

SUBJECT CODE:- 478
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(CIVIL) Examination Nov/Dec 2015
Fluid Mechanics-I
(Revised)

[Time: Three Hours]

[Max. Marks: 80]

“Please check whether you have got the right question paper.”

N.B.i) Question no 1 and 6 are compulsory.

ii) Attempt any two questions from each section from remaining.

iii) Draw neat sketches wherever necessary.

iv) Assume suitable data, if necessary.

Section A

- Q.1 Answer the following (any five) 10
- i) State the characteristics of an ideal fluid.
 - ii) Define gauge pressure.
 - iii) Define static pressure
 - iv) Define buoyant force and center of buoyancy
 - v) Draw a neat diagram of
 - a) Path line of fluid profile
 - b) Streak line of fluid particles.
 - vi) Differentiate between steady and unsteady flow.
 - vii) State true or false: flow is irrotational if the fluid particles do not rotate as they revolve in circles about the origin.
 - viii) Draw neat diagram of velocity distribution and shear stress distribution in case of laminar flow in circular pipes.
 - ix) If specific gravity of a liquid is 0.68, make calculations for its mass density and specific volume.
 - x) Draw neat diagram of inclined single column manometer.
- Q.2 a) Define viscosity. Obtain an expression for viscosity. Also give its S.I. units. 07
- b) Two pressure points in a water pipe are connected to a manometer, which has the form of an inverted U- tube. The space above the water in the two limbs of the manometer is filled with a fluid of sp. Gravity 0.70m. if the difference of level of water columns in the two limbs is 0.30m, what is the corresponding difference of pressure between the two points? 08
- Q.3 a) Obtain an expression for total pressure and centre of pressure on lock gates. 07
- b) A rectangular plate 2.5meters long and 2.0m wide is immersed vertically in water in such a way that its 2.5m side is parallel to the water surface and is 0.8 meter below it. Find 08
- i) Total pressure on the plate and
 - ii) Position of center of pressure.
- Q.4 a) Define two-dimensional stream function and velocity potential. Show that following stream function. $\psi = 6x - 4y + 7xy + 9$, Represents an irrotational flow. Find its velocity potential. 08
- b) Find an expression for the loss of head of a viscous fluid flowing through a circular pipe. 07
- Q.5 a) Explain the conditions of equilibrium of a floating body with neat sketch. 05
- b) List out various types of fluid flow and explain any one of it. 05
- c) Give the classification of fluids. 05

SECTION-B

Q.6	Solve any five	10
	i) Enlist the various instruments used for measuring flow.	
	ii) Define laminar boundary layer.	
	iii) Give the assumption made in Bernoulli's equation	
	iv) Define friction drag and pressure drag.	
	v) Draw neat diagram of internal and external mouthpiece.	
	vi) Define momentum correction factors.	
	vii) Draw neat diagram of pitot-tube connected with piezometer.	
	viii) What do you mean by convergent-divergent mouthpiece	
	ix) What do you mean by partially-submerged orifice	
	x) Give Francis's formula for weir with velocity of approach.	
Q.7	a) Derive an expression for discharge through a venturimeter.	07
	b) The head of water over on orifice of diameter 60mm is 8.0m. Find the actual discharge and actual velocity of jet at vena-contracta. Tate: $C_d=0.6$ and $C_v=0.98$	08
Q.8	a) A cipolletti weir of crest length 600mm discharges water. The head of water over the weir is 40 cm. find the discharge over the weir if the channel is of 700mm wide and 400mm deep. Take $C_d=0.62$.	08
	b) Obtain an expression for discharge over a triangular notch.	07
Q.9	a) Obtain an expression for the boundary shear stress in terms of momentum thickness.	07
	b) Define	04
	i) Stream –lined body	
	ii) Bluff body	
	c) What do you understand by total drag on a body and resultant force on a body?	04
Q.10	a) Obtain an expression for discharge over a stepped notch.	05
	b) Explain how to determine hydraulic coefficients experimentally.	06
	c) The head of water over a rectangular notch is 90 cm. the discharge is 300 litres/sec. find the length of the notch when $C_d=0.62$.	04