

Seat No.: \_\_\_\_\_

Enrolment No. \_\_\_\_\_

# UJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 711205N

Date: 16-01-2013

Subject Name: Hydro Power Engineering (Elective)

Time: 02.30 pm – 05.00 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) Give classification of hydropower plant as per the head of the water 07  
 (b) Enlist the different types of the turbines and explain Francis turbine 07
- Q.2** (a) Enlist different sources of energy and explain hydropower as source of energy 07  
 (b) A reaction turbine is supplied with 160 cu.m. of water per second and work under a maximum head of 108 m . Assuming overall efficiency of the plant 80 % and specific weight of water 1000 m<sup>3</sup>/s , calculate the horse power developed in KW 07
- OR**
- (b) Explain hydropower development of India 07
- Q.3** (a) Explain different types of penstock 07  
 (b) Explain behaviors of surge tank 07
- OR**
- Q.3** (a) Explain (i) Load factor (ii) Capacity factor (iii) Firm power 07  
 (b) Considering daily flow in a river constant 10 m<sup>3</sup>/s what would be the firm capacity of a runoff 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 20 m . Overall efficiency  $\eta=85\%$  07
- Q.4** (a) Explain different methods of support of penstock 07  
 (b) Explain design criterias of surge tank 07
- OR**
- Q.4** (a) A penstock with internal diameter of 1.0 m supplies water at head equivalent to 19.4 Kg/cm<sup>2</sup> . There is a possibility of 19 % increase in the pressure due to transient conditions. The design stress and the efficiency of the joint may be assumed to be 1000 Kg/cm<sup>2</sup> and 84 % respectively . calculate the approximate thickness of the penstock required 07
- Q.4** (b) Explain rigid water column theory 07
- Q.5** (a) Enlist different types of intake and explain dam intake 07  
 (b) Explain Draft tube 07
- OR**
- Q.5** (a) The following data of a turbine is given 07  
 (i) Frequency : 50 Hz  
 (ii) Pairs of poles : 10  
 (iii) Gross Head : 60 m  
 (iv) Power generation : 128000 HP,  
 (v) Efficiency of head race tunnel and penstock : 95 %  
 (vi) Overall efficiency : 90 %  
 (vii) Numbers of unit : 3  
 Calculate (i) Synchronous speed of generator  
 (ii) Net Head of turbine  
 (iii) Discharge  
 (iv) Specific speed
- (b) Explain (i) Tail race (ii) Trash rack 07

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