LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

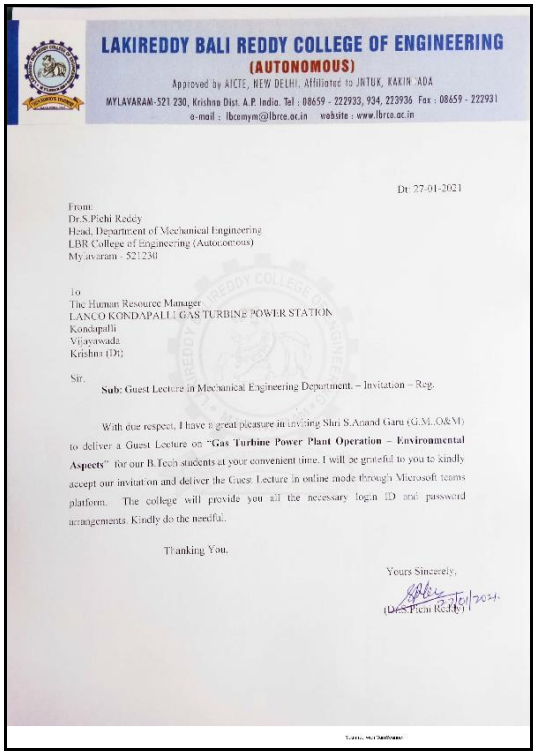
L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF MECHANICAL ENGINEERING

Guest Lecture Report

On

Thermal Power Generation with focus on Gas Turbine basec Combined Cycle Power Plant Operation & Environmental Aspects



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Dt: 27-01-2021

From:
Dr.S.Pichi Reddy
Head, Department of Mechanical Engineering
LBR College of Engineering (Autonomous)
Mylavaram - 521230

To
The Human Resource Manager
LANCO KONDAPALLI GAS TURBINE POWER STATION
Kondapalli
Vijayawada
Krishna (Dt)

Sir,

Sub: Guest Lecture in Mechanical Engineering Department. – Invitation – Reg.

With due respect, I have a great pleasure in inviting Shri S.Anand Garu (G.M. O&M) to deliver a Guest Lecture on "**Gas Turbine Power Plant Operation – Environmental Aspects**" for our B.Tech students at your convenient time. I will be grateful to you to kindly accept our invitation and deliver the Guest Lecture in online mode through Microsoft teams platform. The college will provide you all the necessary login ID and password arrangements. Kindly do the needful.

Thanking You.

Yours Sincerely,

(Dr.S.Pichi Reddy)

Date / Duration: 4th February**, 2021**. 11.00 AM to 01.00 PM

Resource Persons: Shri S.Anand, General Manager, Lanco Kondapalli Combined Cycle Power Station, Vijayawada

Mr. S. Anand is working as the General Manager at the 1476 MW Capacity Combined Cycle Power Plant near Vijayawada. He has around 30 years experience in Operation, Maintenance & Commissioning of Power Plants and worked in various capacities starting as a Graduate Engineer Trainee. Currently as Head of the Operation & Maintenance group he is leading a team of more than 100 Engineers in Operation & Maintenance of Power Plant. He is also a BEE certified Energy Auditor and also has a Diploma in Industrial Safety.

Mr.Anand completed his B.Tech in Electrical & Electronics Engineering from Calicut University in the Year 1990 and completed 1 year training course in Operation & Maintenance of Thermal Power Plants from Power Engineers Training Society (currently called NPTI (National Power Training Institute)). He has undergone various trainings in Power Plant Operation at U.K, Malaysia & India.

Mr.Anand started his career in Power Plants in the year 1991 and worked in mostly Thermal Power Plants. Currently he also provides Technical support to a 91.8 MW Wind Turbine farm.

This presentation will give insight on Power Generation in a Thermal Power Plant.

