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

Dr.M. JOE MARSHELL., Assistant Professor (Sr.G)/EIE

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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 Level**	**Competence**
1.	Differentiate between Renewable and Non-Renewable energy sources.	**CO1**	**BTL 2**	Understand
2.	Why we can't completely depend on solar and wind power plant?	**CO1**	**BTL 2**	Understand
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 power plants**.**	**CO1**	**BTL 1**	Remember
7.	Mention the functions of two important components of Nuclear power plant.	**CO1**	**BTL 2**	Understand
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 power plant.	**CO1**	**BTL 2**	Understand
12.	Point out the two important working principle of Solar Photo Voltaic Cell.	**CO1**	**BTL 2**	Understand
13.	Classify the types of wind power plant.	**CO1**	**BTL 2**	Understand
14.	Point out the four significant need of instrumentation in power generation.	**CO1**	**BTL 2**	Understand
15.	State the two major importance of instrumentation in power generation	**CO1**	**BTL 2**	Understand
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 power plant.	**CO1**	**BTL 1**	Remember
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?	**CO1**	**BTL 1**	Remember
22.	What is the non-renewable source of energy?	**CO1**	**BTL 1**	Remember
23.	Give major building block of thermal power plant?	**CO1**	**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 process of electric power generation using Wind Energy.	**(7)**	**CO1**	**BTL 3**	Apply
	ii)	Explain with a neat sketch, the process of electric power generation using Solar Energy.	**(6)**	**CO1**	**BTL 3**	Apply
2.	Discuss in detail with a schematic diagram the hydro power plant generation.		**(13)**	**CO1**	**BTL 3**	Apply
3.	Describe the various process take place in thermal power plant with neat diagram.		**(13)**	**CO1**	**BTL 3**	Apply
4.	**i)**	Describe briefly the importance of instrumentation in nuclear power plant.	**(6)**	**CO1**	**BTL 3**	Apply
	ii)	Describe the working Principle of solar cells with neat diagram.	**(7)**	**CO1**	**BTL 3**	Apply
5.	With a block diagram explain the operation of nuclear power plant and also mention the important parameters to be monitored in each block.		**(13)**	**CO1**	**BTL 4**	Analyze
6.	**i)**	Describe the various operations involved in thermal power plant.	**(9)**	**CO1**	**BTL 3**	Apply
	ii)	Describe the importance of instrumentation in power generation.	**(4)**	**CO1**	**BTL 3**	Apply
7.	**i)**	Compare and evaluate the performance characteristics of thermal and nuclear power plants based on each component**.**	**(5)**	**CO1**	**BTL 3**	Apply
	ii)	Illustrate the schematic diagram and explain the operations of Pressurized water nuclear reactor & Boiling water nuclear reactor.	**(8)**	**CO1**	**BTL 3**	Apply
8.	Discuss the various role of instrumentation system in thermal power plant. Also list the desirable qualities of measurement requirements.		**(13)**	**CO1**	**BTL 3**	Apply
9.	Draw the Piping and Instrumentation diagram of a Boiler system in a thermal power plant with the functions of each unit.		**(13)**	**CO1**	**BTL 3**	Apply
10.	Explain the applications of cogeneration in power plant with neat sketch.		**(13)**	**CO1**	**BTL 4**	Analyze
11.	What is meant by cogeneration? Also explain the topping cycle and bottoming cycle operation of cogeneration system.		**(13)**	**CO1**	**BTL 4**	Analyze
12.	**i)**	Assess the need of combine cycle power generation?	**(3)**	**CO1**	**BTL 4**	Analyze
	ii)	Explain any two types of combined cycle power generation unit with neat sketch and working.	**(10)**	**CO1**	**BTL 4**	Analyze
13.	Distinguish 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 nuclear power plant and Survey of methods of power generation.	**(13)**	**CO1**	**BTL 4**	Analyze
16.	Discuss in detail with a schematic diagram the hydro power plant generation.	**(13)**	**CO1**	**BTL 4**	Analyze
17.	Explain in detail a Combined Heat and Power System. Also mention their applications	**(13)**	**CO1**	**BTL 4**	Analyze
	PART C				
1.	Compare the various methods of power generation and present the summary in table from various factors.	**(15)**	**CO1**	**BTL 4**	Analyze
2.	Asses the utilization of boilers under various classifications in detail.	**(15)**	**CO1**	**BTL 4**	Analyze
3.	Compile the process used for converting thermal energy into electrical energy	**(15)**	**CO1**	**BTL 4**	Analyze
4.	Discuss the operation of combined cycle system including Gas turbine and steam turbine in power plant with neat sketch and also discuss the merits and demerits in combined cycle applications.	**(15)**	**CO1**	**BTL 4**	Analyze
5.	Draw the Piping and Instrumentation diagram of a Boiler system in a thermal power plant with the functions of each unit.	**(15)**	**CO1**	**BTL 4**	Analyze

