**E.G.S. PILLAY ENGINEERING COLLEGE, NAGAPATTINAM.**

**DEPARTMENT OF CIVIL ENGINEERING**

**SEVENTH SEMESTER B.E. (CIVIL ENGINEERING)**

**CE6703 – WATER RESOURCES AND IRRIGATION ENGINEERING (2018- 2019)**

**COURSE PLAN - IMPLEMENTATION PART**

1. **GENERAL DETAILS**

 **Course Code :** CE 6703

**Course Name :** Water Resources And Irrigation Engineering

Programme : B.E.-Civil A&B

**Prepared By Course Coordinator :** E.VENKATESAN

**Reviewed By 1.Domain Coordinator :** E.VENKATESAN

 **2. HOD :**Dr.R.Sivakumar

**Approved By Programme Coordinator :**Mrs.P.Malliga

**Effective Date :**

**Version No. :** 01

**II Course Context and Overview**

**Water resources and irrigation Engineering** is an subject in 7th semester in B.E. (Civil. Engg.)curriculum.Water Resources and irrigation engineering is study about the water resources for agricultural land for cultivating agricultural food, seeds and fertilizer products. It is used to develop the moisture of the soil to produce more number of agricultural plant growths. In this we can also study about storage of water and impact of human environment need water for agricultural. And water can be supply by drainage and pipe line system. We also study about supply of water to seasonal crops. It develops benefit for farmers and government by economically. Irrigation is the controlled application of water to croplands. Its primary objective is to create an optimal soil moisture regime for maximizing crop production and quality while at the same time minimizing the environmental degradation inherent in irrigation of agricultural lands. Irrigation is thus critical for food security in semi-arid and arid areas Irrigation has two primary objectives: To supply the essential moisture for plant growth; &To leach or dilute salts from the soil. Irrigation water management deals with the frequency of irrigation, depth of water to be applied, and measures to increase the uniformity of applications. Irrigation management should be a set of practices designed to maximize efficiencies and minimize the labor and capital requirements of a particular irrigation system.

|  |  |
| --- | --- |
| Course designed by | Anna University, Chennai (R2013) |
| 1 | Category | Basic Sciences(B) | Engineering Sciences (ES) | Humanities and Social Sciences (HSS) | Professional Core (PC) | Professional Elective (PE) | Employability Enhancement Course (EEC) |
|  |  |  | **x** |  |  |
| 2 | Broad area | Structural | Design | Environment | General |  |
|  |  | x |  |  |

**III.Prerequisite**

1.Fundamentals knowledge of basic Sciences.

**IV.(a). Course Outcomes (COs):**

**After successful completion of the course, students will be able to**

|  |  |  |
| --- | --- | --- |
|  | **Competency** | **Cognitive level** |
| CO1 | Describe basic concepts of water resources planning and Explain the management of reservoir system | Understand |
| CO2 | Discuss the availability of water resources and prepare water budget. | Understand |
| CO3 | Compute the consumptive use of water for irrigation. | Understand |
| CO4 | Design the canal impounding structures for effective water management system. | Apply |
| CO5 | Explain the irrigation management system and scheduling.  | Understand |

**(b). Program Outcomes (PO)**

**After successful completion of the programme, Graduates will be able to**

**PO1:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

**PO2:** Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

**PO3:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

**PO4:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

**PO5:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

**PO6:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

**PO7:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

**PO8:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

**PO9:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

**PO12:** Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

**(c). Program Specific Outcomes (PSO)**

**At the end of B.E. Civil EngineeringProgrammes, Graduate will be able to**

**PSO 1:**Graduates will be able to for apply appropriate methodology geotechnical, structural design and

analysis, material selection, planning, scheduling estimation and costing, using modern tool in

construction field.