Name of the Coordinators:

1. Dr. P.Ravindra Kumar, Professor
2. Mr. K.V.Viswanadh, Sr.Asst.Professor
3. Mr.K.Lakshmi Prasad

Audience: Mechanical Engineering 3rd and 4th Year Students

Total Number of Participants: 224

Objective of the Event: To improve the knowledg levels on clean power plant operation and its maintenance, environmental aspects of gas turbine power plants.

1) Main components of Power system – Generation, Transmission & Distribution

2) Different types of Power Generation-

- Thermal Power Stations
- Hydro Electric Power Stations
- Combined Cycle Power Plants
- Nuclear Power Plants
- Renewable (Biomass, Wind Turbines, Solar…)
- Co-generation Plants

3) Gas Turbine works on which Thermodynamic cycle – Brayton

4) Steam Turbine works on which Thermodynamic cycle – Rankine

5) Name some major equipment in a Power Plant

- Turbines –Steam and/or Gas
- Boilers (Heat Recovery Steam Generators)
- Feed Water Heaters
- Condenser
- Pumps
- Piping, Valves
- Compressors
- Generators
- Transformers
- Associated Electrical and Controls

6) Process of Power Generation in a CCPP:

Compressor draws air from atmosphere and discharges in to combustion chamber at higher pressure. Fuel is injected and burned in the combustion chamber.

The resultant hot air-fuel mixture is expanded through turbine blades making them spin about a shaft. The spinning turbine drives a generator that converts the spinning energy into electricity.

Exhaust heat from the gas turbine is sent to a heat recovery steam generator (HRSG).The steam generated in the HRSG is used in the steam turbine to generate electricity.

7) Mention some advantages of Combined Cycle Power Generation

1. Higher Thermal Efficiency (56%)
2. Lower Installation Cost(Rs.5 Cr./MW)
3. Less Land Area requirement
4. Fuel Flexibility(Natural gas, HSD, Naphtha, Synthetic gas)
5. Flexible Duty Cycle
6. Shorter Installation Time(18-24 months)
7. Higher Reliability/Availability
8. Lower Operation & Maintenance Costs – less manpower requirement
9. Lower Aux. power consumption
10. Reduced Emission

8) Performance of a Power Plant is measured on what parameters:

- Generation Capacity(MW)
- Efficiency (%)
- Heat Rate(Kcal/Kwh)
- Aux. Power Consumption(% of Gen.)
- Plant Load Factor (%)
- Availability (%)

9) Give 2 examples for Non Conventional Energy:

Wind & Solar

10) Name some Major Environmental concerns related to Conventional Power Generation

- Global Warming
- Acid Rain
- Destructive Effects of Coal mining
- Oil Spills
- Submerging of land due to dams
- Radiation
- Ash disposal

After listening the guest lecture students are required to answer the quiz questions

1)What is the air standard cycle for a gas turbine called

2) What is the difference between a Rankine cycle & Brayton cycle

3) Which among these is the main component of a gas turbine plant

4) Which of the following is (are) the limitation(s) of gas turbines

5) Gas turbine power plant is ------ efficient than steam turbine plant

6) In a gas turbines high thermal efficiency is obtained in----

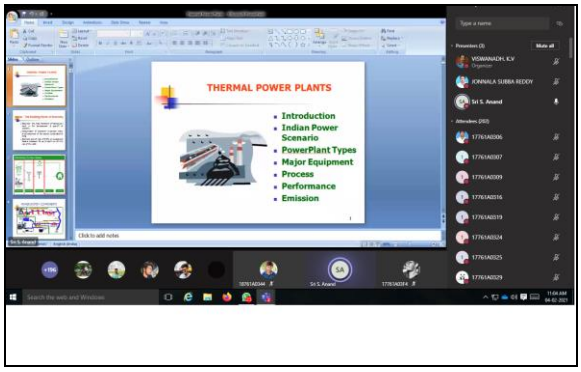
7) In a two stage gas turbine plant; Reheating after first stage----

