CE 376 HYDROMECHANICS
SPRING 2019-2020

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COURSE OUTLINE

1.INTRODUCTION
- 1.1. Scope of the Course

2.PIPE FLOW
- 2.1. Entrance Region and Fully Developed Flow (1. Week)
- 2.2. Fully Developed Flow in Closed Conduits (1. Week)
- 2.3. Laminar and Turbulent Flow (1. Week)
- 2.4. Major Head Losses (2. Week)
- 2.5. Minor Head Losses (3. Week)
- 2.6. Single Pipe Flow Systems (4. Week)
- 2.7. Multiple Pipe Flow Systems (4. Week)
- 2.8. Pump and System Curves (5. Week)

I. MIDTERM

3.OPEN CHANNEL FLOW
- 3.1. General Characteristics of Open Channel Flow (7. Week)
  - 3.1.1. Comparison of Closed Conduit and Open Channel Flows
  - 3.1.2. Types of Open Channel Flows
  - 3.1.3. Geometric Elements of Open Channel Sections
  - 3.1.4. States of Open Channel Flow
  - 3.1.5. Velocity Distribution in Open Channel Sections
  - 3.1.6. Pressure Distribution in Open Channel Sections
- 3.2. Basic Equation in Open Channel Flow (8. Week)
  - 3.2.1. Continuity Equation
  - 3.2.2. Momentum Equation
  - 3.2.3. Energy Equation
- 3.3. Uniform Flow (9. Week)
  - 3.3.1. Resistance in Open Channel Flow
  - 3.3.2. Chezy Formula
  - 3.3.3. Manning Formula
  - 3.3.4. Composite and Compound Sections
  - 3.3.5. Hydraulic Efficiency of Cross-Sections
  - 3.3.6. Uniform Flow Computations
- 3.4. Specific-Energy Concept and Critical Flow (10. Week)
  - 3.4.1. Specific Energy and Alternate Depth and Choke Concept
  - 3.4.2. Critical Flow and Critical Slope
  - 3.4.3. Channel Transitions
- 3.5. Rapidly Varied Flow (11. week)
  - 3.5.1. Hydraulic Drop and Jump
  - 3.5.2. Momentum Principle and Specific Force
  - 3.5.3. Specific Force and Hydraulic Jump in Rectangular Channels
  - 3.5.4. Types of Hydraulic Jump

3.6. Gradually Varied Flow (12. week)

3.6.1. General Equation of Gradually Varied Flow

3.6.2. Numerical Step Methods

3.6.3. Types of Slopes

II. MIDTERM

4. DIMENSIONAL ANALYSES AND SIMILITUDE

4.1. Buckhingham's π -Theorem and Power Product Method (14 week)

4.2. Modeling (15 week)

Reference Books:

1)Fundamentals of Fluid Mechanics, Munson B.R., Young D.F., Okisihi T.H., John Wiley & Sons Inc., New York, 1998

2) Douglas J.F., Janusz M.G. and Swaffield J.A., 'Fluid Mechanics', Prentice Hall.

3) Fox, R.W., McDonald, A.T., and Pritchard, P.J., "Introduction to Fluid Mechanics, John Wiley & Sons, Inc.

4) Mechanics of Fluids, Shames I., McGraw-Hill Inc-Kogakusha Co., Tokyo, 1982

5) Open Channel Hydraulics, Chow V.T., McGraw-Hill Inc-Kogakusha Co., Tokyo, 1959

6) Open Channel Flow, French R.H., McGraw-Hill, Singapore,1987

Grading:

2 Midterms + [Homeworks + Quizzes + Reports] = 60% of total grade

Final Examination = 40% of total grade

Attendance: 70% is compulsory.