Name: **Enrolment No:**	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2019

Programme Name: M. Tech REE **Semester : III**
Course Name : Alternate Energy Technologies **Time : 03 hrs**
Course Code : EPEC 7020 **Max. Marks : 100**
Nos. of page(s) : 2
Instructions: All questions are mandatory. Assume parameters wherever required and mention the same.

SECTION A

S. No.		Marks	CO
Q 1	Discuss the advantages and disadvantages of magneto hydro dynamic generator	**4**	**CO1**
Q 2	Discuss the environmental benefits of using hydrogen as a fuel	**4**	**CO2**
Q 3	Explain briefly about the technical limitations of FC technology.	**4**	**CO3**
Q 4	Discuss the limitations of oscillating water column.	**4**	**CO4**
Q 5	Explain the principle of operation of ocean thermal energy conversion	**4**	**CO5**

SECTION B

Q 6	An MHD duct consist of gas of velocity v=650x+150y+0z. The magnetic field, B=4.2T is applied in z direction. The conductivity of ionized gas is 60 mho/m. Mean collision time of electron is 10^{-10} and loading factor k = 0.6. Given width, height and length are 0.65 m, 0.35 m and 1.5 m respectively. Calculate i. Generated voltage and its gradient inside the duct ii. Indicate the direction of flow of conventional current in the load and indicate the polarities of electrodes. iii. Load voltage and its gradient caused inside the duct iv. Current density and current in the system v. Power density and Total power generated vi. Power Delivered to the load vii. Joules Heating loss in the duct viii. Efficiency of the system	**10**	**CO1**
Q 7	Discuss various hydrogen storage techniques and explain any two in detail with neat diagram.	**10**	**CO2**
Q 8	Compare different types of fuel cell technologies used for powering a standalone system.	**10**	**CO3,CO4**
Q 9	A tidal project has installed capacity of 2176 MW in 64 units each of 34 MW rated output. The head at rated output is 5.52 m. The embankment is 4 km. Assume 95 % efficiency for both turbine and generator. The generation is 5 hours twice a day. Calculate a. The quantity of water flowing through each turbine and the total flow out of the tidal basin. b. The surface area of reservoir behind the embankment. c. Energy produced in TW-h per year	**10**	**CO5**

SECTION-C			
Q 10	Derive an expression for maximum power output from a continuous electrode faraday generator. Calculate the same for the MHD having the dimensions $\boldsymbol{w = 0.65m\ \ h = 0.4m\ \ and\ l = 1.75m}$. The magnetic field strength is B = 4.2 T along h and the gas velocity is 620 m/s. Assume the performance coefficient as 0.65.	**20**	**CO1**
Q 11	Describe the following schemes for tidal energy generation, and draw all characteristic curves for each scheme. a. Single way generation b. Two way generation	**20**	**CO5**