UNIT II MEASUREMENTS IN POWER PLANTS

Electrical measurements: current, voltage, power, frequency, power factor – non electrical parameters: flow of feed water, fuel, air, steam pressure and steam temperature – smoke density measurement – Flue gas oxygen analyzer – pollution monitoring instruments.

	PART A			
Q.No	**Question**	**CO's**	**BT Level**	**Competence**
1.	Classify the types of orifice.	**CO2**	**BTL 2**	Understand
2.	Write the two types of feed water heaters in a steam power plant.	**CO2**	**BTL 2**	Understand
3.	List various methods of feed water flow measurement in power plant.	**CO2**	**BTL 1**	Remember
4.	Define the suitability of float type in boiler drum level measurement.	**CO2**	**BTL 2**	Understand
5.	Compare two element and three element drum level control.	**CO2**	**BTL 2**	Understand
6.	Analyze the importance of drum level measurement. How is it taken care of?	**CO2**	**BTL 2**	Understand
7.	Name any two sensors used for temperature measurement in steam turbines.	**CO2**	**BTL 1**	Remember
8.	What is the need of correction factor in temperature measurement of Steam in High Pressure Boiler.	**CO2**	**BTL 2**	Understand
9.	Give the two scales used for temperature measurements in power plants.	**CO2**	**BTL 2**	Understand

10.	List the sensors for measurement of steam pressure and steam temperature.	**CO2**	**BTL 1**	Remember
11.	What is the need of connecting thermocouples in series and parallel during temperature measurement.	**CO2**	**BTL 2**	Understand
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 analyzer**.**	**CO2**	**BTL 2**	Understand
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 meters?	**CO2**	**BTL 2**	Understand
23.	How is the power factor of an electrical circuit calculated, and why is it important?	**CO2**	**BTL 2**	Understand
24.	Name two types of instruments used to measure electrical power and explain their applications briefly.	**CO2**	**BTL 1**	Remember
	PART B			
1.	Describe in detail about coal flow measurement methods with neat diagram. **(13)**	**CO2**	**BTL 3**	Apply
2.	**i)** Describe a primary and secondary element each in the measurement of feed water flow. **(7)**	**CO2**	**BTL 3**	Apply
	ii) Discuss the principle behind vortex flow meter. **(6)**	**CO2**	**BTL 3**	Apply
3.	**i)** With suitable diagram, explain the principle of Electromagnetic type flow meters. **(10)**	**CO2**	**BTL 4**	Analyze
	ii) Mention the advantages and limitations of Electromagnetic type flow meters**.** **(3)**	**CO2**	**BTL 4**	Analyze
4.	**i)** Specify the need of drum level measurement. **(3)**	**CO2**	**BTL 3**	Apply
	ii) Explain the method of measuring drum level using differential pressure method. **(10)**	**CO2**	**BTL 3**	Apply
5.	How do you measure the speed of the turbine and what is the control mechanisms required for maintaining the optimum speed of the turbine? **(13)**	**CO2**	**BTL 3**	Apply
6.	State the importance of vibration analysis in turbine. What are the various techniques used for vibration measurement? Explain anyone vibration measurement technique in detail. **(13)**	**CO2**	**BTL 3**	Apply
7.	**i)** Explain with a neat diagram to measure the steam temperature. **(7)**	**CO2**	**BTL 4**	Analyze

