Total No. of Questions : 12]

SEAT No. :

P4538

[Total No. of Pages : 4

[4959] - 1018

B.E. (Civil) (Semester - II)

HYDROPOWER ENGINEERING

(2012 Pattern) (Elective - III(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, Q.No. 11 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 climate change on Hydropower? Elaborate with suitable example. **[3]**

b) Considering the day by day increasing demand of water, discuss the future prospects of water power in India. **[4]**

OR

Q2) a) Discuss the significance of national power grid. **[4]**

b) What are the opportunities and threats in hydropower development in India? **[3]**

Q3) a) What is run off river plants? Explain in detail. **[3]**

b) When a runoff river plant operates as a peak load station with a weekly load factor of 25%, all is capacity is firm capacity. What must be the minimum flow in the river so that the station may serve as the base load station? It is given that rated installed capacity of the generator is 10000 kW. Operating head is 20m. Plant efficiency is 80%. Estimate the daily load factor of the plant if the stream flow is 20cumec. **[4]**

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OR

Q4) a) A closed cycle plant with a gross head of 350m has a head race tunnel 4 m dia and 700 m long. The powerhouse discharge directly in the lower reservoir. The flow velocity is 6.5 m/s. and the friction factor (f) is 0.018. If the overall efficiencies of pumping and generation are 855 and 88% respectively. Estimate the plant efficiency. **[4]**

b) Enlist the components of high head diversion plant and give two examples of such plant. **[3]**

Q5) a) Write the significance of load factor on the cost of hydropower generation. **[3]**

b) What are the load curve and load duration curves? **[3]**

OR

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

b) Elaborate the different methods to meet the demand of variable loads on power plants. **[3]**

Q7) a) Write notes on flowing types of intakes : **[6]**

i) run of river intake

ii) canal intake

iii) tower intake.

b) What are the measure electrical equipments used in power plants? **[5]**

c) What is the necessity of cooling the transformers? Elaborate different methods of it. **[5]**

OR

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

b) Advantages and disadvantages of underground power plants. **[4]**

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

Q9) a) Explain the governing system of turbines at any hydroelectric power plant. **[5]**

b) What is cavitation and how can you minimize it? **[5]**

c) What are the three types of surge tanks? Draw line diagrams and explain all the three types in brief. **[6]**

OR

Q10)a) Explain the classification of turbines based on **[6]**

i) pressure

ii) head and

iii) flow directon

b) A power house is equipped with four units of vertical shafts pelton turbines to be coupled with 70000kVA, 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 together is to be 94%. The four units together will provide power of 250000kW 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. **[10]**

Q11) a) The cost of a small power plant is Rs 2×10^{6} having the life expectancy of 20 years. The net annual installment to recover the cost is Rs. 20000. The interest is 12%. Using sinking fund method find the salvage value of the plant after 20 years of service. **[6]**

b) Write a note on selection of power plants for power generation. **[6]**

c) What are the performance and operating characteristics of a power plant. **[6]**

OR

Q12) a) A power plant of 210 MW is installed when the capital cost is 18000/kW The interest and depreciations are 12%. Annual load factor is 60%. Annual capacity factor is 54%. Annual running charges Rs 200 × 10^6. Energy consumed by power plant auxiliaries is 6%. Calculate cost of power generation for kWh. **[6]**

b) Write down the economic load sharing between base load and peak load plants. **[6]**

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