

Roll No.

24515

B. Tech. 7th Semester (Civil Engineering)

Examination – December, 2012

HYDROPOWER ENGINEERING

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 : Attempt *five* questions in all. Q. No. 1 is *compulsory*. Attempt *one* question from each Section. Each question carries equal marks (20 Marks).

1. (a) What do you mean by plant factor ?
- (b) Name the principles types of power plants.
- (c) Write the relation for theoretical power available from falling water.
- (d) Distinguish between load factor & plant factor.
- (e) For what purpose relief valve is provided ?

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- (f) Explain the term pondage.
- (g) Define specific speed.
- (h) Write expression for unit power of a hydraulic turbine.
- (i) What is difference between run-off-river plant without pondage & run-off-river plant with pondage ?
- (j) Mention any two considerations supporting the construction of underground power houses.

$$2 \times 10 = 20$$

SECTION – A

- 2. (a) What is meant by hydropower ? Compare hydropower with thermal power w.r.t. Indian conditions. 10
- (b) Discuss status of hydropower worldwide. 10
- 3. (a) The load on a hydel plant varies from a minimum of 10,000 KW to a maximum of 35,000 KW. Two turbo generators of capacities 22,000 KW each have been installed. Calculate :
 - (i) Total installed capacity of the plant
 - (ii) Plant factor
 - (iii) Maximum demand
 - (iv) Load factor
 - (v) Utilisation factor 10

- (b) What is load duration curve ? Explain with sketch. Discuss its use. 10

SECTION – B

4. (a) Explain run-off-river plants ? Why these plants have not been adopted in this country ? 10
- (b) Estimate installed capacity & magnitude of pondage for a run-off-river hydel plant with the following data :

Daily flow in the river = 24 cumecs

Net head on plant = 12 m

Efficiency of plant = 75%

The plant is to operate for six days in a week. 10

5. (a) What is a pumped storage plant ? Explain the advantages of a pumped storage plant for short peak load duration. 10
- (b) What is difference between storage & pondage ? Support your answer with a neat sketch. 10

SECTION – C

6. (a) What are various types of surge shafts ? Explain each. 10
- (b) What are penstocks ? Discuss its designs criteria. 10

7. Write short note on : $4 \times 5 = 20$

- (i) Water hammer
- (ii) Type of valves
- (iii) Anchor blocks
- (iv) Classification of penstocks

SECTION - D

8. (a) Briefly explain the various considerations in the selection of a proper type of turbines for a hydro power station, indicating also the conditions where a particular type of turbine is suitable. 10

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

9. (a) What are various types of powerhouses ? Discuss surface power house in detail. 10

(b) What are advantages & disadvantages of underground powerhouse ? 10