Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2019

Programme Name: B. Tech. (PSE) **Semester : VI**
Course Name : Steam Turbine & its Auxiliaries **Time : 03 hrs**
Course Code : PSEG 318 **Max. Marks: 100**
Nos. of page(s) : 2
Instructions: All questions are compulsory

SECTION A

S. No.		Marks	CO
Q1	State the function of 'Air Extraction System' used in a Steam Condenser. Explain with the help of suitable diagram an 'Air Ejector'.	**4**	**CO1**
Q2	Explain at least four primary functions of the 'Turbine Governing System'.	**4**	**CO2**
Q3	Discuss the four primary functions of the 'Condensate system'.	**4**	**CO2**
Q4	Explain the importance of 'DC Emergency Oil Pump' in Turbine Oil System.	**4**	**CO3**
Q5	Enumerate the advantages & disadvantages between 'Vertical mounted' & 'Horizontally mounted' Feed Water Heater.	**4**	**CO1**

SECTION B

Q6	Enumerate four primary functions of the 'Turbine Oil System' along with the major equipment(s) used in the same.	**10**	**CO4**
Q7	Explain at least four ways of starting a TPP station from cold condition having Boiler Feed Pump (BFP) configuration as (1X50% MD-BFP + 2X50% TD-BFP).	**10**	**CO3**
Q8	Explain with the help of appropriate figure the following types of 'Cooling Towers' along with their respective application: 1. IDCT 2. FDCT	**10**	**CO2**
Q9	Explain the 'On-load detection' method of 'Air leakage' in condenser shell. OR Explain the 'Off-load detection' method of 'Air leakage' in condenser shell.	**10**	**CO3**

SECTION-C

Q10	(A) Below given are the NDCT parameters: • Cooling Water temperature at condenser inlet = 32 Deg.C • Cooling Water temperature at condenser outlet = 37 Deg.C • Cooling Water flow = 1500 M^3/ Hr • Drift Loss from the Cooling Tower = 0.09% • Evaporation loss from the Cooling Tower = 0.84%	**12 + 8**	**CO3**

	• Cycle of Concentration (COC) = 3 Calculate the following: 1) Cooling Tower Blow down losses 2) Total loss from the Cooling Tower 3) Make-up water requirement per day (B) Explain with the help of appropriate diagram the following: 1) Closed loop Cooling Water system 2) Open loop Cooling Water system		
Q 11	(A) The velocity of steam entering a simple impulse turbine is 1000 m/sec and the nozzle angle is 20 Deg. The peripheral velocity of blades is 400 m/sec and the blades are symmetrical. Calculate the blade angles. If the relative velocity at exit is reduced by friction to 80% of that at inlet, calculate the following: 1) Tangential force on the blades 2) Diagram Power for a mass flow of 0.75 Kg/sec 3) Axial Thrust 4) Diagram efficiency (B) Explain the following along with appropriate diagram indicating their point of application: 1) Phosphate dosing system 2) Hydrazine dosing system	**12 + 8**	**CO4**

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SECTION A

S. No.		Marks	CO
Q1	Explain the function of the **'De-aerator'** in **'Turbine Condensate re-circulation system'**.	**4**	**CO1**
Q2	Explain the importance of 'Turbine Governing system' with the help of Speed Sensing logic diagram.	**4**	**CO2**
Q3	Enumerate & explain three primary applications of **'Turbine Oil System'**.	**4**	**CO2**
Q4	With the help of appropriate figure, explain the following types of Cooling Towers: 1) NDCT 2) Dry type Cooling Tower	**4**	**CO3**
Q5	Explain the method of detection of CW leakage from the condenser tube during 'On-load' condition.	**4**	**CO1**

SECTION B

Q6	Explain the five primary functions of the 'Condensate Extraction Pumps (CEP)'.	**10**	**CO4**
Q7	Analyze the advantages & disadvantages of having 2 X 100% and 3 X 50% configuration Condensate Extraction Pumps (CEP) w.r.t a) Capital Cost b) Operating Cost (inclusive of maintenance expenditure) c) Operational flexibility & economics	**10**	**CO3**
Q8	Explain with the help of appropriate figure the following types of 'Cooling Towers' along with their respective application: 1. Wet Cooling Tower 2. Dry Cooling Tower	**10**	**CO2**
Q9	With the help of neat diagram, explain 'Direct Contact type Heat Exchanger' used in Turbine Condensate re-circulation system along with their specific application. OR With the help of neat diagram, explain 'Surface type Heat Exchanger' used in Turbine Condensate re-circulation system along with their specific application.	**10**	**CO3**

SECTION-C

Q10	(A) For a surface condenser used in a TPP, calculate the rate of flow of Cooling Water (CW) and the Cooling Ratio having the following parameters: • Total amount of turbine exhaust steam = 20 Kg/ sec • Final condensate temperature = 25 Deg.C	**12 + 8**	**CO4**

	• CW temperature at condenser I/L = 15 Deg.C • CW temperature at condenser O/L = 22 Deg.C • Enthalpy of steam at Condenser I/L = 2500 KJ/ Kg Consider, heat capacity of water = 4.19 KJ/ Kg/ Deg.C (B) Explain the various types of losses in a Cooling Towers.		
Q 11	(A) The velocity of steam entering a simple impulse turbine is 1000 m/sec and the nozzle angle is 20 Deg. The peripheral velocity of blades is 400 m/sec and the blades are symmetrical. If the steam is to enter the blades without shock , what will be the blade angle. Neglecting the friction effects on the blades, calculate the 1) Tangential force on the blades 2) Diagram Power for a mass flow of 0.75 Kg/sec 3) Axial Thrust 4) Diagram efficiency (B) Give reasons, why it is not possible to condense the Turbine exhaust steam into condensate by increasing the pressure inside the condenser instead of taking away heat by using cooling water system.	**12 + 8**	**CO3**