**PSO 2:** Apply new and eco-frendly concepts in civil and allied areas to achive the industrial need.

**V.COs VsPos/PSOs Matrix**

| **Comp.** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **P1O** | **PO11** | **PO12** | **PSO 1** | **PSO 2** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| CO1 | M | L | - | - | - | M | M | - | - | - | - | - | - | L |
| CO2 | M | L | - | - | - | M | M | - | - | - | - | - | - | L |
| CO3 | M | L | - | - | - | M | M | - | - | - | - | - | - | L |
| CO4 | S | M | L | - | - | M | M | - | - | - | - |  - | - | L |
| CO5 | M | L | - | - | - | M | M | - | - | - | - |  - | - | L |

Support provided by COs to Pos/PSOs:-L = lightly(1); M = Moderately(2); S = Substantially(3)

**Explanations:**

**CO1: Describe basic concepts of water resources planning and Explain the management of reservoir system**

This CO contributes to

-(Moderately) (PO1): Apply the basic concepts of water resources planning.

-(lightly) (PO2):

-(lightly) (PO6&07):

- (Moderately) (PSO2):

**CO2: Discuss the availability of water resources and prepare water budget.**

This CO contributes to

-( Moderately) (PO1):

- (lightly) (PO2):

-(lightly) (PO6&07):

- (lightly) (PSO2):

**CO3: Compute the consumptive use of water for irrigation.**

This CO contributes to

-(Moderately) (PO1):

- (lightly) (PO2):

-(lightly) (PO6&07):

- (lightly) (PSO2): Apply the concepts of structural material selection, planning, scheduling, estimation

using modern tool inconstruction field.

**CO4: Design the canal impounding structures for effective water management system.**

This CO contributes to

-(substanially) (PO1):

- (Moderately) (PO2):

- (lightly) (PO3):

-(lightly) (PO6&07):

- (lightly) (PSO2):

.

**CO5: Explain the irrigation management system and scheduling.**

This CO contributes to

- (Moderately) (PO1):

- (Lightly) (PO2):

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-(lightly) (PO6&07):

- (lightly) (PSO2):

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**VI. Delivery Technologies**:

|  |  |
| --- | --- |
| **S. No.** | **Teaching Aids** |
|  | Classroom with LCD Projector |

**VII. Syllabus**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CE6703** | **CE6703 WATER RESOURCES AND IRRIGATION ENGINEERING** | **L** | **T** | **P** | **C** |
| **3** | **0** | **0** | **3** |
|  |  |  |  |
| **UNIT I** | **WATER RESOURCES**  | **9 Hours** |
| Water resources survey – Water resources of India and Tamilnadu – Description of water resources planning – Estimation of water requirements for irrigation and drinking- Single and multipurpose reservoir – Multi objective - Fixation of Storage capacity -Strategies for reservoir operation - Design flood-levees and flood walls. |
| **UNIT II** | **WATER RESOURCE MANAGEMENT** | **9 Hours**  |
| Economics of water resources planning; – National Water Policy – Consumptive and non consumptive water use - Water quality – Scope and aims of master plan - Concept of basin as a unit for development - Water budget-Conjunctive use of surface and ground water  |
| **UNIT III** | **IRRIGATION ENGINEERING** | **9 Hours**  |
| Need – Merits and Demerits – Duty, Delta and Base period – Irrigation efficiencies – Crops and Seasons - Crop water Requirement – Estimation of Consumptive use of water. |
| **UNIT IV** | **CANAL IRRIGATION** | **9 Hours**  |
| Types of Impounding structures: Gravity dam – Diversion Head works - Canal drop – Cross drainage works – Canal regulations – Canal outlets – Canal lining - Kennady’s and Lacey’sRegime theory. |
| **UNIT V** | **IRRIGATION METHODS AND MANAGEMENT** |  **9 Hours**  |
| Lift irrigation – Tank irrigation – Well irrigation – Irrigation methods: Surface and Sub-Surface and Micro Irrigation - Merits and demerits – Irrigation scheduling – Water distribution – Participatory irrigation management with a case study. |
|  | **Total:**  | **45 Hours** |

