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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. Answer sheet 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 **any two** parts of each question.
5. Assume suitable data wherever necessary.
6. Use of non programmable pocket calculator is allowed.
7. Figure to the right indicate full marks.

1. a) i) Discuss the advantages and disadvantages of hydrelectric power over thermal power. **5**

ii) Discuss the present status of electrical power generation from renewable energy sources in India. **5**

b) Explain in detail that how hot water power potential stream at particular site is estimated. **10**

c) The yearly out put of a stand by and base load plant which share the common load are 11 x 10^6 KW- Hour and 12.5x10^6 KW-Hour respectively. The installed capacity of the stand by plant is 30MW and that of base load plant is 25MW. The peak load taken by the stand by station is 15MW and this station works for 2500 hours during the year. The base load plant takes a peak of 23 MW calculate for both stations.

i) Annual load factor..... **4**
ii) Plant use factor..... **3**
iii) Capacity factor. **3**

2. a) Explain with the help of neat sketches showing all components the functioning of following types of hydroelectric power plants. **10**

i) Run of river plant.

ii) High head diversion plant.

b) How the energy and power is estimated in case of tidal hydroelectric power plant. What are the main draw backs of the tidal power plant and how and upto what extent can they be overcome. **10**

c) A run of river hydroelectric power plant has an effective head of 25m. The overall efficiency of the plant may be taken as 78%. The average daily load during the different timings of the town, to which the power is supplied by the plant is as shown in table below. **10**

Time	00.00	02.00	04.00	06.00	08.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
Load (MW)	20.00	17.00	14.00	22.00	58.00	60.00	40.00	50.00	62.00	75.00	60.00	45.00

Plot the load curve and-

i) Find the average load and the minimum average daily flow which could supply the indicated load.

ii) Find the volume of pondage required to produced the necessary power assuming the average daily flow calculated as above.

3. a) Explain the components and structural details of both surface and sub surface hydroelectric power plant station. **10**

b) A penstock carries 10cum / sec of water under a head of 40m. The cost of pipeline in place is given by $38xhxd^2$ rupees per running meter length. Where "h" is the head in meter and "d" is the diameter of penstock in meter. The annual fixed charges are 7.5% of the pipeline cost. Calculate the most economical diameter of the penstock for the following data. **10**

i) Friction factor for penstock is 0.025

ii) Efficiency of turbine 80%

iii) Selling price of power generated Rs. 700 per KW - annum.

c) What are the purpose of providing the surge tank ? How the surge tanks are classified. Describe the behaviour of surge tank with the help of neat sketch. **10**

4. a) i) Define bio - mass. How the biomass conversion takes place. **5**

ii) Enumerate the different factors which affect the size of bio - digestion. **5**

b) Write short note on following. **10**

i) Solar Chimney.

ii) Water - De - Salination.

c) Explain the following. **10**

i) Energy Farming.

ii) Solar water heater.

5. a) How the wind energy conversion system is classified ? Discuss in brief. **10**

b) i) Describe the main considerations in selecting site for wind farm.

ii) What are the merits and limitations of wind energy. **10**

c) Wind at 1 atmospheric pressure and 15ºC temperature has a velocity of 10m/sec The turbine has diameter of 120 m and its operating speed is 40 r.p.m. at its maximum efficiency. Calculate. **10**

i) Power (total) density in the wind stream

ii) The maximum obtainable power density assuming x = 40%

iii) The total power produced in KW.

iv) Torque and axial thrust.

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