I.D. No. 24515

B.Tech. 7th Semester F. Scheme (Civil Engineering-XI)

Examination, May–2014

HYDRO-POWER ENGINEERING

Paper–CE-451-F

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

Note : *(i)* ***Question No. 1 is compulsory.***

*(ii) Attempt **one** question from each section.*

(iii) All questions carry equal marks.

*(iv) Attempt **five** questions in all.*

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

1. (a) Describe the advantages of water power.

(b) Differentiate between thermal power and hydropower.

(c) Explain the methods for prediction of loads.

(d) Describe reversible turbines and cavitations in turbines.

(e) Describe basic features of hydropower plants.

5×4=20

Section–A

2. (a) What do you mean by hydro-power ? Explain the importance of hydropower in power system. 10

(b) What are the different sources of energy ? Explain the advantages of hydropower in detail. 10

3. (a) Define and state the equations for :
   (i) Load factor
   (ii) Capacity factor
   (iii) Utilization factor
   (iv) Plant factor. 10

   (b) What is load duration curve ? With the help of graph explain its significance and applications. 10

Section–B

4. (a) The runoff river hydropower plant has inflow of 30 cumecs and it works on head of 50 m with a provision for pondage to meet daily demand with load factor of 75%. Determine the power generation capacity of plant at 85% overall efficiency. What amount of pondage is needed if the plant operates at the peak station for six hours ? 10

   (b) Define storage and pondage. What are the difference between storage and pondage ? Explain briefly. 10

5. (a) What is pump storage plant ? Describe the different types of pump storage plants along with their advantages. 10

(b) A turbine generates 20,000 kw power at the head of 250 m with two jets. If the overall efficiency of turbine is 75% and velocity of water in the jet is 95% of the theoretical velocity. Determine the quantity of water in cumecs. Assume $C_d = 0.988$ and speed ratio = 0.45. 10

Section–C

6. (a) Describe the following :

(i) Anchor blocks

(ii) Types of valves. 10

(b) Describe surge shafts and its types. Briefly explain the design of surge shaft. 10

7. (a) For rigid and elastic pipe, derive the expression for water hammer pressure. 10

(b) What do you mean by penstock ? What is its necessity ? Explain the classification of penstocks. 10

Section–D

8. (a) What are the different types of turbines ? Describe the general criterion for the selection of turbine. 10

(b) Explain the design theory of draft tube in detail. 10

9. (a) Sketch the details of typical power house and show all components. Also describe the functions of the components briefly. 10

(b) What are the advantages and disadvantages of underground power house ? Explain in detail. 10