## 20CE4701D –OPEN CHANNEL HYDRAULICS

| Offering Branches | CE | | |
|---|---|---|---|
| Course Category: | Professional Elective | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisites: | 20CE3301- Mechanics of Fluids 20BS1101-Calculus and Algebra | Continuous Evaluation: | 30 |
| | | Semester End Evaluation: | 70 |
| | | Total Marks: | 100 |

**Course Outcomes**

Upon successful completion of the course, the student will be able to:

| CO1 | **Understand** the concept of open channels | K2 |
|---|---|---|
| CO2 | **Design** economic channel sections | K3 |
| CO3 | **Apply** gradually varied flow equation and able to solve problems | K3 |
| CO4 | **Understand** and **analyze** energy dissipation during hydraulic jump | K4 |
| CO5 | **Understand** the concept of flood routing | K2 |

**Contribution of Course Outcomes towards achievement of Program Outcomes**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 2 | | | 2 | | | | | 2 | | 2 | |
| CO2 | 2 | 2 | 2 | | | 2 | | | | | 2 | | 1 | |
| CO3 | 2 | 2 | 2 | | | 2 | | | | | 2 | | 2 | |
| CO4 | 2 | 2 | 2 | | | 2 | | | | | 2 | | 1 | |
| CO5 | 2 | 2 | 2 | | | 2 | | | | | 2 | | 1 | |
| Avg. | 2 | 2 | 2 | | | 2 | | | | | 2 | | 1 | |

| 1- Low | 2-Medium | 3-High |
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## Course Content

| UNIT-1 | Introduction, types of channels, classification of flows, velocity distribution, pressure distribution, specific energy, critical depth – calculation, kinetic energy correction factor, momentum correction factor. Bottom slopes and Surface profiles. | CO1 |
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| UNIT-2 | Uniform Flow: Chezy's equation, Manning's formula, velocity distribution, uniform flow computations, hydraulically efficient channel sections, Specific Energy, Specific Force, Critical Flow, Compound channel section, Irrigation canal. | CO2 |
| UNIT-3 | Gradually Varied Flow (GVF): Differential equation for GVF, classification and features of flow profiles, control sections, simple numerical solutions of GVF problems. | CO3 |
| UNIT-4 | Rapidly Varied Flow: Hydraulic jump in horizontal rectangular channel, use of jump as energy dissipater, Applications of hydraulic Jump. Types of hydraulic jump | CO4 |
| UNIT-5 | Flood Routing through reservoirs and flood routing through channel, Muskingum method of flood routing. | CO5 |

## Learning Resources

| Text Books | 1. K. Subramanya, Flow in Open Channels, 5/e, Tata McGraw Hill, 2015. 2. VenTe Chow, Open-Channel Hydraulics, McGraw-Hill, 2009. |
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| Reference Books | 1. P.N. Modi and S.M. Seth, Hydraulics and Fluid Mechanics and Hydraulic |

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| | Machines, 20/e, Standard Book House, 2015.<br>2. A.K. Jain, Fluid Mechanics, 12/e, Khanna publishers, 2014. |
| **e- Resources<br>& other<br>digital<br>material** | 1. https://nptel.ac.in/courses/105/103/105103096/<br>3. https://nptel.ac.in/content/storage2/courses/105107059/module1/lecture1/lecture1.pdf |