KATHMANDU UNIVERSITY
End Semester Examination
January/February 2025

Level : B.E.
Year : IV
Time : 2 hrs. 30mins.

04 FEB 2025

Course : CIEG 406
Semester : I
F. M. : 40

SECTION "B"
[40 marks]

Attempt *ALL* questions. Assume a suitable value if any data is missing.

1. Describe the obstacles to developing hydropower in Nepal. Discuss the hydro-potential in Nepal. [2+2]

2. Discuss the hydropower development cycle with flow chart. [4]

3. A hydropower plant is planned to be designed in Nepalese river, where mean monthly flows for a typical year are as follows:

Month	Discharge (m^3/s)	Month	Discharge (m^3/s)
January	4.4	July	78.1
February	3.9	August	108.9
March	3.4	September	52.8
April	4.2	October	22.0
May	4.2	November	9.9
June	16.5	December	6.4

Other data pertaining to the plant are as follows:

Design Discharge	=	18 m3/s
Full Supply Level	=	2250 masl
Turbine Centerline	=	1650 masl
Diameter of 4 km long tunnel	=	3 m
Diameter of 1 km long penstock	=	2.2 m
Friction factor of tunnel and penstock	=	0.014 and 0.012
Hydraulic Efficiency	=	95%
Turbine Efficiency	=	93%
Generator Efficiency	=	99%
Transformer Efficiency	=	99%

Considering only the frictional loss,

i. Compute installed capacity, primary and secondary energy to be produced from the power plant assuming that 10% of minimum monthly flow to be released downstream. What is the plant factor? [2+2+2+2]

ii. The developer is interested to develop a daily peaking reservoir for 4 hours. What will be the capacity of the reservoir to satisfy daily peaking requirement? [2]

4. Discuss about the objectives and the strategies of the hydropower development policy 2001. List out the various hydropower development institutions in Nepal. [3+1]

5. What are the most commonly used intakes in Run-of-River hydropower projects in Nepal? What factors do you consider while selecting the site for intake location? [3+3]

P.T.O.

6. What is economic diameter of penstock? A steel penstock with an internal diameter of 1.25 m, supplies water at a head equivalent to 18 kg/cm^2. There is a possibility of a 20% increase in pressure due to transient conditions. The design stress and efficiency of the joint may be assumed to be 1025 kg/cm^2 and 85% respectively. Compute the thickness of the penstock required. [2+4]

7. Explain the general arrangement for a power house. How would you fix the appropriate dimensions of a power house? [2+4]