## SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

#### **DEPARTMENT OF**

### **ELECTRONICS AND INSTRUMENTATION ENGINEERING**

#### **QUESTION BANK**



#### **VII SEMESTER**

#### **1907801 – Thermal Power Plant Instrumentation**

**Regulation – 2019** 

Academic Year 2024 – 2025 (Even semester)

Prepared by

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#### DEPARTMENT OF ELECTRONICS AND INSTRUMENTATION ENGINEERING <u>QUESTION BANK</u>

# SUBJECT : 1907801 – THERMAL POWER PLANT INSTRUMENTATION SEM / YEAR: VII / IV

**UNIT I - POWER GENERATION METHODS** 

Brief survey of methods of power generation: hydro, thermal, nuclear, solar and wind power – importance of instrumentation in power generation – thermal power plants: building blocks, details of boiler processes P&I diagram of boiler – cogeneration.

PART A					
Q.No	Question	CO's	BT	Competence	
-			Level	-	
1.	Differentiate between Renewable and Non-Renewable	CO1	BTL 2	Understand	
	energy sources.				
2.	Why we can't completely depend on solar and wind	CO1	BTL 2	Understand	
	power plant?				
3.	Classify the methods of power generation.	CO1	BTL 2	Understand	
4.	Identify the two important use of surge tank.	CO1	BTL 1	Remember	
5.	Give any two role of air preheater.	CO1	BTL 2	Understand	
6.	Name the four commonly used moderators in nuclear	CO1	BTL 1	Remember	
	power plants.				
7.	Mention the functions of two important components of	CO1	BTL 2	Understand	
	Nuclear power plant.				
8.	Mention about enriched uranium.	CO1	BTL 2	Understand	
9.	Define Chain Reaction.	CO1	BTL 1	Remember	
10.	Give the disadvantages of Nuclear Power Plant.	CO1	BTL 2	Remember	
11.	Discuss about how to control nuclear reactor in nuclear	CO1	BTL 2	Understand	
	power plant.				
12.	Point out the two important working principle of Solar	CO1	BTL 2	Understand	
	Photo Voltaic Cell.				
13.	Classify the types of wind power plant.	CO1	BTL 2	Understand	
14.	Point out the four significant need of instrumentation in	CO1	BTL 2	Understand	
	power generation.				
15.	State the two major importance of instrumentation in	CO1	BTL 2	Understand	
6	power generation				
16.	Name the three basic cycle of Thermal Power Plant.	CO1	BTL 1	Remember	
17.	Define the role of Economiser in thermal power plant.	CO1	BTL 2	Understand	
18.	Examine the basic factors to be considered for thermal	CO1	BTL 1	Remember	
	power plant.				
19.	Define the term Cogeneration.	CO1	BTL 1	Remember	
20.	Draw the instrument line symbol for pneumatic signal.	CO1	BTL 2	Understand	
21.	What is the advantage of Hydro power plant?	<b>CO1</b>	BTL 1	Remember	
22.	What is the non-renewable source of energy?	<b>CO1</b>	BTL 1	Remember	
23.	Give major building block of thermal power plant?	<b>CO1</b>	BTL 1	Remember	
24.	What are varies method of power generation?	CO1	BTL 1	Remember	

		PART B				
1.	i)	Illustrate with a neat sketch, the	(7)	CO1	BTL 3	Apply
	,	process of electric power generation				11 5
		using Wind Energy.				
	ii)	Explain with a neat sketch the	(6)	CO1	BTL 3	Apply
	•••	process of electric power generation		001	DILU	r pprj
		using Solar Energy				
2	Discuss	n detail with a schematic diagram the	(13)	CO1	BTI 3	Apply
2.	bydro po	wer plant generation	(10)	COI	DILJ	Арргу
2	Describe	the verious process take place in	(13)	CO1	BTI 3	Apply
5.	thormal n	the various process take place in	(13)	COI	DILJ	Appry
4	thermal p	Describe briefly the importance of	(6)	CO1	DTI 2	Annly
4.	1)	Describe briefly the importance of	(0)	COI	BILS	Apply
		instrumentation in nuclear power				
		plant.	<b>/</b>	~~~		
	ii)	Describe the working Principle of	(7)	C01	BTL 3	Apply
		solar cells with neat diagram.			2	
5.	With a b	lock diagram explain the operation of	(13)	CO1	BTL 4	Analyze
	nuclear	power plant and also mention the				
	important	t parameters to be monitored in each				
	block.					
6.	<b>i</b> )	Describe the various operations	(9)	CO1	BTL 3	Apply
		involved in thermal power plant.				
	ii)	Describe the importance of	(4)	CO1	BTL 3	Apply
		instrumentation in power generation.				
7.	i)	Compare and evaluate the	(5)	CO1	BTL 3	Apply
	,	performance characteristics of				11 2
		thermal and nuclear power plants				
		based on each component.				
	ii)	Illustrate the schematic diagram and	(8)	CO1	BTL 3	Apply
		explain the operations of Pressurized		001	2120	1 1991
		water nuclear reactor & Boiling water				
		nuclear reactor				
8	Discuss	the various role of instrumentation	(13)	CO1	BTI 3	Apply
0.	eveter i	n thermal power plant. Also list the	(13)	COI	DILJ	Арргу
	dogirable	qualities of massurement requirements				
0	Drowy the	Diving and Instrumentation diagram of	(12)	CO1	DTI 2	Apply
У.		riping and instrumentation diagram of	(13)	COI	DILJ	Арргу
	a Boller	system in a thermal power plant with				
10	the functi	lons of each unit.	(12)	001		
10.	Explain	the applications of cogeneration in	(13)	COI	BTL 4	Analyze
	power pla	ant with neat sketch.	(10)	601		
11. 🍷	What is	meant by cogeneration? Also explain	(13)	CO1	BTL 4	Analyze
	the topping	ng cycle and bottoming cycle operation				
	of cogene	eration system.				
12.	<b>i</b> )	Assess the need of combine cycle	(3)	CO1	BTL 4	Analyze
		power generation?				
	ii)	Explain any two types of combined	(10)	CO1	BTL 4	Analyze
		cycle power generation unit with neat				
		sketch and working.				
13.	Distingui	sh the different methods of power	(13)	CO1	BTL 3	Apply

