

Hall Ticket No

Question Paper Code: AEE516



# INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

## MODEL QUESTION PAPER

B.Tech VII Semester End Examinations, November- 2019

Regulations: R16

### POWER PLANT CONTROL AND INSTRUMENTATION

(EEE)

Time: 3 hours

Max. Marks: 70

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

#### UNIT – I

1. a) Explain the block diagram and working of hydel power plant. [7M]  
b) Explain the importance of instrumentation in power plants. [7M]
2. a) Compare thermal power plant with nuclear power plant. [7M]  
b) What are the factors to be considered while selecting the power plant? [7M]

#### UNIT – II

3. a) Write briefly about Voltage measurement and Current measurement. [7M]  
b) Describe air flow control system. [7M]
4. a) Explain in detail about Steam temperature Measurement [7M]  
b) Explain about various types of radiation detectors. [7M]

#### UNIT – III

5. a) Explain about (a) liquid chromatography (b) gas chromatography [7M]  
b) Brief about different methods of pH measurements. [7M]
6. a) Explain about (a) Dissolved oxygen analyzer (b) Flue gas Oxygen analyzer [7M]  
b) Brief about analysis of impurities in feed water and steam. [7M]

#### UNIT – IV

7. a) Explain the instrumentation diagram using feedback controller for boilers. [7M]  
b) Describe three element feed water control system. [7M]
8. a) Explain interlocks in boiler. [7M]  
b) Describe fire side control mechanism of steam temperature control in detail. [7M]

#### UNIT – V

9. a) Describe in detail steam pressure control. [7M]  
b) Explain in detail shell temperature monitoring and control. [7M]
10. a) Describe in detail about cooling system used in thermal power plant [7M]  
b) Write short notes on speed and vibration monitoring and control. [7M]



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## COURSE OBJECTIVES:

The course should enable the students to:

I	Assess different methods of power generation.
II	Discuss measurement of electrical and non-electrical parameters involved in power generation plants.
III	Illustrate the different types of devices used for data acquisition and analyze in power plants.
IV	Describe control system and control loops applied in power plants.
V	Integrate monitoring of different parameters like speed, vibration of turbines and their control.

## COURSE OUTCOMES (COs):

CO 1	Knowledge of the available sources of energy for electricity generation along with the working principle of the different power plants and cogeneration.
CO 2	Describe the measurement of electrical parameters and non-electrical parameters.
CO 3	Determine the importance of analyzers in power plants.
CO 4	Educate on boiler and advanced boiler control techniques.
CO 5	Discuss the turbine control techniques and cooling methods.

## COURSE LEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

S No.	Description
AEE516.01	Describe power generation from non-renewable and renewable sources: Thermal, Hydel, nuclear, solar and wind power plants.
AEE516.02	Examine the importance of instrumentation in power generation.
AEE516.03	Interpret the importance of cogeneration in power production.
AEE516.04	Discuss the measurement of electrical quantities.
AEE516.05	Discuss the measurement of non-electrical quantities.
AEE516.06	Recognize the environment related factors such as radiation, smoke and dust.
AEE516.07	Examine the concept of gas analyzer.
AEE516.08	Analyze the pH meter and fuel analyzer.
AEE516.09	Illustrate the pollution monitoring instruments.
AEE516.10	Discuss the combustion control.
AEE516.11	Summarize the various methods available for steam temperature control.
AEE516.12	Evaluate the effect of distributed control and interlocks in boiler.
AEE516.13	Analyze the steam pressure control and lubricant oil, temperature control.

AEE516.14	Explore the methods of turbine control.
AEE516.15	Discuss the different methods of cooling systems.
AEE516.16	Apply the concepts of non-renewable and renewable generation, measurements and control in power plants to solve real world applications.
AEE516.17	Explore the knowledge and skills of employability to succeed in national and international level competitive examinations.

**MAPPING OF MODEL QUESTION PAPER QUESTIONS TO THE ACHIEVEMENT OF COURSE LEARNING OUTCOMES:**

<b>SEE QUESTION No.</b>		<b>COURSE LEARNING OUTCOMES</b>		<b>BLOOM'S TAXONOMY LEVEL</b>
1	<b>a</b>	<b>AEE516.01</b>	Describe power generation from non-renewable and renewable sources: Thermal, Hydel, nuclear, solar and wind power plants.	Understand
	<b>b</b>	<b>AEE516.02</b>	Examine the importance of instrumentation in power generation.	Understand
2	<b>a</b>	<b>AEE516.01</b>	Describe power generation from non-renewable and renewable sources: Thermal, Hydel, nuclear, solar and wind power plants.	Understand
	<b>b</b>	<b>AEE516.01</b>	Describe power generation from non-renewable and renewable sources: Thermal, Hydel, nuclear, solar and wind power plants.	Understand
3	<b>a</b>	<b>AEE516.04</b>	Discuss the measurement of electrical quantities.	Understand
	<b>b</b>	<b>AEE516.05</b>	Discuss the measurement of non-electrical quantities.	Understand
4	<b>a</b>	<b>AEE516.05</b>	Discuss the measurement of non-electrical quantities.	Understand
	<b>b</b>	<b>AEE516.06</b>	Recognize the environment related factors such as radiation, smoke and dust.	Understand
5	<b>a</b>	<b>AEE516.08</b>	Analyze the pH meter and fuel analyzer.	Understand
	<b>b</b>	<b>AEE516.08</b>	Analyze the pH meter and fuel analyzer.	Understand
6	<b>a</b>	<b>AEE516.07</b>	Examine the concept of gas analyzer.	Understand
	<b>b</b>	<b>AEE516.09</b>	Illustrate the pollution monitoring instruments.	Understand
7	<b>a</b>	<b>AEE516.13</b>	Analyze the steam pressure control and lubricant oil, temperature control.	Understand
	<b>b</b>	<b>AEE516.11</b>	Summarize the various methods available for steam temperature control.	Understand
8	<b>a</b>	<b>AEE516.12</b>	Evaluate the effect of distributed control and interlocks in boiler.	Understand
	<b>b</b>	<b>AEE516.10</b>	Discuss the combustion control.	Understand
9	<b>a</b>	<b>AEE516.13</b>	Analyze the steam pressure control and lubricant oil, temperature control.	Understand
	<b>b</b>	<b>AEE516.14</b>	Explore the methods of turbine control.	Understand
10	<b>a</b>	<b>AEE516.15</b>	Discuss the different methods of cooling systems.	Understand
	<b>b</b>	<b>AEE516.14</b>	Explore the methods of turbine control.	Understand

**Signature of the Course Coordinator**

Dr. Mule Laxmidevi Ramanaiah, Associate Professor

**HOD, EEE**