**Text / Reference Books**

|  |  |  |  |
| --- | --- | --- | --- |
| **Sl. No.** | **Title of the Book** | **Author(s)** | **Publisher** |
| **TEXT BOOKS** |
| T1 | Water Resources Engineering | Linsley R.K. and Franzini J.B, | McGraw- Hill, 2000. |
| T2 | Irrigation and water power Engineering | Punmia B.C., | Laxmi Publications,2009 |
| T3 | Irrigation Engineering and Hydraulic structures. | Garg S. K., | Khanna Publishers,2009 |
| **REFERENCES** |
| R1 | Elements of Water Resources Engineering | Duggal, K.N. and Soni, J.P., | New AgeInternational Publishers, 2005 |
| R2 | Water Resources Systems Planning and Management | Chaturvedi M.C., | McGraw-Hill Book Co., 1997. |
| R3 | Irrigation Theory and Practice | Michael A.M., | Vikas Publishing House Pvt. Ltd.,Noida, Up, 2008 |
| R4 | Irrigation Water Management | Dilip Kumar Majumdar, | Prentice-Hall of India, NewDelhi, 2008. |
| R5 | Irrigation Engineering | Asawa, G.L., | NewAge International Publishers, New Delhi, 2000 |
| **REFERENCE WEBSITES** |
| 1 | <http://nptel.iitm.ac.in> |
| 2 | http://www.ce.iitb.ac.in/ |

| **S.No.** | **Topic(s)** | **Hours** | **Teaching Method** |
| --- | --- | --- | --- |
| Unit – IWATER RESOURCES |
| Describe basic concepts of water resources planning and Explain the management of reservoir system |
|  | Water resources survey | 1 | Lecture with Discussion |
|  | Water resources of India and Tamilnadu | 1 |
|  | Description of water resources planning | 1 |
|  | Estimation of water requirements for irrigation and drinking | 1 |
|  | Single and multipurpose reservoir | 1 |
|  | Fixation of Storage capacity | 1 |
|  | Strategies for reservoir operation | 1 |
|  | Design flood-levees and flood walls. | 2 |
| **Total Number of hours for Unit I:10 (LH-09, TH-0, CH-0)** |
| **Unit II WATER RESOURCE MANAGEMENT** |
| **Discuss the availability of water resources and prepare water budget.** |
|  | Economics of water resources planning | 1 | Lecture with Discussion |
|  | National Water Policy | 1 |
|  | Consumptive and non consumptive water use | 1 |
|  | Water quality | 1 |
|  | Scope and aims of master plan | 1 |
|  | Concept of basin as a unit for development | 1 |
|  | Water budget | 1 |
|  | Conjunctive use of surface waterand ground water   | 2 |
| **Total No. of hours for Unit II : 09 (LH-09, TH-0, CH-0)** |
| **Unit - III IRRIGATION ENGINEERING** |
| Compute the consumptive use of water for irrigation. |
|  | Needs of irrigation | 1 | Lecture with Demonstration |
|  | merits and demerits of irrigation | 1 |
|  | DutyBase period, Delta Base period | 1 |
|  | Irrigation efficiencies | 2 |
|  | Crops and Seasons | 1 |
|  | Crop water Requirement | 1 |
|  | Estimation of consumptive use of water | 2 |
| **Total No. of hours for Unit III : 09 (LH-09, TH-0, CH-0)** |
| **Unit - IV CANAL IRRIGATION** |
| Design the canal impounding structures for effective water management system. |
|  | Types of Impounding structures | 1 | Lecture with Demonstration |
|  | Gravity dam | 1 |
|  | Diversion Head works | 1 |
|  | Canal drop | 1 |
|  | Cross drainage works | 1 |
|  | canal regulations | 1 |
|  | Canal outlets | 1 |
|  | Canal linning | 1 |
|  | Kennady‟s and Lacey‟s Regime theory  | 1 |
| **Total No. of hours for Unit IV : 09 (LH-09, TH-0, CH-0)** |
| **Unit - V IRRIGATION METHODS AND MANAGEMENT** |
| Explain the irrigation management system and scheduling.  |
|  | Irrigation Management Methods | 1 | Lecture with Demonstration |
|  | Lift Irrigation | 2 |
|  | Tank Irrigation | 1 |
|  | Well Irrigation | 1 |
|  | Surface And Sub-Surface And Micro Irrigation | 1 |
|  | Merits And Demerits Of Irrigation | 1 |
|  | Irrigation Scheduling, Water Distribution | 2 |
|  | Participatory Irrigation Management With A Case Study  |  |  |
| **Total No. of hours for Unit IV : 09(LH-09, TH-0, CH-0)** |
| **Total Hours: 45 hrs** |