	generation.				
14.	Elaborate the Boiler Process with neat diagram.	(13)	CO1	BTL 4	Analyze
15.	Explain the importance of instrumentation in	(13)	CO1	BTL 4	Analyze
	nuclear power plant and Survey of methods of				·
	power generation.				
16.	Discuss in detail with a schematic diagram the	(13)	CO1	BTL 4	Analyze
	hydro power plant generation.				-
17.	Explain in detail a Combined Heat and Power	(13)	CO1	BTL 4	Analyze
	System. Also mention their applications				
	PART C				. 0
1.	Compare the various methods of power	(15)	CO1	BTL 4	Analyze
	generation and present the summary in table			(	
	from various factors.			R C	V
2.	Asses the utilization of boilers under various	(15)	CO1	BTL 4	Analyze
	classifications in detail.			0	
3.	Compile the process used for converting thermal	(15)	CO1	BTL 4	Analyze
	energy into electrical energy		- 2. 1		
4.	Discuss the operation of combined cycle system	(15)	<b>CO1</b>	BTL 4	Analyze
	including Gas turbine and steam turbine in		27		-
	power plant with neat sketch and also discuss the				
	merits and demerits in combined cycle				
	applications.				
5.	Draw the Piping and Instrumentation diagram of	(15)	CO1	BTL 4	Analyze
	a Boiler system in a thermal power plant with				
	the functions of each unit				
	the functions of each unit.				
	UNIT II MEASUREMENTS IN POV	VER F	PLANTS		
Electrical me	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, po	VER I ower fa	PLANTS	on electric	al parameters:
Electrical me	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, po water, fuel, air, steam pressure and steam temper	VER F wer fa ature -	PLANTS ctor – no - smoke	on electric density m	al parameters: easurement –
Electrical me flow of feed Flue gas oxy	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, po water, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments.	WER H ower fa ature -	PLANTS ctor – nc - smoke	on electric density m	al parameters: easurement –
Electrical me flow of feed y Flue gas oxyg	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, po water, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A	WER F ower fa ature -	PLANTS ctor – nc - smoke	on electric density m	al parameters: easurement –
Electrical me flow of feed v Flue gas oxyg Q.No	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, po water, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question	VER I ower fa ature -	PLANTS ctor – nc - smoke CO's	on electric density m BT	al parameters: easurement – Competence
Electrical me flow of feed v Flue gas oxyg Q.No	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, po water, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question	VER I ower fa ature -	PLANTS ctor – nc - smoke CO's	on electric density m BT Level	al parameters: easurement – Competence
Electrical means flow of feed of Flue gas oxygenergy Q.No	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, po water, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question	WER I ower fa rature -	PLANTS ctor – nc - smoke CO's CO2	on electric density m BT Level BTL 2	al parameters: leasurement – Competence Understand
Electrical means flow of feed with Flue gas oxygenerating of the second	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, pow water, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question Classify the types of orifice. Write the two types of feed water heaters in a s	WER I ower fa ature -	PLANTS ctor – nc - smoke CO's CO2 CO2	on electric density m BT Level BTL 2 BTL 2	al parameters: easurement – Competence Understand Understand
Electrical met flow of feed v Flue gas oxyg Q.No 1. 2.	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, powater, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question Classify the types of orifice. Write the two types of feed water heaters in a spower plant.	VER I ower fa ature -	PLANTS ctor – nc - smoke CO's CO2 CO2	on electric density m BT Level BTL 2 BTL 2	al parameters: easurement – Competence Understand Understand
Electrical means flow of feed of Flue gas oxygenerating the second secon	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, powater, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question Classify the types of orifice. Write the two types of feed water heaters in a s power plant. List various methods of feed water flow measure in power plant.	VER F ower fa rature - steam	PLANTS ctor – nc - smoke CO's CO2 CO2 CO2	on electric density m BT Level BTL 2 BTL 2 BTL 1	al parameters: leasurement – Competence Understand Understand Remember
Electrical met flow of feed v Flue gas oxyg Q.No 1. 2. 3.	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, powater, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question Classify the types of orifice. Write the two types of feed water heaters in a spower plant. List various methods of feed water flow measure in power plant.	VER I ower fa ature - steam ement	PLANTS ctor – nc - smoke CO's CO2 CO2 CO2	on electric density m BT Level BTL 2 BTL 2 BTL 1	al parameters: easurement – Competence Understand Understand Remember
Electrical met flow of feed v Flue gas oxyg Q.No 1. 2. 3. 4.	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, powater, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question Classify the types of orifice. Write the two types of feed water heaters in a spower plant. List various methods of feed water flow measure in power plant. Define the suitability of float type in boiler drum	VER F ower fa ature - steam ement level	PLANTS ctor – nc - smoke CO's CO2 CO2 CO2 CO2	on electric density m BT Level BTL 2 BTL 2 BTL 1 BTL 2	al parameters: easurement – Competence Understand Understand Remember Understand
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Electrical met flow of feed v Flue gas oxys Q.No 1. 2. 3. 4. 5.	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, powater, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question Classify the types of orifice. Write the two types of feed water heaters in a spower plant. List various methods of feed water flow measure in power plant. Define the suitability of float type in boiler drum measurement. Compare two element and three element drum	VER I ower fa ature - steam ement level level	PLANTS ctor – nc - smoke CO's CO2 CO2 CO2 CO2 CO2	on electric density m BT Level BTL 2 BTL 2 BTL 1 BTL 2 BTL 2	al parameters: easurement – Competence Understand Understand Remember Understand Understand
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Electrical met flow of feed v Flue gas oxyg Q.No 1. 2. 3. 4. 5. 6. 7. 8.	UNIT II MEASUREMENTS IN POV   asurements: current, voltage, power, frequency, powater, fuel, air, steam pressure and steam temper   gen analyzer – pollution monitoring instruments.   PART A   Question   Classify the types of orifice.   Write the two types of feed water heaters in a spower plant.   List various methods of feed water flow measure in power plant.   Define the suitability of float type in boiler drum measurement.   Compare two element and three element drum control.   Analyze the importance of drum level measure How is it taken care of?   Name any two sensors used for temper measurement in steam turbines.   What is the need of correction factor in temper	VER E VER E Swer fa ature - steam ement level level ment. rature rature	PLANTS ctor – nc - smoke CO's CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	on electric: density m BT Level BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2	al parameters: easurement – Competence Understand Understand Remember Understand Understand Understand Remember Understand Understand
Electrical means flow of feed with Flue gas oxygenerating the second sec	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, powater, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question Classify the types of orifice. Write the two types of feed water heaters in a spower plant. List various methods of feed water flow measure in power plant. Define the suitability of float type in boiler drum measurement. Compare two element and three element drum control. Analyze the importance of drum level measure How is it taken care of? Name any two sensors used for tempe measurement in steam turbines. What is the need of correction factor in temper measurement of Steam in High Pressure Boiler.	VER E VER E Swer fa ature - steam ement level level ment. rature rature	PLANTS $ctor - nc$ $ctor - smoke$ $CO's$ $CO2$	on electric: density m BT Level BTL 2 BTL 2 BTL 1 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2	al parameters: easurement – Competence Understand Understand Remember Understand Understand Understand Remember Understand
Electrical mean flow of feed v Flue gas oxyg Q.No 1. 2. 3. 4. 5. 6. 7. 8. 9.	UNIT II MEASUREMENTS IN POV asurements: current, voltage, power, frequency, powater, fuel, air, steam pressure and steam temper gen analyzer – pollution monitoring instruments. PART A Question Classify the types of orifice. Write the two types of feed water heaters in a spower plant. List various methods of feed water flow measure in power plant. Define the suitability of float type in boiler drum measurement. Compare two element and three element drum control. Analyze the importance of drum level measure How is it taken care of? Name any two sensors used for temper measurement in steam turbines. What is the need of correction factor in temper measurement of Steam in High Pressure Boiler. Give the two scales used for temper	WER I   wer fa   ower fa   ature -   steam   steam   ement   level   nent.   rature   rature   rature   rature	PLANTS ctor – nc - smoke CO's CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	on electric: density m BT Level BTL 2 BTL 2 BTL 1 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2	Competence Understand Understand Understand Remember Understand Understand Understand Understand Understand Understand Understand Remember Understand

