

24515

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

24515-P-3-Q-9(15)

[P.T.O.]

Section-C

(3)

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 : 10
- (i) Specific speed of turbines. 10
- (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

(2)

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

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 $C_p = 0.988$ and speed ratio = 0.45. 10