	ii) Explain with a neat diagram to measure the steam pressure.	**(6)**	**CO2**	**BTL 4**	Analyze
8.	With a neat sketch illustrate the working of flue gas oxygen analyser.	**(13)**	**CO2**	**BTL 3**	Apply
9.	Explain the method of measuring smoke, density in thermal power plant with a conceptual diagram.	**(13)**	**CO2**	**BTL 4**	Analyze
10.	**i)** How do you evaluate the proximate analysis of fuel and explain it.	**(8)**	**CO2**	**BTL 3**	Apply
	ii) Describe about the flow control measurements required in power plants.	**(5)**	**CO2**	**BTL 3**	Apply
11.	Mention the different methods of analysis of fuel and illustrate the analysis of fuel by bomb calorimeter in detail.	**(13)**	**CO2**	**BTL 3**	Apply
12.	Describe the need of Fuel Analysis in Thermal Power plant. Also explain the Fuel Analysis method in detail.	**(13)**	**CO2**	**BTL 3**	Apply
13.	List the parameters to be measured in Flue gas of Boiler.	**(13)**	**CO2**	**BTL 3**	Apply
14.	**i)** Explain the method of measurement of speed.	**(7)**	**CO2**	**BTL 3**	Apply
	ii) What are the basic impurities in feed water and how do you analyze them.	**(6)**	**CO2**	**BTL 4**	Analyze
15.	Explain about (a) Dissolved oxygen analyzer (b) Flue gas Oxygen analyzer	**(13)**	**CO2**	**BTL 4**	Analyze
16.	Discuss the temperature measurements in power plants in detail.	**(13)**	**CO2**	**BTL 4**	Analyze
17.	Write short notes on: a) Drum level measurement b) Temperature compensation techniques	**(13)**	**CO2**	**BTL 3**	Apply
	PART C				
1.	Classify the transducers based on Low, Medium and High temperature applications. Also list the major temperature measurement points and suggest suitable sensors in Thermal power plant.	**(15)**	**CO2**	**BTL 4**	Analyze
2.	Classify the different methods for measuring flow. Suggest suitable instruments to measure coal flow in power plant.	**(15)**	**CO2**	**BTL 4**	Analyze
3.	Discuss, how to analysis fuel using ultimate and proximate analysis.	**(15)**	**CO2**	**BTL 4**	Analyze
4.	Why conventional float type drum level measurement is not suitable for Drum level measurement in high Pressure boiler? Also explain anyone method to measure boiler drum level in thermal power plant. U4	**(15)**	**CO2**	**BTL 4**	Analyze
5.	Explain the various methods of measurement of flow of coal.	**(15)**	**CO2**	**BTL 4**	Analyze
UNIT III FURNACE CONTROL					

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 Level**	**Competence**
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 load change.	**CO3**	**BTL 2**	Understand
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 control.	**CO3**	**BTL 2**	Understand
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 importance.	**CO3**	**BTL 2**	Understand
13.	Discuss about 'swelling' and 'shrinking' in boiler drum.	**CO3**	**BTL 2**	Understand
14.	List the significance of air-fuel ratio in boiler.	**CO3**	**BTL 1**	Remember
15.	Differentiate the advantage of three element control with single element control.	**CO3**	**BTL 2**	Understand
16.	Point out the function of furnace draft and how to quantify furnace draft.	**CO3**	**BTL 2**	Understand
17.	What will happen if furnace pressure is (i) too negative and (ii) too positive?	**CO3**	**BTL 2**	Understand
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 plant.	**CO3**	**BTL 2**	Understand
21.	What is the primary purpose of a pulverizer in a coal-handling system?	**CO3**	**BTL 2**	Understand
22.	Differentiate between natural draught and forced draught in furnace systems.	**CO3**	**BTL 2**	Understand
23.	What is the significance of maintaining an optimal fuel/air ratio in combustion systems?	**CO3**	**BTL 2**	Understand
24.	How does soot-blowing improve the efficiency of a boiler system?	**CO3**	**BTL 2**	Understand
	PART B			
1.	List the two basic types of deaerator. Explain any one of them. **(13)**	**CO3**	**BTL 3**	Apply
2.	**i)** Describe about how deaerator is controlled in boiler system. **(6)**	**CO3**	**BTL 3**	Apply
	ii) Recommend the suitable method to control boiler drum level and explain **(7)**	**CO3**	**BTL 3**	Apply

