Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2018

Programme Name: B. Tech. (Electrical) **Semester** : V
Course Name : Thermal & Hydraulic Equipment **Time** : 03 hrs
Course Code : MHEG 374 **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, state the difference between 'Direct Contact Type' & 'Surface Type' Heat Exchanger.	4	CO2
Q2	Enumerate at least 4 most important functions of 'Condensate Extraction Pump'.	4	CO1
Q3	Compare & contrast a Steam turbine with a Hydro-Turbine.	4	CO2
Q4	State the advantage and disadvantage of hydro turbine used for power generation.	4	CO2
Q5	With the help of Rankine diagram, explain the difference between 'Dry Saturated Steam' & 'Superheated Steam'.	4	CO3

SECTION B

Q6	A) With the help of appropriate diagram, explain the operation of centrifugal type Boiler Feed Pump (BFP) by elaborating the method adopted to maintain the NPSH (Net Positive Suction Head) for the BFP. B) Compare & contrast between MD- BFP & TD- BFP.	10	CO4
Q7	With the help of appropriate diagram, explain the various types of Wet Cooling Towers.	10	CO2
Q8	Calculate the Free Air Delivery (FAD) of an Air Compressor with perfect "Isothermal Compression" for the following observed data: a) Receiver Capacity = 0.25 m3 b) Initial pressure in the Receiver = 1 Kg/ cm2 (g) c) Initial pressure in the Receiver = 13 Kg/cm2 (g) d) Compressor pumping time = 3.9 min	10	CO3

<table>
<tr><td>Q9</td><td>With the help of neat diagram, explain Diesel Cycle.
OR
With the help of neat diagram, explain Otto Cycle.</td><td>10</td><td>CO2</td></tr>
<tr><td colspan="4">SECTION-C</td></tr>
<tr><td>Q10</td><td>A) Design the turbine configuration (number of turbines required) for a hydro-electric power plant using Kaplan Turbines as per the data given below:
a) Water availability (Q) = 175 m3/sec
b) Available Head (H) = 18 m
c) Actual speed of the turbines (N) = 150 rpm
d) Overall efficiency = 82%
e) Maximum Specific Speed of the Turbines (Ns) = 460

B) Also, calculate the synchronous speed of the generator for the above mentioned turbine scheme.</td><td>20</td><td>CO4</td></tr>
<tr><td>Q 11</td><td>Calculate the turbine efficiency of a condensing turbine for the following steam conditions. Assume generator efficiency as 92%. Power generated from the turbine is 3.0 MW.
<table><tr><td>Condition</td><td>Flow, TPH</td><td>Steam Enthalpy (Kcal/Kg)</td></tr><tr><td>Turbine Inlet Steam</td><td>39.13</td><td>756</td></tr><tr><td>Turbine Intermediate Steam Extraction,</td><td>31.9</td><td>683</td></tr><tr><td>Turbine Outlet Steam</td><td>7.23</td><td>608</td></tr></table></td><td>20</td><td>CO3</td></tr>
</table>

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Name of the School (Please tick, symbol is given)	:	**SOE**	☐	**SOCS**		**SOP**	
Programme	:	**B. Tech. (Electrical Engineering)**					
Semester	:	**V**					
Name of the Course	:	**Thermal & Hydraulic Equipment**					
Course Code	:	**MHEG 374**					
Name of Question Paper Setter	:	**Amarnath Bose**					
Employee Code	:	**40001146**					
Mobile & Extension	:	**9717097969**					
Note: Please mention additional Stationery to be provided, during examination such as Table/Graph Sheet etc. else mention "NOT APPLICABLE":							

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Note: - Pl. start your question paper from next page

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SECTION A

S. No.		Marks	CO
Q1	Explain 'Shell & Tube' type Heat Exchanger along with appropriate diagram.	4	CO2
Q2	Enumerate at least 4 most important functions of 'Boiler Feed Pump (BFP)'.	4	CO1
Q3	Compare & contrast Impulse Turbine with a Reaction Turbine.	4	CO2
Q4	State the advantage and disadvantage of steam turbine used for power generation.	4	CO2
Q5	With the help of Rankine diagram, explain the following: a) Sensible Heat b) Latent Heat c) Super Heat d) Critical Temperature point	4	CO3

SECTION B

Q6	A) Explain the function of Positive Displacement Pump along with appropriate example. B) Compare & contrast the pump configuration of (2 X 100%) with (3 X 50%).	10	CO4
Q7	Explain the operation of Air Cooled Condenser along with appropriate diagram.	10	CO2
Q8	Calculate the Indicated Power (IP), Brake Power (BP) & Mechanical Efficiency for a 2- Stroke Diesel Engine with the following data: A) Mean Effective Pressure (MEP) = 27.44 N/cm2 B) Cylinder Bore Diameter = 20 cm C) Cylinder Stroke Length = 30 cm D) Crank Speed = 400 rpm E) Brake drum diameter = 100 cm F) Brake Load = 64 Kg	10	CO3
Q9	With the help of neat diagram, explain Turbine Reheat Cycle.	10	CO3

<table>
<tr><td></td><td>OR
With the help of neat diagram, explain Turbine Regenerative Cycle.</td><td></td><td></td></tr>
<tr><td colspan="4">SECTION-C</td></tr>
<tr><td>Q10</td><td>A) In a hydroelectric power plant, water is available at the rate of 1.864 m3/sec with an available head of 250 m. The turbines run at a speed of 250 rpm with 70% efficiency. Determine available power& suggest suitable turbine & number of turbines required. Consider a plant load factor of 0.5.

B) Explain the function of the following in a Hydro-electric Plant:
a) Dam b) Spillway c) Surge Tank d) Draft Tube</td><td>20</td><td>CO4</td></tr>
<tr><td>Q 11</td><td>Calculate the Power generated by a power plant having its generator & turbine efficiencies as 92% & 82.6% respectively.
The steam parameters are as follows:
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