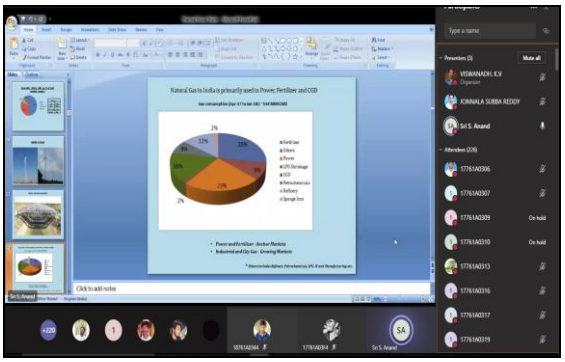
8) Intercooling in gas turbines

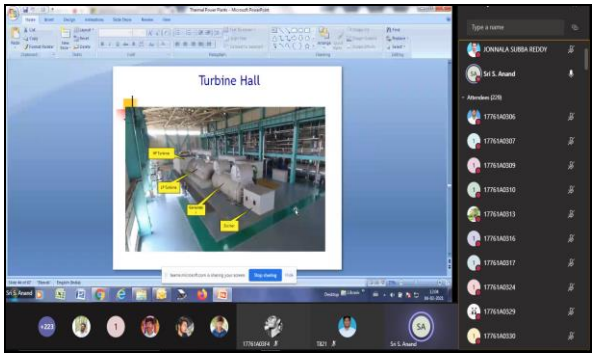
9) The dominant factor that influence the amount of NOx in a gas turbine engine is

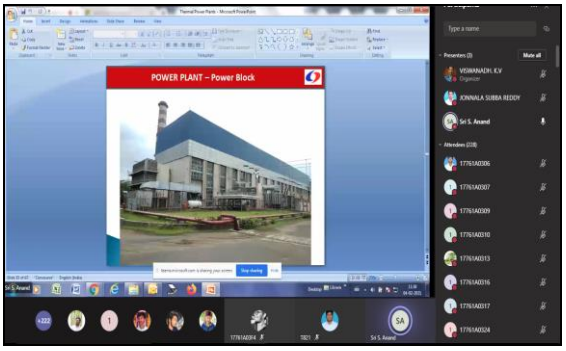
10) Disadvantage of using water injection to reduce NOx in aircraft gas turbine engines is

Outcome of the Event: After listening the webinar the 142 participants submitted the given quiz questions and analysed the impact.

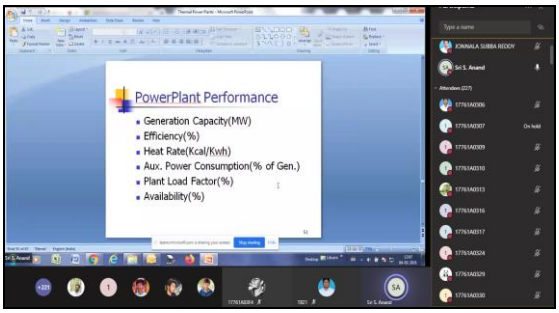

THERMAL POWER PLANTS
Introduction
Indian Power Scenario
PowerPlant Types
Major Equipment
Process
Performance
Emission

