Department of Civil Engineering, IIT Delhi

Major Test

CEL 451

Water Power Engineering

Time: 10.30-12.30 Date: 07-05-2016 Room No. LH316 Total Marks: 40

Assume any Missing Data No Extra Time is allowed **Submit on Time**

1. What is the potential of SHP in India? Explain its economic aspects in India. [Marks: 4]

2. Mention any four different types of intakes with figures giving examples where these have been used in hydel projects. [Marks: 6]

3. Derive the Muskingum Equation for releasing water in the channel with figure. Also steps followed to determine its storage coefficients. [Marks: 6]

4. A Pelton wheel is revolving at a speed of 190 r.p.m. and develops 5150.25kW when working under a head of 220m with an overall efficiency of 80%. Determine unit speed, unit discharge and unit power. The speed ratio for the turbine is given as 0.47. Find the speed, discharge and power when this turbine is working under a head of 140m. [Marks: 6]

5. The hub diameter of a Kaplan turbine, working under a head of 12m, is 0.35 times the diameter of the runner. The turbine is running at 100 r.p.m. If the vane angle of the extreme edge of the runner at outlet is 15° and flow ratio is 0.6, determine: (i) Draw velocity triangles and diameter of the runner (ii) Diameter of the boss and (iii) Discharge through the runner. [The velocity of whirl at outlet is given as zero] [Marks: 6]

6. Differentiate between:
(a) Load Factor and Plant Factor
(b) Draft Tube and Tail Race
(c) Firm Power and Secondary Power
[Marks: 6]

7. Short Notes:
(a) Cooperating Double Basin Arrangement
(b) Banded Penstock
(c) Trash Rack [Marks: 6]