10.	List the sensors for measurement of steam pressure and	CO2	BTL 1	Remember
	steam temperature.			
11.	What is the need of connecting thermocouples in series	CO2	BTL 2	Understand
	and parallel during temperature measurement.			
12.	Quote the digital methods of measuring speed.	CO2	BTL 1	Remember
13.	Classify the types of turbine speed measurement.	CO2	BTL 2	Understand
14.	Name the five sensors used in measuring vibration.	CO2	BTL 1	Remember
15.	Give the need of vibration monitoring in turbine.	CO2	BTL 2	Understand
16.	Summarize the working principle of Orsat flue gas	CO2	BTL 2	Understand
	analyzer.			. 0
17.	Describe about flue gas and list any two flue gases.	CO2	BTL 2	Understand
18.	State the purpose of Flue gas analyser.	CO2	BTL 2	Understand
19.	Quote the objective of Fuel Analysis.	CO2	BTL 1	Remember
20.	Mention the principle of bomb calorimeter.	CO2	BTL 2	Understand
21.	What are the disadvantages of pitot tube?	CO2	BTL 2	Understand
22.	What are the different types of positive displacement	CO2	BTL 2	Understand
	meters?			
23.	How is the power factor of an electrical circuit	CO2	BTL 2	Understand
	calculated, and why is it important?	5,00-		Charlotana
24.	Name two types of instruments used to measure	CO2	BTL 1	Remember
	electrical power and explain their applications briefly.	001		
	PART B			
	Describe in detail about coal flow measurement (13)	CO2	BTL 3	Apply
1.	methods with neat diagram.	001	DILU	- <b>-</b> PP-J
	i) Describe a primary and secondary (7)	CO2	BTL 3	Apply
2.	element each in the measurement of	001		
	feed water flow.			
	ii) Discuss the principle behind vortex (6)	CO2	BTL 3	Apply
	flow meter.			
	i) With suitable diagram, explain the (10)	CO2	BTL 4	Analyze
3.	principle of Electromagnetic type flow			j -
	meters.			
	ii) Mention the advantages and (3)	CO2	BTL 4	Analyze
	limitations of Electromagnetic type			j -
	flow meters.			
	i) Specify the need of drum level (3)	CO2	BTL 3	Apply
	measurement.			11.5
4.	ii) Explain the method of measuring (10)	CO2	BTL 3	Apply
0	drum level using differential pressure			11 2
	method.			
· · · · · · · · · · · · · · · · · · ·	How do you measure the speed of the turbine (13)	CO2	BTL 3	Apply
5.	and what is the control mechanisms required for			11 0
	maintaining the optimum speed of the turbine?			
	State the importance of vibration analysis in (13)	CO2	BTL 3	Apply
	turbine. What are the various techniques used for			
0.	vibration measurement? Explain anyone			
	vibration measurement technique in detail.			
7	i) Explain with a neat diagram to (7)	CO2	BTL 4	Analyze
/.	measure the steam temperature.			-

