Total No. of Printed Pages:2

SUBJECT CODE NO:- P-72
FACULTY OF ENGINEERING AND TECHNOLOGY
S.E.(CIVIL) Examination May/June 2017
Fluid Mechanics-I
(Revised)

[Time: Three Hours] **[Max.Marks:80]**

Please check whether you have got the right question paper.

N.B i) Q.No.1 and Q.No.6 are compulsory.
ii) Solve any two from remaining questions for section A and any two for section B.
iii) Assume suitable data, if necessary.

Section A

Q.1 Solve any five from following. 10
1) Draw a net diagram showing different types of fluids.
2) Define specific volume.
3) What is meant by intensity of pressure?
4) Define the term vapour pressure?
5) Enlist the applications of flow net.
6) Define radial flow.
7) Define metacentric height.
8) Draw neat diagram for inclined plane surface sub-merged in liquid.
9) What are the properties of stream function(Ψ)

Q.2 a) If specific gravity of a liquid is 0.80. Make calculations for its mass density, specific volume and specific weight. 06
b) What do you mean by single column manometers? How are they used for the measurement of Pressure? 06
c) State the Archimedes Principle. 03

Q.3 a) Derive an expression for the force exerted on a submerged vertical plane surface by the static liquid and locate the position of centre of pressure. 08
b) A vertical square 1.6 m on a side with two sides horizontal is immersed in a oil density900 kg/m^3, such that the centre of pressure is 7.5 cm below the center of gravity .How far below the square be immersed in oil? What will be the total force on the square? 07

Q.4 a) The velocity components in fluid How are given by u=2xy, $v = a^2 + x^2 - y^2$. 07
i) Show that the flow is possible.
ii) Derive the relative stream function.
b) Derive an expression for the velocity distribution for viscous How through a circular pipe. 08

Q.5 Write short notes on (any three) 15
1) Free and force vortex
2) Equilibrium of Floating bodies.
3) Expression for the meta-centric
4) Draw neat diagram of .
a) U-tube manometer
b) Inverted U- tube Manometer

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Section-B

Q.6 Solve any five from following. 10

1) Define potential energy and kinetic energy.
2) Give classification of notches.
3) Define Moment of momentum equation.
4) Draw neat diagram of partially sub-merged orifice.
5) What do you mean by a drowned weir?
6) Define momentum thickness.
7) Draw neat diagram of vertical venturimeter with U-tube manometer.
8) Enlist the types of boundary layer.
9) The reading of differential manometer connected to the inlet and throat is 20 cm of mercury; find the pressure head for water flowing through horizontal venturimeter.
10) Draw the diagram for forces acting on a pipe bend.

Q.7 a) Derive Bernoulli's equation for the flow of an incompressible frictionless fluid. 07

b) A venturimeter with200 mm diameter at convergent cone and 100 mm at throat is laid with it's axis horizontal and is used for measuring the flow of oil of sp. Gr.0.80. the oil mercury differential manometer shows a gauge difference of 250 mm. Calculate the discharge. Take Cd= =0.97 08

Q.8 a) Obtain an expression for discharge through 10

i) Mouthpiece running free
ii) Mouthpiece running full.

b) The head of water over the centre of an orifice of diameter 25 cm is 2.8 m. The actual discharge through the orifice is 450 lit/sec. Find the co-efficient of discharge 05

Q.9 a) Explain in detail 06

1) Laminar boundary layer
2) Turbulent boundary layer.

b) Obtain an expression for drag and Lift. 09

Q.10 a) The head of water over a rectangular weir is 400 mm. The length of the crest of the weir with end contraction suppressed is 2.0m. find the discharge by using Francis's formula. 05

b) Find the velocity of the flow of an oil through a pipe, when the difference of mercury level in a differential U-tube manometer connected to the two tappings o the piton-tube is 150 mm. Take C_v=0.98 and sp. gr. of oil=0.8. 06

c) Explain how to determine coefficient of velocity (Cv) experimentally. 04