

16335(D)

M. Tech 3rd Semester Examination

Hydro Power Engineering

WRE-118

Time : 3 Hours

Max. Marks : 100

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

- Note :** (i) Attempt five questions in all, selecting one question from each section A, B, C, D and section E is compulsory.
(ii) Assume suitable data if necessary.

SECTION - A

- (a) What are the different sources of energy? Differentiate between renewable and non renewable energy sources. (10)
(b) 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% over all efficiency. What amount of pondage is needed if the plant operates at the peak station for six hours? (10)
- (a) Give major positive and negative attributes of hydropower. (10)
(b) Calculate the monthly energy demand for residential house of typical middle class family. (10)

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SECTION - B

- What do you understand by run-of-river plants? What are the parts and arrangements of such plants? Draw a neat sketch of such a plant. (20)
- (a) What is pumped storage plant? What are its advantages and limitations? (10)
(b) Define and explain (i) firm and secondary power (ii) load and utilization factor. (10)

SECTION - C

- (a) What are penstocks and of which material can they be manufactured? Under what circumstances each material can be used? (10)
(b) A power station is fed through a 10,000m long concrete lined tunnel of 5m diameter. Operating under a gross head of 200m. The discharge through the tunnel is 30 m³/s. A simple surge tank of 300 sq.m area has been provided at the end of the tunnel. Calculate: the maximum upsurge and down surge in the tank. Assume f for concrete lining = 0.016. (10)
- Give the classification of surge tank and also explain the working principle of each with necessary sketches. (20)

SECTION - D

- (a) What is specific speed of the turbine and runaway speed of the turbine? (5)
(b) Discuss in brief the classification of turbines based on the head, flow direction and Specific speed. (10)

[P.T.O.]

- (c) Write a short note on "Selection of turbine". (5)
8. (a) Determine the number of turbines and diameter of runner for a power plant having 40 cumecs inflow, 20 m head. The efficiency of turbine is 85% with the speed of 225 rpm. Assume the specific speed as 250 and speed ratio as 0.8. (15)
- (b) Write a note on governing of turbines (5)

SECTION - E

9. (a) Define following: (i) the (gross) theoretical potential, (ii) the technically feasible potential or the net exploitable potential, (iii) the economically feasible potential. (3)
- (b) Explain the flow duration curve for a stream with hydropower potential. (3)
- (c) Write a short note on "intake structures for hydropower generation". (5)
- (d) Explain Pelton turbine with neat sketch. (5)
- (e) Explain the ways of increasing firm power from hydro project. (2)
- (f) What is the difference between storage and pondage? (2)