

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – SUMMER 2019****Subject Code: 2154002****Date: 03/06/2019****Subject Name: Fluid Mechanics and Hydraulics****Time: 02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Define and explain the terms: (i) Water Hammer; (ii) Hydraulic Gradient Line; (iii) Total Energy Line. **07**
- (b) Explain the phenomenon of capillarity. Obtain an expression for capillary rise of a liquid. **07**
- Q.2** (a) In view of open channel flow, Differentiate: (i) Uniform and non-uniform flow; (ii) Laminar and turbulent flow; (iii) Critical, sub-critical and supercritical flow; (iv) Rapidly varied and gradually varied flow. **07**
- (b) What is manometer? Describe any one in detail. **07**
- OR**
- (b) Define pressure. Derive an expression for pressure intensity at a point in a fluid. Why the pressure is a scalar quantity? **07**
- Q.3** (a) How are the weirs and notches classified? Derive the expression for the discharge through a trapezoidal notch or weir. **07**
- (b) Prove that streamlines and equipotential lines are orthogonal. **07**
- OR**
- Q.3** (a) Describe the construction, operation and use of pitot tube using neat sketch. **07**
- (b) Explain following terms with neat sketch: (1) Stream line (2) Path line (3) Streak line (4) Stream Tube. **07**
- Q.4** (a) Explain the principle of venturimeter with a neat sketch and derive the expression for the rate of flow of fluid through venturimeter. **07**
- (b) What is specific energy curve for open channel flow? Draw specific energy curve, and then derive expressions for critical depth and critical velocity. **07**
- OR**
- Q.4** (a) Elucidate the importance of hydraulic coefficients. Define: (i) Co-efficient of velocity; (ii) Co-efficient of contraction and (iii) Co-efficient of discharge. **07**
- (b) Find an expression for loss of energy head for a hydraulic jump in open channel flow. **07**
- Q.5** (a) Draw and discuss the operating characteristics of centrifugal pumps. **07**
- (b) Derive equation for head loss due to friction (Darcy-Weisbach Equation) in flow through pipes. **07**
- OR**
- Q.5** (a) What do you mean by gross head, net head and efficiency of turbine? Explain the different types of the efficiencies of a turbine. **07**
- (b) Derive an expression for the loss of head due to (i) Sudden enlargement and (ii) Sudden contraction of a pipe. **07**
