Graphic Era HILL UNIVERSITY
Established by an Act of the State Legislature of Uttarakhand (Adhiniyam Sankhya 12 of 2011)
University under section 2(f) of UGC Act, 1956

Term Evaluation (Even) Semester Examination March 2025

Roll no.....

Name of the Course: B.Tech Civil Engineering
Semester: VIII
Name of the Paper: Water Power Engineering
Paper Code: TCE 811
Time: 1.5 hour **Maximum Marks: 50**

Note:
(i) Answer all the questions by choosing any one of the sub-questions
(ii) Each question carries 10 marks.

Q1. CO1 (10 Marks)

a. Predict the load of a town in year 2026 using Scheer formula and the following data:
Per capita load in year 2022 = 250 kWh
Population growth rate = 7 % (constant for five years period)
Population in year 2022 = 180,00000

OR

b. Discuss the relative advantage and disadvantage of the hydropower and the thermal power.

Q2. CO1 (10 Marks)

a. A four way is to design to meet out the pondage requirement of a runoff river scheme. The daily flow in the river is 20 m^3/s. The plant is to be used as 15 hrs peaking station. Determine the pondage factor and storage capacity of four ways.

OR

b. The yearly output of a base load plant with 25 MW installed capacity is $125x10^6$ kWh. The plant takes a peak of 22.5 MW. Calculate the annual load factor and capacity factor.

Q3. CO1 (10 Marks)

a. A runoff river plant on a stream have a inflow of $20m^3/s$ and net head of 30m with provision of pondage to meet daily peak demand with a load factor of 60% . Determine the power generation capacity of a plant at 80% of overall efficiency. The plant runs at a peak station for 3 hrs and balance period in a day for average load. Calculate amount of pondage needed.

OR

b. Define the strength and weaknesses of a water power in India.

Q4. CO2 (10 Marks)

a. Explain the Diversion Canal Plant and its different layouts with a neat sketch.

OR

b. An isolated pumped storage power plant has a head race tunnel 4m in diameter and 700 m long. The gross head of water is 300 m and the power house discharges directly into the lower reservoir. The flow rate is 60 cumecs and friction factor is f = 0.018. If the overall efficiency of pumping and generation are 85% and 88% respectively, estimate the plant efficiency.

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Q5. CO2 (10 Marks)

a. At kisneyama P-S Plant in Japan, the two reversible pump-turbines that have been used have the following rating during the pumping operation Speed is 225rpm, Head is 230 m and Discharge is 86 m^3/s. Determine the approximate submergence necessary

OR

b. Calculate the specific speed of a turbine and suggest the type of turbine required for a river having a discharge of 240L/s with an available head of 45m. Take the efficiency of turbine = 82% and speed = 450r.p.m