HWRM 401 ADVANCE FLUID MECHANICS (THEORY) (02 Credit hrs)

PRE-REQUISITE: HWRM-203

LEARNING OUTCOMES:

- This course will provide an introduction to the fluid dynamics & hydraulic machinery to the students.
- The students will learn about the Flow Systems.
- They will have the knowledge about Control Structures used in fluid dynamics.
- The students will get used to Storage Structures & dimensional analysis.
- The students will be equipped with the Pumps its types & their Uses.

CONTENTS

Unit-1 Introduction

1.1. Introduction of fluid dynamics
1.2. Flow control systems
1.3. Characteristics of flow control system
1.4. Characteristics of flow control
1.5. Hydraulics of flow control
1.6. Flow control concept

Unit-II Flow Systems

2.1. Pipe flow system
2.2. Water distribution analysis,
2.3. Design, construction and maintenance of irrigation channels

Unit-III: Control Structures

3.1. Design of discharge control
3.2. Structures; Design of surface and underground pipe line systems
3.3. Design of Channels
3.4. Construction and maintenance of irrigation canals

Unit-IV: Storage Structures

4.1. Design of storage structures
4.2. construction and maintenance of small irrigation water storage structures.

Unit-V: Pumps Types & Uses

5.1. Principles, types, operations, performance and maintenance of irrigation pumps
5.2. Total pumping head
5.3. Study of characteristics curves for different pumps

Unit-VI: Selection Criteria

6.1. Pump selection
6.2. Power unit selection
6.3. Economic aspects of irrigation pumping machinery

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,
- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

RECOMMENDED TEXT BOOKS / SUGGESTED READINGS

1. Kay, M. (2008). *Practical Hydraulics*. Taylor & Francis, Abingdon, UK.
2. Douglas, J. F. J. M. Gasiorek, J. A. Swaffield and Lynne B. Jack. (2005). *Fluid Mechanics.* Pearson Education Limited, Edinburgh, UK.
3. Khurmi, R.S. (2012). *Textbook of Hydraulics and Fluid Mechanics*. Chand & Co Ltd., India
4. Subramanya, K. (2008). *Flow in Open Channels*. Tata McGraw-Hill.
5. Akan, A. O. (2006). *Open Channel Hydraulics*. Butterworth-Heinemann, Burlington, MA, USA.

HWRM 401 ADVANCE FLUID MECHANICS (LAB) (01 Credit hr)

PRE-REQUISITE: HWRM-203

LEARNING OUTCOME:

- This course will provide an introduction to the demonstration of various parts of Hydraulic Bench.
- The students will learn about the experimental study of laminar and turbulent Flow.
- They will have the knowledge about measurement of drag on a small sphere.
- The verification of Bernoulli's theorem will be performed by the students.
- The students will get used to calibration of Orifices by various methods.
- The students will be equipped with the calibration of venturi meter.
- They will become conversant with calibration of. rectangular and triangular notch

CONTENTS

Unit-1

1.1. Demonstration of various parts of Hydraulic Bench

Unit-II

2.1. Experimental study of laminar and turbulent Flow.

Unit-III:

3.1. Measurement of Drag on a small sphere.

Unit-IV:

4.1. Calibration of Orifices by Various Methods

Unit-V:

5.1. Calibration of Venturi meter

Unit-VI:

6.1. Calibration of. Rectangular and Triangular Notch

Unit-VII:

7.1. Verification of Bernoulli's theorem

ASSIGNMENTS – TYPE AND NUMBER WITH CALENDAR

It is continuous assessment. The weightage of Assignments will be 25% before and after midterm assessment. It includes:

- classroom participation,
- attendance, assignments and presentation,
- homework
- attitude and behavior,
- hands-on-activities,

- short tests, quizzes etc.

ASSESSMENT AND EXAMINATIONS

Sr. No.	Elements	Weightage	Details
1.	Mid Term Assessment	35%	It takes place at the mid-point of the semester
2.	Formative Assessment	25%	It is continuous assessment. It includes: classroom participation, attendance, assignments and presentation, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3.	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

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