UNIT III – WATER REQUIREMENT OF CROPS**
- ▶ **UNIT IV – HYDROLOGY**
- ▶ **UNIT V- GROUND WATER AND WELL HYDRUALICS**
- ▶ **UNIT VI – INVESTIGATION AND RESERVIOUR PLANNING**

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1. INTRODUCTION

- Definition of irrigation.
- Water resources in India.
- Development of irrigation in India, need of irrigation in India.
- Benefits of irrigation.
- Ill effects of irrigation.
- Irrigation systems: minor and major.
- Medium and minor irrigation projects.
- Command area development,
- Impact of irrigation on environment,
- National water policy.



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2. IRRIGATION METHODS AND MANAGEMENT

- ▶ Types of irrigation: surface irrigation, subsurface irrigation;
- ▶ lift irrigation, Bandhara irrigation, percolation tanks.
- ▶ Techniques of water distribution: free flooding, border flooding, check flooding, basin flooding, furrow irrigation method,
- ▶ micro irrigation, sprinkler irrigation, drip irrigation.
- ▶ Irrigation scheduling,
- ▶ participatory irrigation management

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3. WATER REQUIREMENT OF CROPS:

- ▶ Crops and crop seasons in India,
- ▶ cropping pattern, duty and delta,
- ▶ quality of irrigation water,
- ▶ soil water relationship, soil characteristics significance from irrigation considerations, root zone soil water
- ▶ infiltration,
- ▶ consumptive use,
- ▶ irrigation requirement,
- ▶ frequency of irrigation,
- ▶ water requirement and capacity of canal and reservoir,
- ▶ assessment of irrigation water, water conservation, rain water harvesting.



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4. HYDROLOGY

- ▶ Hydrologic cycle,
- ▶ Precipitation: Types of precipitations,
- ▶ measurement of rainfall by rain gauges,
- ▶ stream flow measurement,
- ▶ runoff, factors affecting runoff, computation of runoff,
- ▶ yield of the catchment runoff hydrograph,
- ▶ flood discharge and calculations,
- ▶ unit hydrograph, application of unit hydrograph,
- ▶ methods of deriving unit hydrograph, S-hydrograph, complex hydrograph.

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5. GROUND WATER AND WELL HYDRAULICS

- ▶ Ground water resources,
- ▶ occurrence of ground water, well irrigation.
- ▶ Well hydraulics: steady state flow in wells,
- ▶ equilibrium equations for confined and unconfined aquifer,
- ▶ aquifer tests,
- ▶ design of water wells.

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6. INVESTIGATION AND RESERVOIR PLANNING

- ▶ Selection of site for reservoir,
- ▶ zones of storage reservoir,
- ▶ capacity elevation and area elevation curve of reservoir site,
- ▶ control levels, fixation of control levels,
- ▶ reservoir sedimentation, methods of control of sedimentation,
- ▶ evaporation loss,
- ▶ estimation and controlling methods of evaporation.