(b) Find the critical depth and critical velocity of the water flowing through a rectangular channel of width 5 m, when discharge is 15 m^3/s. 5

(c) Find the rate of change of depth of water in a rectangular channel of 10 m wide and 1.5 m deep, when the water is flowing with a velocity of 1 m/s. The flow of water through the channel of bed slope 1 in 4000, is regulated in such a way that energy line is having a slope of 0.00004. 5

UNIT – IV

8. (a) The depth of flow of water, at a certain section of a rectangular channel of 2 m wide, is 0.3 m. The discharge through the channel is 1.5m^3/s. Determine whether a hydraulic jump will occur, and if so, find its height and loss of energy per kg of water. 7

(b) What is hydraulic jump ? Write down different types of hydraulic jump and various applications of hydraulic jump. 8

9. (a) Define surge in an open channel. Derive an expression for positive surge due to sudden increase of flow. 10

(b) Explain the moment of momentum equation. 5

Roll No. ....

3080

B. Tech. 4th Semester (Civil) Examination – July, 2021

HYDRAULIC ENGINEERING

Paper : PCC-CE-202-G

Time : Three hours] ***[Maximum Marks : 75***

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions by selecting ***one*** question from each Unit and question no. **1** is ***compulsory***.

1. Define any *six* from the following : $2.5 \times 6 = 15$

(i) Causes of turbulence

(ii) Loss of head due to obstruction and bend in pipe

(iii) Sub-critical, critical & super-critical flow

(iv) Elements & characteristics of hydraulic jump

(v) Loss of head due to sudden expansion and sudden contraction in pipe

(vi) Steady and unsteady flow

(vii) Branching of pipes

(viii) Differentiate between Open Channel flow and Pipe flow

P. T. O.

UNIT – I

2. (a) Derive any ***two*** of the following for laminar flow between two parallel fixed plates : 10

(i) Velocity distribution

(ii) Ratio of maximum velocity to average velocity

(iii) Drop of pressure head for a given length

(b) Name various methods adopted for measurement of viscosity of a fluid and write in brief about any ***one***. 5

3. (a) Describe Reynold's experiment with a neat sketch. 7

(b) A smooth pipe of diameter 400 mm and length 800 m carries water at the rate of 0.04 m^3/s. Determine the head lost due to friction, wall shear stress, centre-line velocity and thickness of laminar sub-layer. Take the kinematic viscosity of water as 0.016 stokes. 8

UNIT – II

4. (a) The rate of flow of water through a horizontal pipe is 0.30 m^3/s. The diameter of the pipe which is 200 mm is suddenly enlarged to 400 mm. The pressure intensity in the smaller pipe is 11.772 N/cm^2. Determine : 7

(i) Loss of head due to sudden enlargement

(ii) Pressure intensity in the large pipe

(b) Explain Pipes in series and parallel with diagrams and its expression. 8

5. (a) Define hydraulic gradient line and total energy line with diagram. 6

(b) A Pipe of diameter 20 cm and length 2000 m connects two reservoirs, having difference of water levels as 20 m. Determine the discharge through the pipe. If an additional pipe of diameter 20 cm and length 1200 m is attached to the last 1200 m length of the existing pipe, find the increase in the discharge. Take f = 0.015 and neglect minor losses. 9

UNIT – III

6. (a) A rectangular channel carries water at the rate of 300 liters/sec when bed slope is 1 in 2000. Find the most economical dimensions of the channel if C = 40. 7

(b) What is most economical section ? Derive conditions for the most economical trapezoidal channel section. 8

7. (a) Classify various surface profiles in brief. 5