24196

B.Tech. (Civil) 4th Semester (F. Scheme)

Examination, May–2015

FLUID MECHANICS–II

Paper–CE-204-F

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *(i)* ***Question No. 1 is compulsory.*** *Attempt one question from each section.*

(ii) All questions carry equal marks.

(iii) Assume missing data, if any, suitably.

1. Explain the following : 10×2=20

(a) Laminar and turbulent flow

(b) Net positive suction head

(c) Aging of pipes

(d) Cavitations

(e) Water hammer

(f) Types of slopes

(g) Channel transitions

(h) Three throw pumps

(i) Surges in open channel

(j) Components of centrifugal pump.

Section–A

2. (a) Water is flowing through a rough pipe of diameter 500 mm and length 4500 m at the rate of 0.4 m^3/sec. find the power required to maintain this flow. Assume average height of roughness as 0.50 mm. 10

(b) Describe total energy line and hydraulic gradient line with diagram. 10

3. (a) A pipe of diameter 250 mm and length 4000 m is used for the transmission of power by water. The total head at the inlet of the pipe is 400 m. Find the maximum power available at the outlet of the pipe. Take f = 0.006. 15

(b) Explain the branching of pipes. 5

Section–B

4. (a) Find the discharge through a trapezoidal channel of width 8 m and side slope of 1 horizontal to 3 vertical. The depth of flow of water is 3 m. take C = 50 and slope of bed of channel 1 in 4000. 10

(b) Derive the expression for most economical rectangular channel. 10

5. (a) The discharge of water through a rectangular channel of width 8 m, is 18m^3/sec when depth of flow of water is 1.5 m. Calculate specific energy of flowing water, critical velocity and value of minimum specific energy. 15

(b) Explain classification of surface profile. 5

Section–C

6. (a) Two jets strike the buckets of a Pelton wheel, which is having shaft power 15400 kW. The diameter of each jet is 250 mm. If the net head on the turbine is 400 m, find the overall efficiency of the turbine. Take $C_v = 1.2$. 15

(b) Describe the components of radial flow reaction turbine with neat diagram. 5

7. A conical draft tube having inlet and outlet diameters as 1 m and 2 m discharges water at outlet with a velocity of 3 m/sec. The total length of the draft tube is 6 m and 1.25 m of the length of draft tube is immersed in water. If the atmospheric pressure head is 10 m of water and loss of head due to friction in the draft tube is 0.5 times the velocity head at outlet of the tube, find the pressure head at the inlet and efficiency of the draft tube. 20

Section–D

8. (a) Derive the expression for specific speed for a centrifugal pump. 10

(b) Explain the working of a single stage centrifugal pump with a neat diagram. 10

9. (a) A single acting reciprocating pump, running at 40 r.p.m., discharges 1.5 m^3/sec of water. The diameter of the piston is 250 mm and stroke length 500 mm. Determine the theoretical discharge of the pump, coefficient of discharge and percentage of the slip of the pump. 15

(b) Describe the working of air vessels in detail. 5