Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME Semester –I Examination Feb. - 2012

Subject code: 711205N **Date: 21/02/2012**
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 marks.**

Q.1 **(a)** Explain effect of water hammer and describe rigid water column theory **07**

(b) Describe the classification of Hydropower plant **07**

Q.2 **(a)** A plant is having following details **07**

(i) Units generated per year =11.7 x 10^6 Kwh
(ii) Station capacity =45 MW
(iii) Total hours of working 4000 hours
(iv) Maximum demand =32 MW

Work out following
(i) Plant use factor
(ii) Annual load factor
(iii) Capacity factor

(b) Explain solar and wind Energy as sources of energy **07**

OR

(b) Explain design requirements of penstock and also discuss economical diameter of penstock **07**

Q.3 **(a)** Enlist different types of turbines and explain Kaplan turbine **07**

(b) Describe Trash Rack **07**

OR

Q.3 **(a)** Calculate the total energy in Kwh which can be generated in Kwh from a hydropower station having following data **07**
Reservoir area = 2.7 Sq. Km.
Capacity=6 x 10^6 m^3
Neat head of water at turbines = 82m
Turbine efficiency = 82%
Generator efficiency= 90%
Also find how many meters the level of reservoir will fall if a load of 10000 Kwh is supplied for 7 hours ?

(b) With sketch explain dam intake **07**

Q.4 **(a)** Enlist different type of surge tanks and discuss hydraulic design of surge tanks **07**

(b) For a hydro electric power station the following data is available **07**

Head = 378 m
Discharge = 5.1 cumec
Efficiency of turbine =85 %
Generator frequency = 50 c/s
Determine following (i) Output
(ii) Type of turbine
(iii)Speed of turbine

OR

Q.4 **(a)** Explain (i) firm power (ii) Pondage factor (iii) Anchor block **07**

(b) Give list of different type of valve used in penstock pipes and discuss Butterfly and spherical valve **07**

Q.5 **(a)** Discuss hydropower development of India **07**

(b) A hydropower plant operates for 16 hours a day and 7 days a week with constant available inflow of 36 cumecs net head 40m and overall efficiency 84 % and 10% water losses determine **07**

(i) the maximum constant power as can be obtained to cater for the given demand
(ii) (ii) Maximum pondage capacity (iii) Percent increase in discharge due to pondage

OR

Q.5 **(a)** Explain different components of power plant with sketch **07**

(b) Describe the selection of turbines **07**

****