


<b>Name:</b>	 <b>UPES</b> UNIVERSITY WITH A PURPOSE
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, July 2020**

**Course: Hydropower Engineering**  
**Program: B Tech Civil Engineering**  
**Course Code: CIVL 3015**

**Semester: VI**  
**Time: 3 hours**  
**Max. Marks: 100**

**Instructions:**

- a) Attempt all the questions
- b) Strictly follow the time limit provided

**SECTION A**

S. No.	Question	Marks	CO
Q1	Define the following: a) Dependable Yield b) Power Factor c) Demand factor d) Utilization factor	4	CO1
Q2	How will you defend the environmental related issues with the hydel power?	4	CO1
Q3	How will you delineate a catchment for the hydel power station?	4	CO2
Q4	The Government of India has approved renewable energy status for the large hydel projects. Comment on the significance of this decision.	4	CO3
Q5	Sketch the components of a conventional reaction turbine.	4	CO4

**SECTION B**

Q6	A 25 MW hydel plant working under a head of 35m at 100% load factor is functioning as a peak load plant. Calculate the discharge required if it has to function as a base load plant station; with an overall efficiency of 90 %, what will be the maximum load factor if the discharge is 50 cumecs? Prepare a load vs efficiency curve on the similar grounds using suitable range of discharge including the above two values.	10	CO1
Q7	Sihwa lake tidal power station (South Korea) is the largest tidal power station in the world. With reference to above comment on the feasibility of a tidal power station in India. Your answer must cover the details for the most potential site for tidal power station in India.	10	CO2
Q8	Derive an expression for the specific speed of a turbine and give the range for the selection of all the type of turbines.	10	CO2
Q9	What is the maximum permissible velocity in a CI pipe 100mm diameter and 15mm thick, which can be suddenly stopped by a valve at the outlet end of the pipe without letting rise of pressure in the pipe to exceed $1.545 \times 10^3 \text{ kN/m}^2$ ? Take $E = 123.606 \times 10^9 \text{ N/m}^2$ and $K$ for water as $206.01 \times 10^7 \text{ N/m}^2$ .	10	CO3

**SECTION-C**

Q10	<p>Turbines in <b>Idukki Dam</b>: 6 x 130 MW, (Pelton Wheel) Turbines in <b>Bhakra Dam</b>: 5 x 108, 5 x 157 MW (Francis Turbine) Describe in great detail the criteria which has been chosen for the selection of these type of turbine. A Pelton wheel, working under a head of 500m, produces 13000kW at 430 rpm. If the efficiency of the wheel is 85 %, Determine</p> <ul style="list-style-type: none"><li>a) Discharge</li><li>b) Diameter of the wheel</li><li>c) Diameter of the nozzle.</li></ul>	<b>10+10</b>	<b>CO4</b>
Q11	<p>Analyze the hydropower plant with respect to all the other renewable sources of energy in terms of their <u>capacity potential, dependability and sustainability</u>. Each point of difference should be described in great detail and with respect to the Indian Scenario. Derive an expression for water hammer for gradual closure of a valve.</p>	<b>10+10</b>	<b>CO1,3</b>