KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2018

MAR 1 2 2018

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

Course : MEPP 439
Semester : I
F. M. : 55

SECTION "B"
[5 Q. × 11 =55 marks]

Attempt *ALL* questions. Assume suitable data if missing/necessary.

Q.N. 1

a. Nepal has more than a century long history in hydropower development and has huge hydropower potential. However, Nepal has so far developed only about 919 MW of hydropower. Explain the factors that account for the slow pace of hydropower development. What steps/approaches need to be taken for hydropower development in Nepal? [3]

b. Draw plan and sectional views of a general run of river hydropower plant and briefly explain the components. [4]

c. If you are developing 400 MW reservoir project in Nepal, what are the steps of study to be followed from planning to commissioning stage of development? Briefly describe the level of study. [4]

Q.N. 2

a. Distinguish between gates and valves used in hydropower plant. What factor do you consider while selecting the gates and valves? [3]

b. Give different classification of dams. What are the different forces acting on a Gravity Dam? Also briefly explain the mode of failure of the Gravity Dams. [3]

c. A common load is shared by two stations; one being a base load plant with 25 MW installed capacity and the other being a standby with 30 MW capacity. The yearly output of the standby is 10.5 $x10^6$ kWh and that of the base load plant is 125 $x10^6$ kWh. The peak load taken by the standby is 15 MW working for 2500 hrs during the year. The base load station takes a peak of 22.5 MW. Find the

- annual load factors for both stations
- plant use factors for both stations
- capacity factors for both stations [5]

Q.N. 3

a. Distinguish between anchor blocks and saddles? What are the forces which should be taken into account in anchor blocks stability analysis? [3]

b. Derive the relation for optimum diameter of penstock pipe from analytical approach. [3]

c. The long term monthly flow of one of the Nepalese river is shown in table below,

Month	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Q (m^3/s)	110	90	70	50	30	25	65	220	300	190	115	110

Calculate the flow duration curve and also discuss how to fix the installed capacity, for run of river plant, in Nepal. [5]

Q.N. 4

a. Define and differentiate between dewatering system and drainage system in hydropower plants? [3]
b. Write down the major features of Kulekhani-I hydroelectric power station. Which type of turbine is used in the Kulekhani-I HPP and briefly write the turbine components with their materials. [4]
c. Write down the important unit auxiliaries and station auxiliaries used in hydropower plants? Distinguish between them. Briefly explain one each auxiliaries. [4]

Q.N. 5

a. Why is bifurcation used in hydropower? Discuss about different types of bifurcation. [2]
b. What are the types of hoisting used for operation of gates? Explain about the rope drum hoisting with its application and advantages. [4]
c. A vertical lift gate 4 m wide by 3 m high have six equally loaded horizontal beams and is subjected to a headwater on the sill of 10 m. Determine the maximum water thrust on the gate and its position. Define the location of the horizontal beams. [5]