Name: Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2019

Programme Name: B. Tech. (PSE) **Semester : VI**
Course Name : Power Plant Operation & Control **Time : 03 hrs**
Course Code : PSEG 416 **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 the operation of 'Air Ejector used in a Steam Condenser.	4	CO1
Q2	Explain the importance of the PRDS used in the HP Bypass system operation.	4	CO2
Q3	Using appropriate single line diagram, explain LP line 'Condensate water re-circulation' system.	4	CO2
Q4	Explain the operation of 'DC Emergency Oil Pump' in Turbine Oil System.	4	CO3
Q5	Describe the operation of the following: 1) Direct contact type heat exchanger 2) Surface type Heat exchanger	4	CO1

SECTION B

Q6	Explain the 'Emergency Operation sequence during the following conditions: 1) Low Boiler Furnace Pressure 2) Mill Failure	10	CO4
Q7	A TPP has a Boiler Feed Pump (BFP) configuration as (1X100% MD-BFP + 1X100% TD-BFP). Enumerate the four different methods of starting the unit during cold start-up condition.	10	CO3
Q8	Explain the operation of the following methods of Turbine exhaust steam cooling systems: 1) Once through system (Open loop system) 2) Re-circulation system (Closed loop system	10	CO2
Q9	(A) Give reasons, why do we prefer to use (Forced Draft Cooling Tower) FDCT for a co-generation plant having fertilizer plant as the secondary process. OR (B) Give reasons, why do we not prefer to use (Induced Draft Cooling Tower) IDCT for a co-generation plant having chemical compound manufacturing	10	CO3

	plant as the secondary process.		
	SECTION-C		
Q10	Below is given the plant data of a (2 x 210 MW) Coal based Pit head Thermal Power Plant: • Fuel used = Bituminous variety of Indian coal • Power Plant location = Pit Head • Available raw water source = Distant monsoonal river • Ash Pond area = Outside plant boundary • Power evacuation point = Towards South of the Power Plant site • Plant site ambient condition = Humid with High relative humidity • Wind direction = South to North In order to achieve maximum operational flexibility, design the plant layout (diagram) indicating the following based on the above data: a) Indicate the Main Plant Block (Transformer Yard, TG- Building, Boiler, ESP & Chimney) b) Coal Handling System (both Ext. CHP & Int. CHP) & size of the Coal Stock Pile storage area (in days) & its location c) Size of the Raw Water reservoir within the plant d) Type of Condenser Cooling Water (CW) system (Open type or closed type) e) Type of Ash evacuation system & Ash Pond size along with location	**20**	**CO3**
Q 11	(A) During the operation of the TPP Draft system, enumerate about the 1) Boiler draft Pre-start checks 2) Boiler draft Post-start checks OR (B) Using the Single Line Diagram (SLD), explain the operation of 'Dense Phase Fly Ash Evacuation' system along with the major equipment used in it.	**20**	**CO4**

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SECTION A

S. No.		Marks	CO
Q1	Explain the operation of 'De-super heater' in the Boiler.	**4**	**CO1**
Q2	Explain the sequence of operation of un-loading & loading of Turbine Oil using the Clean Oil Tank & Dirty Oil Tank.	**4**	**CO2**
Q3	Explain the importance of the PRDS used in the LP Bypass system operation.	**4**	**CO2**
Q4	Explain the following w.r.t Cooling Tower operational losses: 1) Drift loss 2) Blow-down loss	**4**	**CO3**
Q5	Explain the function of the 'Degasser' used in DM- Plant.	**4**	**CO1**

SECTION B

Q6	Explain the 'Emergency Operation sequence during the following conditions: 1) High Boiler Furnace Pressure 2) Fan Failure	**10**	**CO4**
Q7	With the help of appropriate diagram (SLD), explain the sequence of operation of the Internal Coal Handling & Feeding system for a Circulatory Fluidized Bed Combustion Boiler.	**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	(A) Explain along with appropriate reasoning the type of (Boiler Feed Pump) BFP configuration selection for a Base load TPP. OR (B) Explain along with appropriate reasoning the type of BFP configuration selection for a Peak load TPP.	**10**	**CO3**

SECTION-C

Q10	Below is given the plant data of a (2 x 210 MW) Coal based load centric Thermal Power Plant: • Fuel used = Anthracite variety of Indian coal • Power Plant location = Load Centric • Available raw water source = Abundant supply • Ash Pond area = Within plant boundary • Power evacuation point = Towards North of the Power Plant site • Plant site ambient condition = Dry & Low relative humidity • Wind direction = North to South In order to achieve maximum operational flexibility, design the plant layout (diagram) indicating the following based on the above data: a) Indicate the Main Plant Block (Transformer Yard, TG- Building, Boiler, ESP & Chimney) b) Coal Handling System (both Ext. CHP & Int. CHP) & size of the Coal Stock Pile storage area (in days) & its location c) Size of the Raw Water reservoir within the plant d) Type of Condenser Cooling Water (CW) system (Open type or closed type) e) Type of Ash evacuation system & Ash Pond size along with location	**20**	**CO4**
Q 11	(A) During the operation of the TPP coal Mills, enumerate about the 1) Mill Pre-start checks 2) Mill Post-start checks OR (B) Using Single Line Diagram (SLD), explain the operation of 'Bottom Ash Evacuation up to ASPH using 'Jet pump evacuation' system along with the major equipment used in it.	**20**	**CO3**