	ii) Explain with a neat diagram to	(6)	CO2	BTL 4	Analyze
	measure the steam pressure.				
8	With a neat sketch illustrate the working of flue	(13)	CO2	BTL 3	Apply
	gas oxygen analyser.	(1.2)	~ ~ ~		
	Explain the method of measuring smoke, density	(13)	CO2	BTL 4	Analyze
9.	in thermal power plant with a conceptual				
	diagram.	(9)	CO2	DTI 2	A com los
	1) How do you evaluate the proximate	(0)	02	BIL 3	Арріу
10	ii) Describe about the flow control	(5)	CO2	BTI 3	Apply
10.	measurements required in power	(5)	02	DILJ	Арргу
	plants.			0	0
	Mention the different methods of analysis of fuel	(13)	CO2	BTL 3	Apply
11.	and illustrate the analysis of fuel by bomb				11 5
	calorimeter in detail.			N.	
	Describe the need of Fuel Analysis in Thermal	(13)	CO2	BTL 3	Apply
12.	Power plant. Also explain the Fuel Analysis		×		
	method in detail.				
13.	List the parameters to be measured in Flue gas of	(13)	CO2	BTL 3	Apply
	Botter.	(7)	CO2	DTI 2	A
	1) Explain the method of measurement	()	002	BIL 3	Арріу
14.	ii) What are the basic impurities in feed	(6)	<u>CO2</u>	BTL 4	Analyze
	water and how do you analyze them	(0)	02	DILT	Anaryze
1.7	Explain about (a) Dissolved oxygen analyzer	(13)	CO2	BTL 4	Analvze
15.	(b) Flue gas Oxygen analyzer				5
16	Discuss the temperature measurements in power	(13)	CO2	BTL 4	Analyze
10.	plants in detail.				
	Write short notes on: a) Drum level	(13)	CO2	BTL 3	Apply
17.	measurement b) Temperature compensation				
	techniques DA DT C				
1	Classify the transducers based on Low Medium	(15)	CO2	DTI 4	Analyza
1.	and High temperature applications. Also list the	(13)		DIL 4	Anaryze
	major temperature measurement points and				
	suggest suitable sensors in Thermal power plant.				
2.	Classify the different methods for measuring	(15)	CO2	BTL 4	Analyze
	flow. Suggest suitable instruments to measure				•
0	coal flow in power plant.				
3.	Discuss, how to analysis fuel using ultimate and	(15)	CO2	BTL 4	Analyze
×	proximate analysis.		~ ~ ~		
4.	Why conventional float type drum level	(15)	CO2	BTL 4	Analyze
	measurement is not suitable for Drum level				
	explain anyone method to measure boiler drum				
	level in thermal power plant 114				
5.	Explain the various methods of measurement of	(15)	CO2	BTL 4	Analyze
	flow of coal.	( )			
	UNIT III FURNACE CONT	ROL			

