Roll No. ..... Total Pages : 03

BT-7/M-18 37048

HYDRO ELECTRIC POWER DEVELOPMENT

CE-413-E

Time : Three Hours] [Maximum Marks : 75

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Asume any missing data.

Unit I

1. (a) Give an account of environmental impacts of water power projects in India. 7½

(b) Discuss load prediction and load duration curve. Illustrate with a neat sketch. 7½

2. (a) A run off river plant is installed on a river having maximum 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 :

(i) without pondage

(ii) with pondage but allowing 8% water to be lost in evaporation and othe losses.

Head at the plant is 16m and plant efficiency is 80%. 7½

(b) What are pumped storage plants ? Discuss with suitable sketches their working and state the advantages in comparison to their hydro plants. 7½

Unit II

3. (a) Mention briefly the salient features of radial gates. Why are they generally preferred for spillway control ? 7½

(b) Why are hydraulic valves provided in the hydro-power projects ? Discuss with sketch any *two* valves. 7½

4. (a) Derive an expression for celerity of wave in power channels. 7½

(b) A penstock of internal diameter 1.25 m supplies water at a head equivalent to 17.65 kg/cm^2. There is possibility of 23% increase in pressure due to transient conditions. The design stress and efficiency of the joint may be assumed to equal to 1000 kg/cm^2 and 87% respectively. Calculate approximate wall thickness of the penstock. 7½

Unit III

5. (a) Determine type and number of turbines which can be installed at a stream with flow 20 cumecs and fall 20 m. Assume overall efficiency 90% and speed 255 rpm and specific speed Ns = 610. 7½

   (b) Explain salient features of Kaplan turbine with the help of neat sketches. 7½

6. (a) Explain with neat sketch governing of turbine. 7½

   (b) Why is spiral casing provided in the turbine ? Explain its types and working along with neat diagrams. 7½

Unit IV

7. (a) Explain various arrangements of cavities in an underground powerhouse. 7½

   (b) Explain with sketch various types of the underground power stations. 7½

8. What do you understand by tidal power ? Explain with sketches various methods of tidal power generation with special reference to India. 15