

B.Tech. 7th Semester (Civil Engg.)

Examination, December-2015

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 hydropower.
(b) Define the terms "storage" and "pondage" related to hydro-power station.
(c) What are the classifications of penstocks ?
(d) Advantages of under-ground power houses.
(e) Describe the methods of load forecasting.

5×4=20

Section-A

2. (a) What do you mean by water-power ? Compare the thermal power with water power. 10
(b) What is the necessity to determine future demand of load ? Explain in detail. 10

3. (a) What are the sources of energy ? Explain the status of hydro-power worldwide. 10
- (b) Define and state the equations for :
- (i) Capacity of plant
 - (ii) Load factor
 - (iii) Maximum demand
 - (iv) Utilization factor
 - (v) Plant factor. 10

Section-B

4. (a) What do you mean by "run of river plants"? Describe the general layout of run of river plants. 10
- (b) What are different types of pump storage plants ? Describe reversible turbines and cavitations in turbines. 10
5. (a) What are the different types of pump storage plants ? Describe the advantages of pumps storage plants, storage plants. 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 surge shafts and its types. What are the functions of surge shafts ? 10
- (b) For rigid and elastic pipe, derive the expression for water hammer pressure. 10
7. (a) Explain the penstocks and their classifications. Also describe the design criteria of penstocks. 10
- (b) What do you mean by water conveyance system ? Describe in detail. 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. 10
9. (a) Describe the following :
- (i) Specific speed of turbines.
 - (ii) Cavitation in turbines. 10
- (b) Sketch the details of typical power house and show all components. Also describe the functions of the components briefly. 10