Roll No. .....

24515

B. Tech. 7th Semester (Civil Engineering) Examination – May, 2015

HYDROPOWER ENGG.

Paper : CE-451-F

Time : Three Hours] *[Maximum Marks : 100*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question No. **1** is ***compulsory***. Attempt ***one*** question from each section. All questions carry equal marks. Attempt ***five*** questions in all. Assume missing data, if any, suitably.

1. (a) Describe the specific speed of turbines. $4 \times 5 = 20$

(b) Describe the role of hydropower in power system.

(c) Describe different load curve and load duration curves.

(d) Describe basic features of hydropower plants.

(e) Describe classification of penstocks for water conveyance system.

2. (a) What is the importance of hydro-power ? Explain the thermal and hydropower energy. 10

(b) Describe the different sources of energy. Explain the advantages of hydropower in detail. 10

3. Define the following : 20

(i) Secondary power

(ii) Diversity factor

(iii) Electrical load on hydropower stations

(iv) Capacity factor and utility factor

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) What do you mean by run of river plants ? Describe general layout of run of river plants. 10

5. (a) Define storage plants. Describe the different types of pump storage plants along with their advantages. 10

(b) A turbine generates 15,000 K W power at the head of 250 m with two jets. If the overall efficiency of turbine is 85% and velocity of water in the jet is 90% of the theoretical velocity. Determine the quantity of water. Assume C_d as 0.99 and speed ratio as 0.45. 10

SECTION – C

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

(b) Describe different types of surge shafts. Also explain the salient features of design of surge shaft. 10

7. (a) Describe "Anchor blocks" and "Types of valve". 5

(b) Define water conveyance system. What is the necessity of penstock in this system ? Describe the design criteria of penstocks. 15

SECTION – D

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

(b) Write a short note on "design theory of draft tube" and "cavitations in turbines" 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 different types of power houses ? Explain the advantages and disadvantages of underground power house in detail. 10