Coal handling: Pulverizers - Furnace Draught: natural draught, forced draught, induced draught,power requirements for draught systems - Combustion control: Fuel/Air ratio, combustion efficiency, excess air, parallel and cross limited combustion control- soot-blowing operation.

	PART A			
Q.No	Question	CO's	BT	Competence
-			Level	-
1.	Describe the concept of excess air.	CO3	BTL 1	Remember
2.	Point out the effect of excess air in combustion.	CO3	BTL 2	Understand
3.	Define Firing rate demand.	CO3	BTL 1	Remember
4.	Give the requirements to be considered for firing due to	CO3	BTL 2	Understand
	load change.			
5.	Describe the role of boiler control.	CO3	BTL 2	Understand
6.	State the role of Attemperator.	CO3	BTL 2	Understand
7.	Write down the necessity for Steam temperature	CO3	BTL 2	Understand
	control.		S.	
8.	Quote the Steam temperature control methods.	CO3	BTL 1	Remember
9.	List the two basic types of deaerator.	CO3	BTL 1	Remember
10.	What is the term swell in boiler drum level control.	CO3	BTL 2	Understand
11.	Quote the need of deaerator control.	CO3	BTL 1	Remember
12.	Give the function of a deaerator in power plant and its	CO3	BTL 2	Understand
	importance.			
13.	Discuss about 'swelling' and 'shrinking' in boiler	CO3	BTL 2	Understand
	drum.			
14.	List the significance of air-fuel ratio in boiler.	CO3	BTL 1	Remember
15.	Differentiate the advantage of three element control	CO3	BTL 2	Understand
	with single element control.			
16.	Point out the function of furnace draft and how to	CO3	BTL 2	Understand
	quantify furnace draft.			
17.	What will happen if furnace pressure is (i) too negative	CO3	BTL 2	Understand
	and (ii) too positive?			
18.	Examine the balanced draft in Boiler.	CO3	BTL 2	Understand
19.	Infer Soot blowing.	CO3	BTL 2	Understand
20.	Examine the role of soot blowing in thermal power	CO3	BTL 2	Understand
	plant.			
21.	What is the primary purpose of a pulverizer in a coal-	CO3	BTL 2	Understand
	handling system?			
22.	Differentiate between natural draught and forced	CO3	BTL 2	Understand
1	draught in furnace systems.			
23.	What is the significance of maintaining an optimal	CO3	BTL 2	Understand
	fuel/air ratio in combustion systems?			
24.	How does soot-blowing improve the efficiency of a	CO3	BTL 2	Understand
	boiler system?			
	PART B		•	
1.	List the two basic types of deaerator. Explain (13)	CO3	BTL 3	Apply
	any one of them.			
2.	i) Describe about how deaerator is (6)	CO3	BTL 3	Apply
	controlled in boiler system.			•
	ii) Recommend the suitable method to (7)	CO3	BTL 3	Apply
	control boiler drum level and explain			