	it with neat sketch.				
3.	Describe fireside and waterside control mechanisms for control steam temperature in boilers.	**(13)**	**CO3**	**BTL 3**	Apply
4.	Organize the steps involved in the operation of a three element feed water drum level control system with its schematic block diagram.	**(13)**	**CO3**	**BTL 3**	Apply
5.	Formulate the strategy to control Steam Temperature with neat diagram.	**(13)**	**CO3**	**BTL 3**	Apply
6.	**i)** What is the main function of super heater? What are advantages of super heated steam?	**(7)**	**CO3**	**BTL 3**	Apply
	ii) Name and explain briefly the different methods used for controlling super heated steam.	**(6)**	**CO3**	**BTL 3**	Apply
7.	List the types of drafts in furnaces and also explain about the control employed for furnace draft system.	**(13)**	**CO3**	**BTL 3**	Apply
8.	Describe how air is delivered to the furnace at the right conditions of now and temperature using air heater and different types of fans in the draught plant.	**(13)**	**CO3**	**BTL 3**	Apply
9.	Mention the role of combustion control. What are the parameters to be monitored during combustion control? Also explain the balanced draft method to control draft in boiler furnace.	**(13)**	**CO3**	**BTL 3**	Apply
10.	Explain the flue gas dew point control.	**(13)**	**CO3**	**BTL 4**	Analyze
11.	**i)** Classify the types of draft established in boiler system, where and how?	**(6)**	**CO3**	**BTL 4**	Analyze
	ii) Explain the method of controlling the combustion by Oxygen trim control.	**(7)**	**CO3**	**BTL 4**	Analyze
12.	**i)** With the help of neat diagram explain the operation of a three element control system. U4	**(9)**	**CO3**	**BTL 3**	Apply
	ii) Discuss about soot blowing.	**(4)**	**CO3**	**BTL 3**	Apply
13.	Illustrate with a SAMA diagram, explain a simple feedback control in a process. Assume a proportional plus integral control function.	**(13)**	**CO3**	**BTL 3**	Apply
14.	Explain the working principle of coal pulverizers used in power plants. Discuss the types of pulverizers used in coal handling systems.	**(13)**	**CO3**	**BTL 3**	Apply
15.	Explain the factors affecting the power requirements of draught systems in boilers and suggest ways to optimize energy usage in these systems.	**(13)**	**CO3**	**BTL 3**	Apply
16.	Derive the expression for the power requirements of draught systems in boilers.	**(13)**	**CO3**	**BTL 4**	Analyze
17.	Explain the types of soot blowers used in thermal power plants.	**(13)**	**CO3**	**BTL 3**	Apply

	PART C			
1.	Differentiate induced and forced draft. How are they measured and controlled? Discuss in detail with neat sketches. **(15)**	**CO3**	**BTL 4**	Analyze
2.	Adapt any two suitable types of steam 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 **(15)**	**CO3**	**BTL 4**	Analyze
3.	What is meant by the term oxygen trim control in boiler operation? How is it performed? Also explain the method of controlling the combustion by oxygen trim control. **(15)**	**CO3**	**BTL 4**	Analyze
4.	Discuss, why should measure and control drum level? Specify the different method of controlling feed water in boiler and explain the why three element control method suitable over two element control method. **(15)**	**CO3**	**BTL 4**	Analyze
5.	Discuss the combined operation of forced draught and induced draught systems, including the advantages and challenges associated with balancing these systems. **(15)**	**CO3**	**BTL 4**	Analyze
UNIT IV BOILER CONTROL				
Boiler metal temperature measurement, pressure measuring devices – Boiler feed water processing and control - drum level measurement methods - steam temperature control: main steam and reheat steam temperature control, superheater control, deaerator control – distributed control system in power plants – interlocks in boiler operation.				
	PART A			
Q.No	**Question**	**CO's**	**BT Level**	**Competence**
1.	Point out the functions performed by all burners.	**CO4**	**BTL 2**	Understand
2.	List the non-control problems when burning waste fuels.	**CO4**	**BTL 1**	Remember
3.	Compare liquid and solid fuel fired boilers	**CO4**	**BTL 2**	Understand
4.	Classify atomizing for different burners**.**	**CO4**	**BTL 2**	Understand
5.	Why atomization is required while burning of oil fuel?	**CO4**	**BTL 1**	Remember
6.	Summarize the coal burning problems that affect boiler.	**CO4**	**BTL 2**	Understand
7.	Recommend the purpose of furnace safety interlocks in a boiler.	**CO4**	**BTL 2**	Understand
8.	Mention the objective of combustion control.	**CO4**	**BTL 1**	Remember
9.	List the types of combustion control for liquid and gaseous fuel boilers**.**	**CO4**	**BTL 1**	Remember
10.	Classify the basic elements for unit pulverizer system.	**CO4**	**BTL 2**	Understand
11.	Interpret the burning of coal by using fluidized bed.	**CO4**	**BTL 2**	Understand
12.	What is the use of pulveriser?	**CO4**	**BTL 1**	Remember
13.	Distinguish single-point positioning control and parallel positioning control.	**CO4**	**BTL 2**	Understand
14.	Classify the coal feeders of volumetric coal feeders.	**CO4**	**BTL 2**	Understand

