Total No. of Printed Pages:2

SUBJECT CODE NO:- H-166
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Civil)
Fluid Mechanics - II
(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 questions from each section.
iii) Assume suitable data if necessary.

Section: A

Q.1 Attempt the following(any five) 10

i. Draw velocity distribution diagram in open channels.
ii. What is Hagen poiseulle's formula?
iii. What do you mean by economic channel sections?
iv. Define aerofoil and Magnus effect.
v. What do you mean by fundamental dimension?
vi. Define Critical Depth and Critical flow.
vii. What are standing Wave Flume and Venturiflume?
viii. Enlist the forces acting on immersed bodies in flowing fluids.
ix. Define Boundary Layer Theory.
x. If v=2.1 m/s, Y_m=1.6m, S_0=1:1000 find out chezy's constant C.

Q.2
a) Explain the most economical section of channel. In which situations, the rectangular channel section can become most economical? Derive the relations involved. 07
b) A channel is to be designed to give a constant mean velocity of flow of 1.8m/sec. at all depth of flow. The lower portion of the channel to carry the minimum discharge is rectangular and the best proportion, the bottom width being 1.5m. Determine the depth of flow when width of water surface is 9m. If Manning's n=0.015, find the channel bed slope. 08

Q.3
a) Define the hydraulic jump and obtain an expression for depth of hydraulic jump. 07
b) A rectangular channel 4m wide and bed slope of 0.0005 discharges $6m^3/s$. find the depth of water using manning formula and taking N=0.02. 08

Q.4
a) Derive an expression for displacement thickness. 07
b) Derive an expression Drag force on a flat plate by momentum equation. 08

Q.5
a) Explain with neat sketch uniform flow and gradually varied flow. 05
b) Describe the Rayleigh's method for dimensional analysis. 05
c) Define :i) Subcritical flow ii) Supercritical flow 05

Section: B

Q.6 Attempt the following.(any five) 10

i. Draw velocity triangle for Kaplan turbine.
ii. What is impact of jets?
iii. What do you mean by impulse momentum question?
iv. Define radial flow reaction turbine.
v. What is reciprocating pump?
vi. Write functions of Surge tank?
vii. Draw neat diagram of Moody draft tube.
viii. Enlist the dimensionless numbers.
ix. What is priming of pumps?
x. If diameter of a wheel pelton turbine is 1.7m and jet diameter is 12cm, find out the number of buckets.

Q.7 a) Derive an expression for the force exerted by jet of fluid on a moving flat plate when the plate is normal to the jet. 07

b) A metal plate on of 10mm thickness and 200mm square is hung so that it can swing freely about the upper horizontal edge. A horizontal jet of water of 20mm diameter impinges with its axis perpendicular and 50mm below the edge of the hinge, and keeps it steadily inclined at 30° at the vertical. Find the velocity of the jet if the specific weight of the metal is 75KN/m^3. 08

Q.8 a) Explain with neat sketch the working of Pelton wheel. 07

b) Determine the efficiency of a Kaplan turbine developing 4000HP under a net head of 5m. It is provided with a draft tube of 3m inlet diameter set 1.6m above the tail race level. A vacuum gauge connected to the draft tube inlet indicates a reading of 5 m of water. Assume draft tube efficiency 78%. 08

Q.9 a) What are the different problems and remedies for centrifugal pump? 07

b) Obtain an expression for the work done by impeller of a centrifugal pump on water per second per unit weight of water. 08

Q.10 Write short notes on following. 15

i) Reciprocating pump.
ii) Effect of acceleration and frictional resistance.
iii) Slip and cavitations with reference to the reciprocating pump.