	it with neat sketch.				
3.	Describe fireside and waterside control	(13)	CO3	BTL 3	Apply
	mechanisms for control steam temperature in				
	boilers.				
4.	Organize the steps involved in the operation of a	(13)	CO3	BTL 3	Apply
	three element feed water drum level control				
	system with its schematic block diagram.				
5.	Formulate the strategy to control Steam	(13)	CO3	BTL 3	Apply
	Temperature with neat diagram.				
6.	i) What is the main function of super	(7)	CO3	BTL 3	Apply
	heater? What are advantages of super				N'
	heated steam?			(	
	ii) Name and explain briefly the	(6)	CO3	BTL 3	Apply
	different methods used for controlling				
	super heated steam.			$\mathbf{O}$	
7.	List the types of drafts in furnaces and also	(13)	CO3	BTL 3	Apply
	explain about the control employed for furnace		x		
	draft system.	(1.2)			
8.	Describe how air is delivered to the furnace at	(13)	CO3	BTL 3	Apply
	the right conditions of now and temperature				
	using air heater and different types of fans in the				
0	draught plant.	(12)	<b>CO</b> 2	DTI 2	A
9.	Mention the role of combustion control. What	(13)	003	BIL 3	Apply
	are the parameters to be monitored during				
	draft method to control draft in hoiler furnace				
10	Explain the flue gas deve point control	(13)	CO3	BTI A	Apolyzo
10.	i) Classify the types of draft established	(6)	CO3	BTL 4	Analyze
11.	in boiler system, where and how?	(0)	005	DIL 4	Anaryze
	ii) Explain the method of controlling the	(7)	CO3	BTL 4	Analyze
	combustion by Oxygen trim control	(,)	005	DILT	7 mary 20
12	i) With the help of neat diagram explain	(9)	CO3	BTL 3	Apply
12.	the operation of a three element	(2)	000	5120	- PP-J
	control system. U4				
	ii) Discuss about soot blowing.	(4)	CO3	BTL 3	Apply
13.	Illustrate with a SAMA diagram, explain a	(13)	<b>CO3</b>	BTL 3	Apply
	simple feedback control in a process. Assume a	` '			
	proportional plus integral control function.				
14.	Explain the working principle of coal pulverizers	(13)	CO3	BTL 3	Apply
	used in power plants. Discuss the types of				
	pulverizers used in coal handling systems.				
15.	Explain the factors affecting the power	(13)	CO3	BTL 3	Apply
	requirements of draught systems in boilers and				
	suggest ways to optimize energy usage in these				
	systems.				
16.	Derive the expression for the power	(13)	CO3	BTL 4	Analyze
	requirements of draught systems in boilers.				
17.	Explain the types of soot blowers used in thermal	(13)	CO3	BTL 3	Apply
	power plants.				

1.	PART C				
	Differentiate induced and forced draft. How are (15)	CO3	BTL 4	Analyze	
	they measured and controlled? Discuss in detail			•	
	with neat sketches.				
2.	Adapt any two suitable types of steam (15)	CO3	BTL 4	Analyze	
	temperature controller to control the temperature			-	
	of superheated steam produced in a boiler to pass				
	through the high pressure turbine and				
	demonstrate its operation with necessary				
	sketches. U4			0	
3.	What is meant by the term oxygen trim control (15)	CO3	BTL 4	Analyze	
	in boiler operation? How is it performed? Also				
	explain the method of controlling the combustion		R-	<i>y</i>	
	by oxygen trim control.				
4.	Discuss, why should measure and control drum (15)	CO3	BTL 4	Analyze	
	level? Specify the different method of		D'		
	controlling feed water in boiler and explain the	x			
	why three element control method suitable over				
	two element control method.	CO2	DTI 4	Amoleumo	
5.	drought and induced drought systems including	COS	BIL 4	Anaryze	
	the advantages and challenges associated with				
	halancing these systems				
	UNIT IV BOIL FR CONTROL				
Boiler metal t	remperature measurement pressure measuring devices	– Boilei	feed wa	ter processing	
	inperature medearement, precedie medearing demeee	201101			
and control -	drum level measurement methods - steam temperature	control:	main stea	am and reheat	
steam temper	drum level measurement methods - steam temperature ature control, superheater control, deaerator control – dis	control: stributed	main stea control sy	am and reheat stem in power	
and control - steam temper plants – interl	drum level measurement methods - steam temperature ature control, superheater control, deaerator control – dis ocks in boiler operation.	control: stributed	main stea control sy	am and reheat stem in power	
and control - steam temper plants – interl	drum level measurement methods - steam temperature rature control, superheater control, deaerator control – dis ocks in boiler operation. PART A	control: stributed	main stea control sy	am and reheat stem in power	
and control - steam temper plants – interl Q.No	drum level measurement methods - steam temperature rature control, superheater control, deaerator control – dis ocks in boiler operation. PART A Question	control: stributed	main stea control sy	Competence	
and control - steam temper plants – interl Q.No	drum level measurement methods - steam temperature rature control, superheater control, deaerator control – dis ocks in boiler operation. PART A Question	control: stributed CO's	main stea control sy BT Level	Competence	
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and control -   steam temper   plants - interl   Q.No   1.   2.   3.   4.   5.   6.   7.   8.   9.   10.   11.   12.   13.	drum level measurement methods - steam temperature rature control, superheater control, deaerator control – dis ocks in boiler operation. PART A Question Point out the functions performed by all burners. List the non-control problems when burning waste fuels. Compare liquid and solid fuel fired boilers Classify atomizing for different burners. Why atomization is required while burning of oil fuel? Summarize the coal burning problems that affect boiler. Recommend the purpose of furnace safety interlocks in a boiler. Mention the objective of combustion control. List the types of combustion control. List the types of combustion control for liquid and gaseous fuel boilers. Classify the basic elements for unit pulverizer system. Interpret the burning of coal by using fluidized bed. What is the use of pulveriser? Distinguish single-point positioning control and parallel positioning control.	control: stributed CO's CO4 CO4 CO4 CO4 CO4 CO4 CO4 CO4 CO4 CO4	main stea control sy BT Level BTL 2 BTL 1 BTL 2 BTL 2 BTL 2 BTL 2 BTL 2 BTL 1 BTL 2 BTL 1 BTL 1 BTL 2 BTL 1 BTL 2 BTL 1 BTL 2 BTL 1 BTL 2	Competence Understand Remember Understand Understand Understand Understand Understand Understand Remember Remember Remember Understand Remember Understand Understand Understand	

