Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Examination January 2010

Subject code: 711205 Subject Name: Hydropower Engineering

Date: 27 / 01 / 2010 Time: 12.00 – 2.30 pm

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** Draw plan of Hydropower plant and Explain function of each component **06**

(b) Calculate annual load factor ,plant use factor and capacity factor for a power station having following details .Station works for 2500 hours during the year **06**

(i) Total units generated per year $=60 \times 10^6$ kwh

(ii) Capacity of the station =30 MW

(iii) Maximum demand =22 MW

Q.2 **(a)** Explain Low Medium and High head Power Plants **06**

(b) Explain different sources of energy and Compare the Conventional Source and Non Conventional Source of energy **06**

OR

(b) The capacity of power station is 85000 KW, the capital cost of the station is Rs.40000 per KW and the fixed cost is 8.5% of the capital cost. Maintenance cost is Rs. 10 Per KW .The transmission cost is is Rs. 300 Per KW. Consider load factor 80 %. Calculate cost of power generation per unit . **06**

Q.3 **(a)** Explain following terms (i) load Factor (ii) Capacity factor (iii) Firm Capacity **06**

(b) A pump storage power plant has a gross head of 300m . The head loss in head race tunnel is 3m . The discharge passing is 4 cumec .The plant efficiency is 90 %. Determine the plant capacity of power generation **06**

OR

Q.3 **(a)** Calculate wall thickness of penstock if internal dia of 2m Supplies at a head equivalent to 18 Kg/Cm^2, there is a possibility of 15 % increase pressure due to transient Condition . The design stress and the efficiency of joint may be assumed to 1025 Kg/cm^2 and 80 percent respectively **06**

(b) With Sketch Explain need of Anchor Block **06**

Q.4 **(a)** Explain Elastic Column Theory of Water Hammer **06**

(b) Describe different types of Penstock **06**

OR

Q.4 **(a)** Give Classification of turbines and Explain Francis turbine **06**

(b) Explain different types of Intake Structures **06**

Q.5	**(a)**	If Head of a Francis turbine is 450m . Available flow 4.2 m^3/s. Efficiency of turbine 85%. . Find the outputof turbine and approximate specific speed	**06**
	(b)	Explain surge Tank	**06**

OR

Q.5	**(a)**	Explain following terms (i) Trash Rack (ii) Pondage Factor (iii) Air Vent	**06**
	(b)	If daily flow in a river is 20 m^3/s. What would be thefirm capacity of run of river plant to be used as an 8 hour peaking station ? What would be the pondage factor and the magnitude of the pondage, Head of the plant 15m. Overall Efficiency 80%	**06**

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