

Mid-West University
Examinations Management Office
Chance Examinations 2081

Bachelor level/ B.E. Civil/ 7th Semester

Time: 3 hours

Subject: Hydropower Engineering (CE472/CE426)

Full Marks: 50

Pass Marks: 25

- Attempt all the questions
- Figures in the margin indicate full marks.
- Assume suitable values, with a stipulation, if necessary.
- Candidates are required to answer the questions in their own words as far as possible.

1. Sketch the typical type of layout of powerhouse projects and briefly explain of each type. (4)
2. Explain the importance, advantages and disadvantages of hydropower in developing countries. (4)
3. Point out the various stages of hydropower planning. Discuss field investigation you carried out at various stage of the hydropower project. (5)
4. The stream flow recorded for the hydropower development site is given below. Draw flow duration curve and determine firm and secondary energy if the available head is 60 m. Design discharge is 40 cumec and overall efficiency is 80%. (6)

Months	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Q m ³ /s	30	38	28	25	18	34	56	72	60	48	38	34

5. A concrete gravity dam (trapezoidal in section) has height 20 m, top width 1.2 m and bottom width 10 m is proposed to block the water of height 18 m. The u/s face of the dam is vertical and d/s face has slope 1:2 (H:V). Considering the forces of self weight, hydrostatic force and uplift pressure, check the stability of dam. (Assume unit weight of concrete 24 KN/m³, permissible shear stress of joint as 1350 KN/m², coefficient of friction as 0.75 and uplift factor k as 0.8). neglect tail water effect to the dam. (6)
6. What are the factors to be considered for selection of dam used in hydropower? Also mention the materials used for dam. (4)
7. What are the requirement of good intake? Explain different types of intakes used in hydropower projects in Nepal with neat sketches. (4)
8. Define surge tank. Design a forebay from following data: (1+5)
Discharge = 20 cumec
Detention time = 3 minutes
Length of penstocks = 500m
Diameter of penstocks = 2m.
9. Design the hydraulic jump stilling basin for the maximum discharge of 25 m³/s/m flowing from overall spillway, with spillway crest 50m above the downstream gravel river bed with a slope of 0.0012 and n= 0.023. (5)
10. What do you mean by draft tube? In a hydropower projects it is planned to use francis turbine. The project has head of 185m and discharge of 85 cumec. Find the specific speed, turbine diameter and elevation of turbine with respect to water surface in tailrace. Assume overall efficiency of 85%. (1+5)

The End