

Name:  
Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, May 2019**

**Course: Hydro power generation**  
**Program: B.Tech ETIPR**  
**Course Code: PSEG 362**

**Semester: 8<sup>th</sup>**  
**Time 03 hrs.**  
**Max. Marks: 100**

**Instructions: All the question are in section A & B are compulsory. Section C has choice only for A part**

**SECTION A**

S. No.		Marks	CO
Q 1	Brief the term “hydrology” and “hydrological cycle”.	4	CO1
Q 2	Explain the importance of spillway in hydro power plant.	4	CO1
Q3	Give the name of turbines used in hydro power plant depending on capacity.	4	CO4
Q4	Explain why “screening” is necessary in water intake structure.	4	CO3
Q5	Write short note on Governing system of turbine in hydro power plant.	4	CO2

**SECTION B**

Q6	State the functions of the following parts of hydro-electric power station. i) Tail race ii) Turbine iii) Penstock iv) Reservoir	10	CO2
Q7	Describe the working of dry type intake well with diagram and also list down the advantages and disadvantages.	10	CO3
Q8	Draw hydro power plant layout and explain each associated component in brief.	10	CO2
Q9	Define orographic precipitation and convective precipitation and types of cyclone.	10	CO1

**SECTION-C**

Q 10	<p>A) Classify different types of spill way and describe any three in detail.</p> <p align="center">OR</p> <p>Define the term Specific Speed. Also, find out the expression for the specific speed of a water turbine in terms of power developed, speed and head available.</p> <p>B) Calculate the power output for hydro power station Head = 31.2 m, Q (Discharge) = 2 m<sup>3</sup>/s, <math>\eta_{WT}</math> (efficiency of turbine) = 0.88, and <math>\eta_{HG}</math> (efficiency of generator) = 0.93</p>	20 (10+10)	CO3,2
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Q11	<p>A) List &amp; explain factors considered for selection of site for a hydroelectric power plant.</p> <p style="text-align: center;">OR</p> <p>What are the criteria of manufacturing of water intake plant and differentiate embedded penstock and surface penstock?</p> <p>B) A proposed hydro-electric station has an available head of 120 meters, a catchment area of 200 sq. km, the rainfall of which is 120 cm per annum. If 0.62 of the total rainfall can be collected, then calculate the power that could be generated. Suggest suitable rating of generator.</p>	<b>10+10=</b> <b>20</b>	<b>CO2,3</b>

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**SECTION A**

S. No.	Question	Marks	CO
Q 1	Define the term Unit Hydrograph with neat diagram.	4	CO1
Q 2	Explain how the head of power plant effected the power output of generator.	4	CO2
Q3	Write shot note on “spillway”.	4	CO3
Q4	Define tail trace and why it is essential for hydro power plant.	4	CO3
Q5	Differentiate base and peak load plants with load curve.	4	CO2

**SECTION B**

Q6	Describe the function of draft tube in Hydro power plant. Also, discuss the various types of draft tube with example.	10	CO4
Q7	Explain various type of intake well structure with diagram.	10	CO3
Q8	Enumerate and explain briefly the factors which should be considered while selecting the site for hydro-electric plant.	10	CO2
Q9	A) Classify the various types of hydraulic turbine. B) The quantity of water available for hydro plant is 250m <sup>3</sup> /sec under a head of 1.6 m. If the speed of the turbine is 50 r.p.m. and efficiency is 82% determine the number of units required. Assume $N_s = 740$ .	5+5	CO4,2

**SECTION C**

Q 10	<p>A) Draw the block diagram of pumped storage plant and elaborate the working of the same. Also, list down the limitation of the pumped storage plant.</p> <p style="text-align: center;">OR</p> <p>Explain the methods of measuring water flow rate of river along with figure.</p> <p>B) A hydro plant operates under an effective head of 100 m and a discharge of 200 m<sup>3</sup> /s. If the efficiency of the turbine alternator set is 0.9, find the power developed.</p>	20 (10+10)	CO1,2
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Q11	<p>A) Explain briefly type of precipitation and cyclone and how they affect the climate.</p> <p style="text-align: center;">OR</p> <p>What are the three different types of penstocks also explain merits and demerits of each.</p> <p>B) A hydro-electric station has an average available head of 100 meters and reservoir capacity of 50 million cubic meters. Calculate the total energy in kWh that can be generated, assuming hydraulic efficiency of 85 % and electrical efficiency of 90%.</p>	<b>10+10= 20</b>	<b>CO1,3</b>
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