**VIII. Detailed Course Plan**

**IX. Test Items for Competencies/Course Outcomes**

|  | **Sub-competencies** | **Cognitive Levels** |
| --- | --- | --- |
| **CO1** | **Describe basic concepts of water resources planning and Explain the management of reservoir system** | Understand |
| TI1 | Differentiate b/w consumptive and non – consumptive use of water. |
| TI2 | Classify the various zones of storage in a reservoir. |
| TI3 | Differentiate b/w single and multipurpose reservoir. |
| TI4 | Briefly explain about water resources in India and Tamil Nadu.  |
| TI5 | Distinguish between structural and nonstructural measures for flood control.  |
| **CO2** | **Discuss the availability of water resources and prepare water budget.** | Understand |
| TI1 | Differentiate between National Water policy (1987) and National Water policy (2002)?  |
| TI2 | What are the different equations for determination of consumptive use?  |
| TI3 | Define water budget.  |
| TI4 | Explain in detail the conjunctive use of surface and ground water.  |
| T15 | Briefly explain the methods for determination of consumptive use?  |
| **CO3** | **Compute the consumptive use of water for irrigation.** | **Understand** |
| TI1 | Define irrigation.  | Understand |
| TI2 | What is the necessity of irrigation?  |
| TI3 | Classify the types of Irrigation.  |
| TI4 | Discuss about the factors affecting the consumptive use of water.  |
| T15 | Explain the Necessity and scope of Irrigation in India and List out some of the major water resources in India?  |
| **CO4** | **Design the canal impounding structures for effective water management system.** |  **Apply** |
| TI1 | Define Canal outlets?  | Understand**Apply** |
| TI2 | What are the different types of Cross drainage works?  |
| TI3 | Describe about ridge canal.  |
| TI4 | Design a cross regulator for a distributor channel taking off from the parent channel, for the following data. Discharge of parent channel = 100 cumes Discharge of distributor = 15 cumes F.S.L of parent channel = u/s & d/s = 218.1 & 217.9 m Bed width of parent channel = u/s & d/s = 42 & 38 m Depth of parent channel = u/s & d/s = 2.5 & 2.5 m F.S.L of distributor = 217.1m Bed width distributor = 15 m Depth of water in distributor = 1.5 m Permissible exit gradient = 1/5  |
| TI5 | Discuss about the points to be considered for selection of site for a dam.  |
| **CO5** | Explain the irrigation management system and scheduling.  | **Apply** |
| TI1 | Define irrigation.  | Understand |
| TI2 | Define participatory irrigation management.  | Understand |
| TI3 | (i) Discuss about the favorable conditions for sub-surface irrigation. (ii) Describe the modes of applying water to crops with neat sketches.  | Understand |
| TI4 | Briefly explain about irrigation management in India and Tamil Nadu.  | Understand |

**X. a)Course Outcomes – Evaluation Strategy**

| **Comp.** | **Internal Tests** | **Assignment** |
| --- | --- | --- |
| **CO1** | 100% | - |
| **CO2** | 100% | - |
| **CO3** | 100% | - |
| **CO4** | 80% | 20% |
| **CO5** | 100% | - |

**XI. GAP ANALYSIS:**

1. To satisfy the Course Outcome number (CO1) (After completion of this course, students can able to explain basic concepts and list applications of robots in industries and other fields., the following topics to be taught to the student through regular lectures.
2. Recent trends and development in the field of robotics (Evolutionary robots, swarm robots, nano robots, micro robots, medical robots, space robots, wearable robots, intelligent robots, autonomous robots, etc.)
3. Applications of robots in other fields like medical robots, space robots, wearable robots, etc.
4. To satisfy Course outcomes CO2-CO4, Mini project will be done by the students.

**Mini Project title:** Make a mini robot for a particular application. Students can select any application. Maximum 4 students can be in a group.

**Course Co-ordinator HoD**