Total No. of Questions : 12]

SEAT No. :

P2966

[Total No. of Pages : 3

[5154]- 518
B.E. (Civil Engineering)
HYDROPOWER ENGINEERING
(2012 Pattern) (Semester - II) (Elective - III) (401009 C)

Time :2½ Hours] *[Max. Marks :70*

Instructions to the candidates:

1) ***Answer any six questions from Q.No.1 OR 2, Q.No.3 OR 4, Q.No.5 OR 6, Q.No.7 OR 8, Q.No.9 OR 10, Q11 OR 12.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of Calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) What is the effect of Global warming? **[3]**

b) Write a note on India's cooperation with neighboring countries in hydropower sector. **[4]**

OR

Q2) a) What are the different trends in energy use patterns in India? Explain the present scenario of any one trend. **[4]**

b) Write note on hydropower development in India. **[3]**

Q3) a) Give classification of hydro electric power plants. **[3]**

b) Write a note on valley dam plants. **[4]**

OR

Q4) a) Define: Reservoir capacity,pondage capacity,pondage factor and plant capacity. **[4]**

b) What are the advantages of pumped storage plants? **[3]**

Q5) a) Define: Connected load, maximum demand and average demand. **[3]**

b) Write a note on flow duration curve related to high head and low head plants. **[3]**

OR

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Q6) a) Write the significance of diversity factor on the cost of hydropower generation. **[3]**

b) Explain the effect of variable load on operation of power plant. **[3]**

Q7) a) Differentiate between exposed and buried penstocks. **[4]**

b) Explain canal intakes, dam intakes and tower intakes in short. **[6]**

c) Explain different methods of air cooling of generators. **[6]**

OR

Q8) a) Write note on pressure shafts and trash racks. **[6]**

b) Write a note on generators. **[4]**

c) What is the necessity of cooling the transformers? Elaborate different methods of it. **[6]**

Q9) a) Write note on 'open type surge tanks' and 'restricted orifice type surge tanks'. **[6]**

b) What is cavitation and how can you minimize it? **[4]**

c) A power house is equipped with four units of vertical shafts pelton turbines to be coupled with 70000k VA, 3 phase, 50 Hz generators. The generators are provided with 10 pairs of poles. The gross design head is 505 m and the transmission efficiency of headrace tunnel and penstocks to gether is to be 94%. The four units together will provide power of 250000 Kw with the efficiency of 90%. The nozzle efficiency is 0.98. Find the design discharge for the turbine, jet diameter and number of jets , the nozzle tip diameter and specific speed. **[6]**

OR

Q10)a) Explain the classification of turbines based on i) Pressure ii) head. **[4]**

b) What is draft tube? Enlist different functions of draft tube? What is efficiency of the draft tube? **[6]**

c) In a hydroelectric plant, Kaplan turbine is fixed with following specifications: Calculate speed ratio, flow ratio and overall efficiency.

Operation Head = 22.5 m, Output power = 126 MW, Discharge = 615 m^3/s, speed = 68.2 rpm, Runner tip to tip diameter = (D) = 9.3m,

Hub Diameter = (D_h)=4.3m,Number of blades =6 **[6]**

Q11)a) The cost of a small power plant is Rs 3 x 10^6 having the life expectancy of 25 years. The net annual installment to recover the cost is Rs. 30000. The interest is 10%. Using sinking fund method find the salvage value of the plant after 20 years of service. **[6]**

b) Write a note on tariff for electrical energy and types of tariffs for hydropower plants. **[6]**

c) Write a detailed note on carbon credits and its implications on clean technology. **[6]**

OR

Q12)a) A power plant of 300 MW is installed when the capital cost is 20000/kW. The interest and depreciations are 10%. Annual load factor is 56%. Annual capacity factor is 45%. Annual running charges Rs 250 x 10^6. Energy consumed by power plant auxiliaries is 6%. Calculate cost of power generation for KWh. **[6]**

b) What are the fixed and running charges in economic analysis of a hydropower plant? **[6]**

c) What is carbon credit? Write long term plans to reduce the CO_2 **[6]**