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DAI1355

ELECTIVE - II
Water Power Engineering
(New) (1311)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :

1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Answer **two** questions from each unit.
5. Assume suitable data wherever necessary and mention it clearly.
6. Neat sketch diagram should be drawn wherever necessary.
7. Black figure to the right indicates full marks.
8. Use of non - programmable pocket calculator is allowed.

UNIT - I

1. a) What is meant by renewable energy sources ? Explain in brief these energy sources with special reference to Indian context. 5
b) Mention the different methods of load forecasting why it is necessary to predict the future load ? 5
2. The mean monthly discharge for 12 months at a particular site of river is tabulated below. 10

Month	Discharge (mm ³)	Month	Discharge (mm ³)
Jan	500	July	2000
Feb	200	Aug	1500
Mar	1500	Sept	1500
Apr	2500	Oct	1000
May	3000	Nov	800
June	2400	Dec	600

Find out the power available at the mean flow of water if the available head is 80m at the site and the overall efficiency of generation is 80%.
Take 30 days in a month.

3. What is the flow duration curve ? Write stepwise procedure to obtain it.
How this curve is used in planning and design of hydroelectric power station. 10

UNIT - II

4. Explain with the help of neat sketches the functioning of following types of hydroelectric power plants. 10
i) Run - of river plant.
ii) High head Diversion plant.
5. Estimate the power at any instant and the total energy in a year from a tidal power plant which is proposed in all estuary. The observed difference between the low and high water tide is 6.0m. The area of estuary is 69 hectares it is assumed that the power generation can be done for 3.5 hours. The overall efficiency for generation and average head can be taken as 75% and 5.6m respectively. The specific gravity of sea water can be taken as 1.03. 10
6. a) Define and explain in brief. 5
i) Storage and pondage of reservoir.
ii) Firm and secondary power.
- b) What are the basic features of a pumped storage power plant ?
State its advantages. 5

UNIT - III

7. Sketch a hydroelectric power plant showing an integral intake with a forebay, floating boom, trashracks, Describe briefly the function of each. 10
8. Describe in brief the surface power stations. How these power houses are located and what are their different types, describe in brief. 10
9. Why the anchor blocks are provided in pipelines ? What are their locations ?
What are the various forces which should be taken into account in their stability analysis. 10

UNIT - IV

10. With the help of schematic diagram, explain the solar passive space cooling system through ventilation. 10
11. a) What are the main advantages in the use of biogas ? What are its main constituents and heating values ? 5
- b) What do you understand by energy farming. 5

12. a) Explain different types of biofuels. 5
- b) Draw the neat sketch of flat plate solar collector mentioning all the components. 5

UNIT - V

13. How the wind energy conversion system (WECS) are classified ? Discuss the advantages and disadvantages of same. 10
14. a) Discuss the relative performances of a pitch regulated and stall regulated wind turbine. 5
- b) Discuss the main considerations in selecting site for wind farm. 5
15. Derive the following relationships for the horizontal axis wind turbine. 10

$$V_e = \frac{1}{3} V_o$$

$$P_{\max} = \frac{8}{27} \rho A V_o^3$$

Where ; V_e = exit velocity
 V_o = wind velocity
 A = Swept Area
 ρ = mass density of air.
