

**3/4 B.Tech. SIXTH SEMESTER**

**CE6T3**

**WATER RESOURCE ENGINEERING – II**

**Credits: 3**

**Lecture: 3 periods/week**

**Internal assessment: 30 marks**

**Tutorial: 1 period /week**

**Semester end examination: 70 marks**

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**Pre-requisites:** Water resources engineering I

**Learning objectives:**

- To learn about the water resource development projects like diversion works, dams and spill ways, their design for stability.
- To gain knowledge on the design of various canal structures.

**Course outcomes:**

At the end of the course, the student will be able to:

1. Apply the design principles of diversion structures.
2. Assess reservoir storage requirements, best sites for reservoirs and dams and design a gravity dam.
3. To apply the design principles of earth dams and spillways.
4. Arrive at appropriate canal regulation works, falls and outlets
5. Apply the design principles of various cross drainage works.

**UNIT-I**

**DIVERSION HEAD WORKS**

Types of Diversion head works, weirs and barrages, layout of diversion head works, components. Causes and failure of hydraulic structures on permeable foundations, Bligh's creep theory, Khosla's theory, determination of uplift pressure, impervious floors using Bligh's and Khosla's theory, exit gradient, functions of U/s and d/s sheet piles.

**UNIT-II**

**RESERVOIR PLANNING**

Investigations, site selection, zones of storage, yield and storage capacity of reservoir, reservoir sedimentation.

**DAMS:**

Types of dams, selection of type of dam, selection of site for dam.

**GRAVITY DAMS**

Forces acting on a gravity dam, causes of failure of a gravity dam, elementary profile and practical profile of a gravity dam, limiting height of a gravity dam, stability analysis, drainage galleries, grouting.

**UNIT-III**

**EARTH DAMS**

Types of Earth dams, causes of failure, criteria for safe design, seepage, measures for control of seepage – filters, stability analysis – stability of downstream slope during steady seepage and upstream slope during sudden drawdown conditions.

**SPILLWAYS:**

Types of spillways, design principles of Ogee spillways, types of spillway gates. Energy dissipation below spillways – stilling basin and its appurtenances.

**UNIT-IV**

**CANAL FALLS:**

Types of falls and their location, design principles of Sarda type fall, trapezoidal notch fall and straight glacis fall.

**CANAL REGULATORS:**

Head and cross regulators, design principles. Canal outlets, types of canal modules, proportionality, sensitivity and flexibility.

**UNIT-V****CROSS DRAINAGE WORKS:**

Types, selection, design principles of aqueduct, siphon aqueduct and super passage.

**Learning resources:****Text books:**

1. Irrigation engineering and hydraulic structures, (23<sup>rd</sup> edition) by Garg S.K., Khanna Publishers, 2010.
2. Irrigation and water power engineering. (16<sup>th</sup> edition) by Punmia B.C., Laxmi Publications Pvt. Ltd., New Delhi, 2010.
3. Irrigation engineering by Arora K.R., Delhi standards publication, 2009.
4. Irrigation Engineering, (3<sup>rd</sup> edition) by Sharma R.K. and Sharma T.K., S.Chand Publishers, 2010.

**Reference books:**

1. Irrigation and water resources engineering by Asawa G.L., New Age International Publishers, 2010.
2. Theory and Design of Hydraulic structures by Varshney, Gupta and Gupta, New Chand and Bros, 1982.
3. Water resources engineering, (2<sup>nd</sup> edition) by Satyanarayana Murthy Challa, New Age International Publisher, 2010.

**e-learning resources:**

NPTEL