Total No. of Printed Pages:2

SUBJECT CODE NO:- H-166
FACULTY OF ENGINEERING 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 remaining questions of each section.
      ii) Assume suitable data if necessary.

Section: A

Q.1   Attempt the following(any five)   10
- i. What is open channels flow?
- ii. What is Hagen poiseuille's formula?
- iii. What do you mean by Froude's Number?
- iv. Define laminar and turbulent flow.
- v. What is the dimension of the viscosity and pressure?
- vi. Define specific energy and Critical Flow?
- vii. What are Standing Wave Flume and Venturiflume?
- viii. Enlist the forces acting on immersed bodies in flowing fluids.
- ix. Define Lift and Drag force.
- x. Write Bernoulli's Equation in case of open channel.

Q.2   a) Explain with a neat sketch, the procedure of measurement of discharge in rivers. 07
       b) Find the specific energy of flowing water through a rectangular channel of width 6.5m 08
          when the discharge is $20m^3$/sec and depth of water is 4.0m.

Q.3   a) Derive an expression for back water curve in open channel. 07
       b) An open channel is V-shaped, each side is being inclined at 45° to the vertical. If it 08
          carries a discharge of 0.04 m^3/sec with the depth of flow at the center is 22.5 cm,
          calculate the slope of the channel. Take C=50.

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

Q.5   a) Explain with neat sketch depth-energy relationships in open channel. 05
       b) Describe Energy Dissipaters. 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 Francis turbine.
     ii.   What is subcritical and supercritical flow?
     iii.   What do you mean by axial flow turbine?
     iv.   Define unit speed and unit power.
     v.   What is runway speed?
     vi.   Draw neat sketch of Indicator diagram.
     vii.   Write function of draft tube.
     viii.   Classify the various types of pump.
     ix.   What is dimensional homogeneity?
     x.   Draw neat sketch of two-stage pumps with impeller in series.

Q.7   a)   Derive an expression for the force exerted by jet of fluid on a moving flat plate when the   07
              plate is Inclined to the jet.
     b)   A jet of water having a velocity of 40 m/sec. strikes a curved vane which is moving with   08
              velocity of 20 m/sec. The jet makes an angle of 30° with the direction of motion of vane
              at inlet and leaves at an angle of 90° then direction of motion of vane outlet. Draw the
              velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so
              that the water enters and leaves the vane without shock.

Q.8   a)   Explain with a neat sketch the working of Kaplan turbine.   07
     b)   A Kaplan turbine produces 60,000 kw under a net head of 25 m with an overall   08
              efficiency of 90%. Taking the value of speed ratio ku as 1.6, flow ratio Ψ as 0.5 and the
              hub diameter as 0.35 times the outer diameter, find the diameter and speed of turbine.

Q.9   a)   With a neat sketch, explain the working of single acting and double acting reciprocating   07
              pump.
     b)   A 6.2 m high and 15 m long spillway discharges 68 m³/sec discharge under a head of   08
              2.0 m. If 1:8 scale model of this spillway is to be constructed, determine model
              dimensions, head over spillway model and the model discharge.

Q.10   Write short notes on following.   15
     i.   Model investigation
     ii.   Governing of turbines
     iii.   Air vessel and its function.