Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2013

Subject code: 711205N **Date: 06-01-2014**

Subject Name: Hydro Power Engineering

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	What are the different methods of classifying the hydro-electric power plants? Explain briefly.	**07**
	(b)	What is meant by the 'economical diameter' of a penstock? How can it be found out?	**07**
Q.2	**(a)**	Enlist different types of surge tanks and discuss hydraulic design of surge tanks.	**07**
	(b)	Explain rigid water column theory.	**07**
		OR	
	(b)	Enlist the different types of turbines and explain Francis turbine.	**07**
Q.3	**(a)**	A power canal, bed width 15.0 m may be assumed to be rectangular in shape with a steady state depth of flow of 3.0 m. The canal supplies water to a power house with three turbines, each turbine rated at a discharge of 30.0 cumecs. If the load in the power house is suddenly thrown off so that two of the turbines have to be shut down, what would be the height of the surge in the canal?	**07**
	(b)	Briefly explain the features of a hydro-power plant.	**07**
		OR	
Q.3	**(a)**	Explain with sketches the various methods of tidal power generation. What are the limitations of each method?	**07**
	(b)	Briefly explain the intake losses.	**07**
Q.4	**(a)**	Write a brief note on 'Draft Tubes'.	**07**
	(b)	Discuss briefly the design criteria for a power canal.	**07**
		OR	
Q.4	**(a)**	How are the load factor, capacity factor, and utilization factor interrelated?	**07**
	(b)	Enlist various types of valves used in penstock. Discuss butterfly and spherical valves.	**07**
Q.5	**(a)**	Explain the following terms: (i) Load factor (ii) Capacity factor (iii) Firm power (iv) Power duration curve	**07**
	(b)	Briefly discuss the procedure generally adopted for the selection of turbine	**07**
		OR	
Q.5	**(a)**	When a run-of-river plant operates as a peak load station with a weekly load factor of 20 %, all its capacity is firm capacity. What will be the minimum flow in the river so that the station may serve as the base load station? The rated installed capacity of generator is 10,000 KW and the operating head is 15.0 m., assume plant efficiency of 80 %. Estimate the daily load factor of the plant if the stream flow is 15.0 cumecs.	**07**
	(b)	Discuss the relative merits and demerits of hydro-power as compared to other power sources.	**07**

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