15.	Inspect the significance of coal pulverizer control in boilers used in thermal power plants.	<b>CO4</b>	BTL 2	Understand
16.	Compare gravimetric and volume tricoal feeders for excess air effect	<b>CO4</b>	BTL 2	Understand
17.	List the factors affecting combustion efficiency of boiler	<b>CO4</b>	BTL 1	Remember
18.	Point out the predominant factor in setting of automatic controllers for optimum efficiency.	<b>CO4</b>	BTL 2	Understand
19.	Give the advantages of cyclone furnace.	CO4	BTL 2	Understand
20.	Predict where we are in need of air fuel ratio control?	<u>CO4</u>	BTL 2	Understand
21.	Why is maintaining the correct drum water level critical for safe boiler operation?	CO4	BTL 2	Understand
22.	What are the consequences of poor deaerator performance in a power plant?	<b>CO4</b>	BTL 2	Understand
23.	Give an example of a critical interlock used in boiler systems.	CO4	BTL 2	Understand
24.	What is the primary function of a distributed control system in power plant operations?	CO4	BTL 2	Understand
	PART B	57		
1.	Describe in detail about the different modes of (13) burning of coal in a boiler.	<b>CO4</b>	BTL 3	Apply
2.	i) Explain in detail about burners for (7) liquid fuels.	<b>CO4</b>	BTL 4	Analyze
	ii) Describe about burners for solid fuels. (6)	CO4	BTL 3	Apply
3.	i) Explain air-fuel ratio control with neat (8) sketch.	CO4	BTL 4	Analyze
	ii) Explain in detail about safety (5) interlocks in furnaces.	<b>CO4</b>	BTL 4	Analyze
4.	Explain in detail about burners for gaseous fuel. (13)	CO4	BTL 3	Apply
5.	Describe with a schematic diagram the furnace (13) safety interlocks.	<b>CO4</b>	BTL 3	Apply
6.	Discuss boiler purge logic in brief with logic (13) diagram.	<b>CO4</b>	BTL 3	Apply
7.	<ul><li>i) Design combustion control scheme (7) for liquid fuel fired boiler.</li></ul>	<b>CO4</b>	BTL 4	Analyze
	ii) Design combustion control scheme (6) for solid fuel fired boiler.	<b>CO4</b>	BTL 4	Analyze
8.	i) Draw and explain about coal (6) pulveriser in detail.	<b>CO4</b>	BTL 4	Analyze
	ii) Describe coal pulveriser control with (7) neat diagram.	<b>CO4</b>	BTL 3	Apply
9.	Classify various combustion control of gaseous (13) fuel and differentiate single point positioning and parallel positioning control of combustion control. Explain any one method of combustion control.	CO4	BTL 3	Apply
10.	system adapted in Power plant. Explain the principle and operation of "Cross-limited"	CO4	BTL 3	Apply

	combustion control system with necessary			
	diagram.			
11.	Explain about circulating bed fluidized bed (13) boiler with a neat diagram.	CO4	BTL 4	Analyze
12.	Discuss about fluidized bed boiler with neat (13) diagram.	CO4	BTL 3	Apply
13.	i) Evaluate the function of Gravimetric (7) coal feeders.	CO4	BTL 4	Analyze
	ii) Illustrate with neat sketch on (6) Volumetric coal feeders.	CO4	BTL 3	Apply
14.	Describe in detail with a neat diagram about (13) cyclone furnace.	CO4	BTL 3	Apply
15.	Describe the working principles, construction, (13) and applications of different types of pressure measuring devices used in boilers.	CO4	BTL 3	Apply
16.	Explain the purpose and types of interlocks in (13) boiler operation. Discuss critical interlocks, their role in ensuring safety.	CO4	BTL 3	Apply
17.	Discuss the architecture and functioning of a (13) Distributed Control System (DCS) in power plants.	<b>CO4</b>	BTL 3	Apply
	PART C			
1.	Explain the importance of Air/Fuel ratio control (15) in a boiler and the methods of controlling the Air/Fuel with necessary diagram.	CO4	BTL 5	Analyze
2.	State the need for interlocks in boiler operation. (15) Also, mention the various process/operation connected with interlocks in steam power plant for safety.	CO4	BTL 4	Create
3.	Predict what are the parameters to be measured (15) for trimming of combustion control and explain how to controlling it.	CO4	BTL 6	Evaluate
4.	Suggest suitable combustion control method for (15) solid, liquid and gaseous fuel and explain it.	CO4	BTL 5	Analyze
5.	Describe the principles and methods of (15) superheater steam temperature control.	CO4	BTL 5	Analyze
	UNIT V TURBINE CONTROL			
Speed measu	urement, rotor and casing movement- vibration - shell tem	perature	monitorin	g and control -
steam pressu	re control - lubricant oil temperature - cooling system			
~9	PART A	r	1	
Q.No	Question	CO's	BT Level	Competence
1.	What is steam turbine?	CO5	BTL 1	Remember
2.	Classify steam turbines.	CO5	BTL 2	Understand
3.	Compare impulse turbine with reaction turbine.	CO5	BTL 2	Understand
4.	Explain velocity compounding in impulse turbine.	CO5	BTL 2	Understand
5.	List the advantages and disadvantages of velocity compounded impulse turbine.	CO5	BTL 1	Remember
6.	Compare throttle and nozzle control governing.	<b>CO5</b>	BTL 2	Understand

