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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATIONS-2022

B.Tech-6th Semester

COURSE CODE: 18B1WCE639

MAX. MARKS: 25

COURSE NAME: Open Channel Flow and Hydraulic Machines

COURSE CREDITS:3

MAX. TIME: 1 Hour 30 Min

Note: All questions are compulsory. Marks are indicated against each question in brackets.

Paper has two sides.

Q.1 An oil having viscosity of 0.143Ns/m^2 and specific gravity 0.9 flows through a pipe 2.5 cm diameter and 300 cm long at $1/10$ of the critical velocity for which Reynolds number is 2500. Find:

- a) Velocity of flow through pipe.
- b) The head in metres of oil across the pipe length required to maintain the flow. (3 Marks)

Q.2 Differentiate between Open Channel flow and Pipe flow with diagrams? (3 Marks)

Q.3.1 Explain the specific energy curve for an open channel uniform flow with relevant diagram. (2.5 Marks)

Q3.2 For a rectangular channel in which uniform flow takes place at a depth of 2 mtr, Calculate the following parameters: (Consider the width of the channel = 4 mtr, slope of the channel = .0036 and Manning Coefficient as .015)

- a) Discharge. (1 Marks)
- b) Velocity of flow. (0.5 Marks)
- c) Energy of flow. (0.5 Marks)
- d) Critical depth of flow. (0.5 Marks)
- e) Critical Energy of flow. (0.5 Marks)
- f) Plot the specific energy curve demonstrating: Energy of flow, Critical Energy (1 Marks)

and Critical Depth of flow;

g) By how much the bottom of the channel can be raised without affecting the overall flow in the channel. (1 Marks)

Q.4 Write the properties of a Hydraulically most efficient and economic section. For a hydraulically efficient trapezoidal section, derive the expression for following condition:

- a) The hydraulic radius is equal to half of the depth of the flow.
- b) Length of side slope is equal to half of the top width.
- c) The sloping side is inclined at an angle of 60 degree with the horizontal.
- d) Radius of the circle with 3 sides of the section as tangent is equal to the depth of the section.
- e) Section is half of a regular hexagon.

(2+1.5+1+1.5 +1.5+1 Marks)

Q.5 Derive the following relationship for open channel flow in triangular section:

- a) Discharge and Critical Depth
- b) Critical depth and Energy

(3Marks)

T2 Examinations April 2022