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JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT
SUMMER SEMESTER – END TERM TEST (JULY 2016)

Course Code: 1011CE312   **Max. Marks: 50**
Course Name: Fluid Mechanics   **Max. Time: 2 hrs**
Course credit: 4

Note: All questions are compulsory. Assume suitable data if required. Notation has its usual meaning.

Q1. Explain the following briefly   [12]

   (a) Steady and unsteady flow
   (b) Uniform and uniform flow
   (c) Velocity potential function
   (d) Ventilation of weir

Q2. A pipe line carrying oil of specific gravity 0.87, changes in diameter from 200 mm diameter at a position A to 500 mm diameter at position B which is 4 m at a higher level. If the pressure at A and B are 9.81 N/cm^2 and 8.886 N/cm^2 respectively and the discharge is 200 litre/sec, determine the loss of head and direction of flow.   [8]

Q3. (a) Explain the principle of venturimeter with a neat sketch.   [3]

   (b) A horizontal venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of oil of specific gravity 0.8. The discharge of oil through venturimeter is 60 litre/sec. find the reading of mercury manometer fitted on the two sides of the venturimeter. The co-efficient of discharge of the meter = 0.98.   [7]

Q4. The resisting force R of a supersonic plane during flight can be considered as dependent upon the length of aircraft L, air density ρ , air viscosity μ, velocity V of the body and bulk modulus of air K. Express the functional relationship between these variables and resisting force R using pie Buckingham theorem.   [10]

Q5. The velocity vector in a fluid flow is given by
$$V = x^2yi + 5y^2zj - (2xyz+yz^2)k$$

Prove that it is possible case of steady incompressible fluid flow. Find the velocity of a fluid particle at (2,1,3).   [2+3]

Q6. Determine the height of a rectangular weir of length 6 m to be built across a rectangular channel. The maximum depth of water on the upstream side of the weir is 1.8 m and discharge is 2000 l/s. take C_d = 0.6 and neglect end contraction.   [5]