AU – 2842

Seventh Semester B. E. (Civil Engineering) Examination

WATER POWER ENGINEERING

Elective - I

Paper – 7 CE 06

(USC – 10219)

P. Pages : 3

Time : Three Hours] [Max. Marks : 80

Note : (1) Separate answer book must be used for each section in the subject Geology, Engineering material of civil branch and Separate answer book must be used for Section A and B in Pharmacy and Cosmetic Tech.

(2) Answer **Three** questions from Section A and **Three** questions from Section B.

(3) Assume suitable data wherever necessary.

(4) Illustrate your answer wherever necessary with the help of neat sketches.

SECTION A

1. (a) Describe in detail pumped storage type power plants. 7

   (b) Explain place of hydropower in a power grid system. 6

OR

2. (a) A Run-of-river plant has 12 cumecs discharge and minimum head of 10 m. Compute firm power, daily pondage factor and pondage if it works for only 8 hours a day and efficiency is 80%. 7

   (b) Describe high head storage plants. 6

3. (a) Discuss how would you decide the number of penstocks for a hydel project having series of turbines. 7

   (b) Calculate max. water hammer pressure and total pressure head developed, when a valve at the end of a 3 km long penstock of 2.5 m diameter is closed in 3.2 sec. Assume steady state head as 92 m, and discharge 26.5 m^3/s. velocity of sound wave 1350 m/s whether the closure is sudden of gradual? 6

OR

4. (a) State ASME criteria for embedded and non embedded i. e. surface penstocks. 7

   (b) What is water hammer ? What are its ill effects ? How these effects can be avoided ? 6

5. (a) Explain with neat sketches simple surge tanks of special design. 7

   (b) State necessity of surge tank. Is a surge tank essential when :

   (i) The power house is located at the foot of a dam.

   (ii) Diversion tunnel type development. 7

OR

6. (a) A surge tank of circular section is located at 2500 m from the reservoir on a penstock of 3 m diameter, steady state velocity 3 m/s, head 42 m and friction factor 0.02. Suggest diameter of surge tank. 6

   (b) State the different functions of surge tank, Also give the list of hydropower developments in which surge tank is not required, with reason. 6

   (c) Enlist different types of surge tanks. 2

SECTION B

7. (a) Describe run of river intake. 7

   (b) Discuss :

   (i) Spacing of bars.

   (ii) Cleaning and

   (iii) Velocity through trash jack. 6

OR

8. (a) State meaning, causes and effects of air entrainment. Also state the provisions made to avoid formation of vortices. 7

(b) State the functions of an "Intake". for hydel channel. What components are provided to fulfill these functions ? 6

9. (a) Sketch a forebay. Show and label installations in it. How capacity of a forebay is decided ? 7

(b) Explain components of Francis turbine with neat sketch. 7

OR

10. (a) Discuss following aspects of design of a hydel channel :

(i) Discharge

(ii) Velocity

(iii) Side slopes and

(iv) Lining. 7

(b) Calculate power (KW) that can be generated by the turbine if Head (Net) = 80 m, discharge = 5 m^3/s and efficiency = 90%. Also calculate specific speed and suggest the type of turbine when speed (N) = 200 rpm. 7

11. (a) Discuss basic principle, location and difficulties in tidal power development. 6

(b) Describe briefly three main divisions of surface power houses with a neat sketch. 7

OR

12. (a) Discuss location of underground power stations. State advantages and limitations of the underground power houses. 7

(b) Compare surface and underground power houses. 6