Code : 011846

B.Tech 8th Semester Exam., 2015

WATER POWER ENGINEERING

Time : 3 hours *Full Marks* : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

(ii) There are ***NINE*** *questions in this paper.*

(iii) Attempt ***FIVE*** *questions in all.*

(iv) Question No. ***1*** *is compulsory.*

1. Choose the correct option (any *seven*) : 2×7=14

(a) A hydropower plant, developed at the site of a drop in an irrigation canal, is of the type

(i) runoff river plant

(ii) storage plant

(iii) pumped storage plant

(iv) tidal plant

(b) Major hydropower generation in India is from

(i) runoff river plants

(ii) storage plants

(iii) pumped storage plants

(iv) tidal plants

(c) A runoff river plant for hydropower generation is essentially a

(i) high head scheme

(ii) low head scheme

(iii) medium head scheme

(iv) Any of these

(d) A storage hydroplant essentially involves

(i) a barrage or a weir

(ii) a dam

(iii) Either *(i)* or *(ii)*

(iv) Neither *(i)* nor *(ii)*

(e) The only statement, which is incorrect in regard to hydropower is

(i) the system efficiency of a hydroplant is quite high

(ii) the installation cost of a hydroplant is very high

(iii) the running cost of a hydroplant is very low

(iv) the hydraulic turbines take a lot of time in being put off and on

(f) The minimum power, which a hydropower plant can generate throughout the year, is called

(i) power plant capacity

(ii) power plant load

(iii) firm power

(iv) water power

(g) If the peak load for a power plant equals the plant capacity, then the ratio of the capacity factor to load factor will be

(i) 1

(ii) 0

(iii) <1

(iv) >1

(v) –1

(vi) None of the above

(h) Pondage requirement in a hydropower plant includes the need

(i) to balance the varying demand

(ii) to compensate for wastage and spillage

(iii) to balance short-time fluctuations in the flow

(iv) All of the above

(i) A Pelton's turbine is a

(i) velocity turbine

(ii) reaction turbine

(iii) pressure turbine

(iv) None of the above

(j) In a Francis turbine, the water

(i) flows out openly

(ii) flows out through a closed draft tube

(iii) Both (i) and (ii), depending upon the type

(iv) Neither (i) nor (ii)

2. (a) Explain surge tank with neat sketch of provisions of surge tank. 7

(b) Write the major components of a hydroelectric scheme and discuss any one component. 7

3. A runoff river plant with an installed capacity of 15000 kW operates at 28% load factor when it serves as a peak load station.

(a) What should be the minimum discharge in the stream, so that it may serve as a base load station? The plant efficiency may be assumed to be 80% when working under a head of 20 m.

(b) Calculate the maximum load factor of the plant when the discharge in the stream is 35 cumecs. 14

4. (a) Discuss the comparison of hydropower with thermal power with reference to Indian conditions. 7

(b) Discuss the selection of suitable type of turbine. 7

5. (a) Write a short note on Tail-Race. 7

(b) Write down the types of hydraulic turbines. Discuss any one as velocity turbine. 7

6. A runoff river plant is installed on a river having a minimum flow of 15 m^3/sec. If the plant is used as a peak load plant operating only for 6 hours daily, compute the firm capacity of the plant—

(a) without pondage;

(b) with pondage but allowing 8% water to be lost in evaporation and other losses, head at the plant in 16 m, and the plant efficiency may be assumed as 80%. 14

7. (a) Write the classification of hydroplants on the basis of hydraulic characteristics. Discuss any one of them. 7

(b) Explain load factor, demand factor and capacity factor. 7

8. The load on a hydel plant varies from a minimum of 10000 kW to a maximum of 35000 kW. Two turbogenerators of capacities 22000 kW each have been installed. Calculate—

(a) total installed capacity of the plant;

(b) plant factor;

(c) maximum demand;

(d) load factor;

(e) utilization factor. 14

9. (a) Write a short note on intake structure. 7

(b) Discuss the functions of penstocks. 7

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