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TEST -2 EXAMINATION- Oct 2017

COURSE CODE: **10B11 CE312** MAX. MARKS: 25

COURSE NAME: **Fluid Mechanics**

COURSE CREDITS: 04 MAX. TIME: 1Hr 30 Min

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.* ***Assume suitable data if required. Notation has their usual meanings.***

Q1. The velocity components in a 2- dimensional incompressible flow are

$$u = 6x + y^3 - 3y\,x^2 \quad , v = 3yx^2 - x^3 - 6y$$

(a) Is the flow continuous? [1]

(b) Is the flow irrotational? [1]

Q2. (a) Explain the terms meta-centre and meta-centric height with neat sketch. [1]

(b) A wooden cylinder (specific gravity = 0.6) of circular cross section having length *l* and diameter *d* floats in water. Find the maximum permissible *l/d* ratio so that the cylinder may float in stable equilibrium with its axis vertical. [4]

Q3. (a) Show that if velocity potential function exists, the flow is irrotational. [1]

(b) If for a two dimensional potential flow , the velocity potential is given by

$$\phi = x(2y-1)$$

Determine the velocity at P (4,5). Determine also the value of stream function ψ at the point P. [4]

Q4. Explain the following briefly [4]

(a) Streak lines and path lines

(b) Linear translation and linear deformation

(c) Bernoulli theorem for real fluid

(d) Steady and unstaedy flow

Q5. (a) Explain the principle of venturimeter with neat sketch. What is the use of venturimeter? [2]

(b) Water is flowing through a pipe having diameters 20 cm and 10 cm at *section 1* and *section 2* respectively. The rate of flow through the pipe is 35 litres/sec. *Section 1* is 2 m above the *section 2*. If the pressure at *section 1* is 40 N/cm^2, find the pressure at *section 2*. The direction of flow is from *section 1 to section 2.* [3]

Q6. The water face profile of a dam shown in figure 1 follows a law $60y = x^3$ where y is the height above the base level in meters and x is the set back of the face from the vertical through the vertex O in meters. Find the resultant force per meter of the dam due to water pressure. [4]

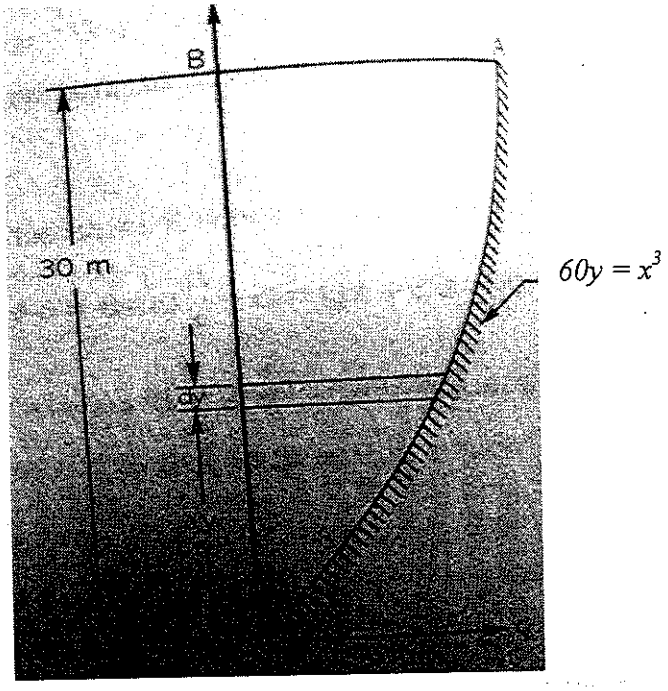

Figure 1