15.	Inspect the significance of coal pulverizer control in boilers used in thermal power plants.	**CO4**	**BTL 2**	Understand
16.	Compare gravimetric and volume tricoal feeders for excess air effect.	**CO4**	**BTL 2**	Understand
17.	List the factors affecting combustion efficiency of boiler.	**CO4**	**BTL 1**	Remember
18.	Point out the predominant factor in setting of automatic controllers for optimum efficiency.	**CO4**	**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?	**CO4**	**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?	**CO4**	**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			
1.	Describe in detail about the different modes of burning of coal in a boiler. **(13)**	**CO4**	**BTL 3**	Apply
2.	**i)** Explain in detail about burners for liquid fuels. **(7)**	**CO4**	**BTL 4**	Analyze
	ii) Describe about burners for solid fuels. **(6)**	**CO4**	**BTL 3**	Apply
3.	**i)** Explain air-fuel ratio control with neat sketch. **(8)**	**CO4**	**BTL 4**	Analyze
	ii) Explain in detail about safety interlocks in furnaces. **(5)**	**CO4**	**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 safety interlocks. (**13)**	**CO4**	**BTL 3**	Apply
6.	Discuss boiler purge logic in brief with logic diagram. **(13)**	**CO4**	**BTL 3**	Apply
7.	**i)** Design combustion control scheme for liquid fuel fired boiler. **(7)**	**CO4**	**BTL 4**	Analyze
	ii) Design combustion control scheme for solid fuel fired boiler. **(6)**	**CO4**	**BTL 4**	Analyze
8.	**i)** Draw and explain about coal pulveriser in detail. **(6)**	**CO4**	**BTL 4**	Analyze
	ii) Describe coal pulveriser control with neat diagram. **(7)**	**CO4**	**BTL 3**	Apply
9.	Classify various combustion control of gaseous fuel and differentiate single point positioning and parallel positioning control of combustion control. Explain any one method of combustion control. **(13)**	**CO4**	**BTL 3**	Apply
10.	Summarize about the various combustion control system adapted in Power plant. Explain the principle and operation of "Cross-limited" **(13)**	**CO4**	**BTL 3**	Apply

