Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–I(New course)• EXAMINATION – WINTER- 2015

Subject Code: 2713305 **Date: 04/01/2016**

Subject Name: HYDROPOWER ENGINEERING

Time:2:30 pm to 5:00 pm **Total Marks: 70**

Instructions:

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

Q.1	**a**	Enumerate the various types of hydropower plants and describe the storage plant.	**07**
	b	Differentiate between hydropower plant and thermal power plant with reference to Indian condition.	**07**
Q.2	**a**	Write short note on hydropower potential of India.	**07**
	b	What are the principal components of hydropower plant. Explain penstock and surge chamber.	**07**
		OR	
	b	Define the following terms (i) Installed capacity of the power house (ii) Load factor (iii) Plant factor (iv) Power factor (v) Water power potential	**07**
Q.3	**a**	Classify and explain the hydraulic turbines accordingly to specific speed.	**07**
	b	What is draft tube? Explain different types of draft tubes. Also write theory of the draft tube.	**07**
		OR	
Q.3	**a**	Determine the absolute pressure head at inlet of a vertical divergent draft tube from the following data; (i) Total length of the draft tube is 6.0 m. (ii) Length of the draft tube drowned is 1.25 m. (iii) Loss of head due to friction in draft tube is 0.25*kinetic head at outlet (iv) Velocity of water at inlet is 5 m/s (v) Inlet diameter of the tube is 0.6 m. (vi) Outlet diameter of the tube is 0.9 m. Also find the efficiency of the draft tube .	**07**
	b	Explain characteristics curves of the turbine.	**07**
Q.4	**a**	Describe the different types of surge tanks of hydropower project.	**07**
	b	Explain governing of a turbine.	**07**
		OR	
Q.4	**a**	Write short note on needle valve and jet deflector.	**07**
	b	Explain hydraulic design of the surge tank.	**07**
Q.5	**a**	Classify and explain penstocks in brief.	**07**
	b	What is intake structure? Explain different types of intakes.	**07**
		OR	

Q.5 **a** A Pelton wheel working under a head of 510 meters has an overall efficiency of 85 % and runs at 430 rpm developing 7000 kW of shaft power. Taking the bucket speed at 0.47 times the jet speed and assuming Cv is 0.97 find the wheel diameter and jet diameter. **07**

b A run off river plant is installed on a river having a minimum flow of 20 cumecs. If the plant is used as a peak load plant operating only for 6 hours daily, compute the firm capacity of the plant : **07**

(a) Without pondage

(b) With pondage but allowing 10 % water to be lost in evaporation and other losses. Head at the plant is 16 m, and the plant efficiency may be assumed as 80% .

****