8. Give the parameters to be measured and controlled in a turbine. CO5 BTL 2 Understand   9. Interpret the free governor mode operation in turbine. CO5 BTL 1 Remember   10. List the basic role of automatic load frequency control. CO5 BTL 2 Understand   11. Analyze the control objective of turbine run-up system. CO5 BTL 2 Understand   12. Examine the forms of cooling apparatus employed in power plants. CO5 BTL 2 Understand   13. Develop oil pressure drop relay in turbine. CO5 BTL 2 Understand   14. Define speed ratio in turbine. CO5 BTL 2 Understand   16. Give the control scheme for turbine load control. CO5 BTL 1 Remember   18. Give the control scheme for turbine load control. CO5 BTL 2 Understand   20. List the types of cooling tower. CO5 BTL 2 Understand   21. What is the principle behind tachometers used for cors BTL 2 Understand   22. How does excessive vibration affect the performance of a turbines? CO5 BTL 2 Understand	7.	Give the methods available for turbine governing system.	CO5	BTL 2	Understand
9. Interpret the free governor mode operation in turbine. COS BTL 2 Understand   10. List the basic role of automatic load frequency control. COS BTL 1 Remember   11. Analyze the control objective of turbine run-up system. COS BTL 2 Understand   12. Examine the forms of cooling apparatus employed in power plants. COS BTL 2 Understand   13. Develop oil pressure drop relay in turbine. COS BTL 1 Remember   15. Design automatic load frequency control. COS BTL 2 Understand   16. Give the control scheme for turbine speed control. COS BTL 2 Understand   19. Point out the significance of oil cooling system. COS BTL 2 Understand   20. List the types of cooling tower. COS BTL 2 Understand   21. What is the purpose of the cooling system in turbines? COS BTL 2 Understand   22. How does excessive vibration affect the performance of a turbine? COS BTL 2 Understand   22. How does excessive vibration affect the performance of a dubine operation? COS BTL 3	8.	Give the parameters to be measured and controlled in a turbine.	CO5	BTL 2	Understand
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	Frequency Control (ALFC) basic generator control loops.				
	ii) Explain about Automatic Voltage Regulator (AVR) basic generator control loops.	(6)	CO5	BTL 4	Analyze
11.	With neat block diagram explain turbine run up system.	(13)	CO5	BTL 3	Apply
12.	List the components in lubrication system and explain any two.	(13)	CO5	BTL 3	Apply
13.	Discuss about oil coolers in turbine with neat sketch.	(13)	CO5	BTL 3	Apply
14.	Explain with the control diagram the boiler- turbine coordinated firing rate control.	(13)	CO5	BTL 4	Analyze
15.	Explain the causes of vibration in rotating machinery and turbines.	(13)	CO5	BTL 3	Apply
16.	Describe the importance of shell temperature monitoring in turbines and boilers.	(13)	CO5	BTL 3	Apply
17.	Discuss the design of lubrication systems, the role of cooling systems in temperature control.	(13)	CO5	BTL 3	Apply
	PART C				
1.	i) Distinguish the operation of impulse type and reaction type turbine with neat sketches.	(7)	CO5	BTL 4	Analyze
	ii) Examine how to achieve automatic load frequency control in steam turbine.	(8)	CO5	BTL 4	Analyze
2.	Discuss about the various governors used for controlling steam input to the turbine for speed control.	(15)	CO5	BTL 4	Analyze
3.	Elaborate the control methodology for the control of pressure/flow, temperature and tank level in a lube oil system.	(15)	CO5	BTL 4	Analyze
4.	Explain the different cooling methods for an electric generator. Why hydrogen cooling is preferred over others for large generators?	(15)	CO5	BTL 4	Analyze
5.	Discuss advancements in cooling technologies for turbines and Highlight their advantages, limitations, and applications in modern power plants.	(15)	CO5	BTL 4	Analyze