	combustion control system with necessary diagram.				
11.	Explain about circulating bed fluidized bed boiler with a neat diagram.	**(13)**	**CO4**	**BTL 4**	Analyze
12.	Discuss about fluidized bed boiler with neat diagram.	**(13)**	**CO4**	**BTL 3**	Apply
13.	**i)** Evaluate the function of Gravimetric coal feeders**.**	**(7)**	**CO4**	**BTL 4**	Analyze
	ii) Illustrate with neat sketch on Volumetric coal feeders.	**(6)**	**CO4**	**BTL 3**	Apply
14.	Describe in detail with a neat diagram about cyclone furnace.	**(13)**	**CO4**	**BTL 3**	Apply
15.	Describe the working principles, construction, and applications of different types of pressure measuring devices used in boilers.	**(13)**	**CO4**	**BTL 3**	Apply
16.	Explain the purpose and types of interlocks in boiler operation. Discuss critical interlocks, their role in ensuring safety.	**(13)**	**CO4**	**BTL 3**	Apply
17.	Discuss the architecture and functioning of a Distributed Control System (DCS) in power plants.	**(13)**	**CO4**	**BTL 3**	Apply
	PART C				
1.	Explain the importance of Air/Fuel ratio control in a boiler and the methods of controlling the Air/Fuel with necessary diagram.	**(15)**	**CO4**	**BTL 5**	Analyze
2.	State the need for interlocks in boiler operation. Also, mention the various process/operation connected with interlocks in steam power plant for safety.	**(15)**	**CO4**	**BTL 4**	Create
3.	Predict what are the parameters to be measured for trimming of combustion control and explain how to controlling it.	**(15)**	**CO4**	**BTL 6**	Evaluate
4.	Suggest suitable combustion control method for solid, liquid and gaseous fuel and explain it.	**(15)**	**CO4**	**BTL 5**	Analyze
5.	Describe the principles and methods of superheater steam temperature control.	**(15)**	**CO4**	**BTL 5**	Analyze

UNIT V TURBINE CONTROL

Speed measurement, rotor and casing movement- vibration - shell temperature monitoring and control - steam pressure control - lubricant oil temperature - cooling system..

PART A

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.	**CO5**	**BTL 2**	Understand

7.	Give the methods available for turbine governing system.	**CO5**	**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 2**	Understand
10.	List the basic role of automatic load frequency control.	**CO5**	**BTL 1**	Remember
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 1**	Remember
15.	Design automatic load frequency control.	**CO5**	**BTL 2**	Understand
16.	Give the control scheme for turbine speed control.	**CO5**	**BTL 2**	Understand
17.	List the losses in steam turbine.	**CO5**	**BTL 1**	Remember
18.	Give the control scheme for turbine load control.	**CO5**	**BTL 2**	Understand
19.	Point out the significance of oil cooling system.	**CO5**	**BTL 2**	Understand
20.	List the types of cooling tower.	**CO5**	**BTL 1**	Remember
21.	What is the principle behind tachometers used for speed measurement in turbines?	**CO5**	**BTL 2**	Understand
22.	How does excessive vibration affect the performance of a turbine?	**CO5**	**BTL 2**	Understand
23.	What is the purpose of the cooling system in turbines?	**CO5**	**BTL 2**	Understand
24.	Why is monitoring casing expansion important in turbine operation?	**CO5**	**BTL 2**	Understand
	PART B			
1.	Discuss the various control schemes for speed and load control in turbine. **(13)**	**CO5**	**BTL 3**	Apply
2.	Describe in detail about free governor mode operation. **(13)**	**CO5**	**BTL 3**	Apply
3.	Describe briefly oil cooling system in turbine. **(13)**	**CO5**	**BTL 3**	Apply
4.	**i)** Discuss in detail about the procedure employed for automatic load frequency control with neat diagram. **(8)**	**CO5**	**BTL 3**	Apply
	ii) Explain about oil pressure drop relay. **(5)**	**CO5**	**BTL 4**	Analyze
5.	Describe briefly various methods of steam turbine governing. **(13)**	**CO5**	**BTL 3**	Apply
6.	Write in detail the lubrication oil temperature control with a neat diagram. **(13)**	**CO5**	**BTL 3**	Apply
7.	**i)** Discuss in detail about the turbine governing system. **(8)**	**CO5**	**BTL 3**	Apply
	ii) Explain the control system employed for oil coolers in turbine. **(5)**	**CO5**	**BTL 4**	Analyze
8.	**i)** Illustrate with neat block diagram explain Impulse turbine. **(6)**	**CO5**	**BTL 3**	Apply
	ii) Illustrate with neat block diagram explain Reaction turbine. **(7)**	**CO5**	**BTL 3**	Apply
9.	Classify various methods of compounding steam turbine. **(13)**	**CO5**	**BTL 3**	Apply
10.	**i)** Explain about Automatic Load **(7)**	**CO5**	**BTL 4**	Analyze

	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