

Name:

Enrolment No:



## UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2019

Programme Name: B. Tech. (Electrical)

Semester : V

Course Name : Thermal & Hydraulic Equipment

Time : 03 hrs

Course Code : MECH 3011

Max. Marks: 100

Nos. of page(s) : 2

Instructions: All questions are compulsory

### SECTION A

S. No.		Marks	CO
Q1	With the help of appropriate diagram, explain: 1) NDCT 2) Fin Fan Cooler	4	CO2
Q2	Enumerate at least 4 most important functions of 'Condensate Extraction Pump'.	4	CO1
Q3	State the reason behind having larger size Turbo-generator for a Hydro Electric Power Plant.	4	CO2
Q4	State the advantage and disadvantage of steam turbine used for power generation.	4	CO2
Q5	Explain the reason behind the selection of copper tubes or copper alloy tubes in 'Shell & Tube' type steam condenser.	4	CO3

### SECTION B

Q6	Explain the following condenser cooling system along with appropriate diagram: a) Open loop CW system                      b) Closed loop CW system	5+5	CO4
Q7	a) In an IDCT the inlet & outlet CW temperatures are 32 Deg. C & 37 Deg. C with a total CW circulation of 1500 M <sup>3</sup> / Hr. Percentage Drift loss is 0.09%, Evaporation loss is 0.84%. Due to certain relaxation in the state regulations on the total usage of CW, the COC was changed from 2 to 4. Calculate the change in 'Make-up water requirement/ day'. b) Comment on the implication the above changes would have on the 'Operation & Maintenance' of the CT.	5+5	CO2
Q8	Calculate the Free Air Delivery (FAD) of a compressor with the following data:  <ul style="list-style-type: none"><li>• Receiver Capacity = 5 m<sup>3</sup></li><li>• Initial pressure in the Receiver = 1 Kg/ cm<sup>2</sup> (g)</li><li>• Initial pressure in the Receiver = 7 Kg/cm<sup>2</sup> (g)</li><li>• Compressor pumping time = 5 min</li><li>• Temperature of air in the Receiver = 36 Deg. Celsius</li><li>• Ambient Air temperature = 30 Deg. Celsius</li></ul>	10	CO3

Q9	<p>Explain HP-LP Bypass &amp; PRDS system along with appropriate diagram(s).  OR  Explain Feed Water recirculation system along with HP heaters along with appropriate diagram.</p>	10	CO3
<b>SECTION-C</b>			
Q10	<p>a) In a hydroelectric power plant, water is available at the rate of 1.864 m<sup>3</sup>/sec with an available head of 250 m. The turbines run at a speed of 250 rpm with 70% efficiency. Determine available power &amp; suggest suitable turbine &amp; number of turbines required. Consider a plant load factor of 0.5.</p> <p>b) Explain the function of the following in a Hydro-electric Plant:  a) Dam b) Spillway c) Surge Tank d) Draft Tube</p>	12+8	CO4
Q 11	<p>For a Turbo-generator used in a co-generation system, the generator &amp; turbine efficiencies are 92% &amp; 82.6%.</p> <p>The steam parameters at the turbine inlet, process extraction &amp; outlet are given below:</p> <p>1) Turbine Inlet Steam: 39.13 TPH at 756 Kcal/Kg  2) Turbine Intermediate Steam Extraction: 31.9 TPH at 683 Kcal/Kg  3) Turbine Exhaust Steam to condenser: 7.23 TPH at 608 Kcal/Kg</p> <p>Calculate the total Power generated by the cogeneration system.</p> <p style="text-align: center;"><b>OR</b></p> <p>Calculate the Indicated Power (IP), Brake Power (BP) &amp; Mechanical Efficiency for a 4- Stroke Diesel Engine with the following data:</p> <p>a) Mean Effective Pressure (MEP) = 6.0 Bar  b) Cylinder Bore Diameter = 200 mm  c) Cylinder Stroke Length = 300 mm  d) Crank Speed = 300 rpm  e) Brake drum diameter = 400 cm  f) Brake Load = 50 Kg</p>	20	CO3