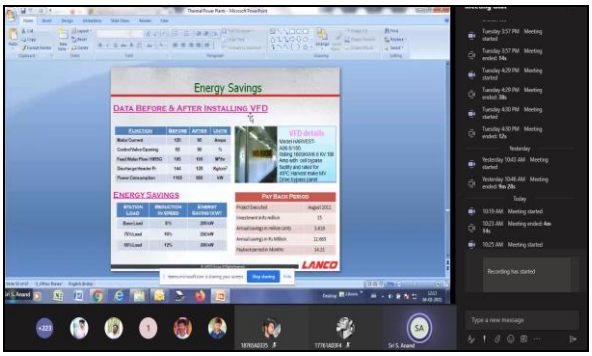


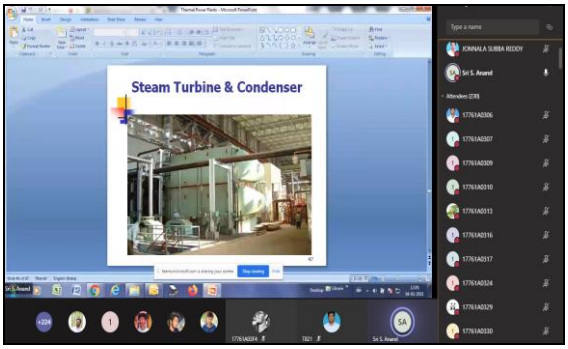

Turbine Hall

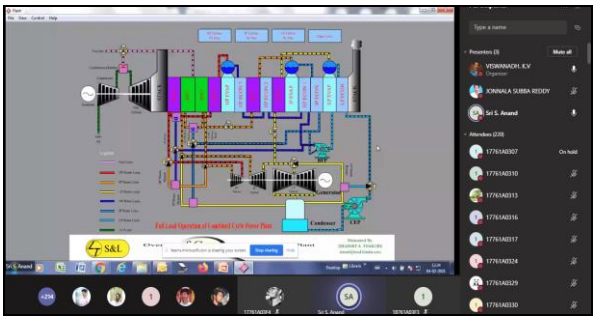

POWER PLANT – Power Block


Central Control Room


PowerPlant Performance
Generation Capacity(MW)
Efficiency(%)
Heat Rate(Kcal/Kwh)
Aux. Power Consumption(% of Gen.)
Plant Load Factor(%)
Availability(%)

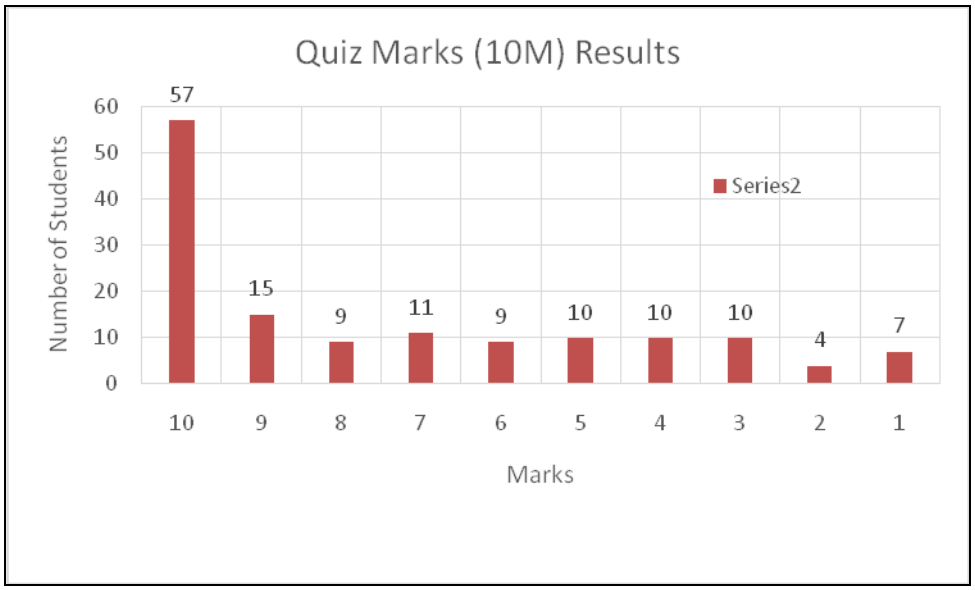

Energy Savings
DATA BEFORE & AFTER INSTALLING VFD
ENERGY SAVINGS
PAY BACK PERIOD
LANCO


Steam Turbine & Condenser



Impact Analysis

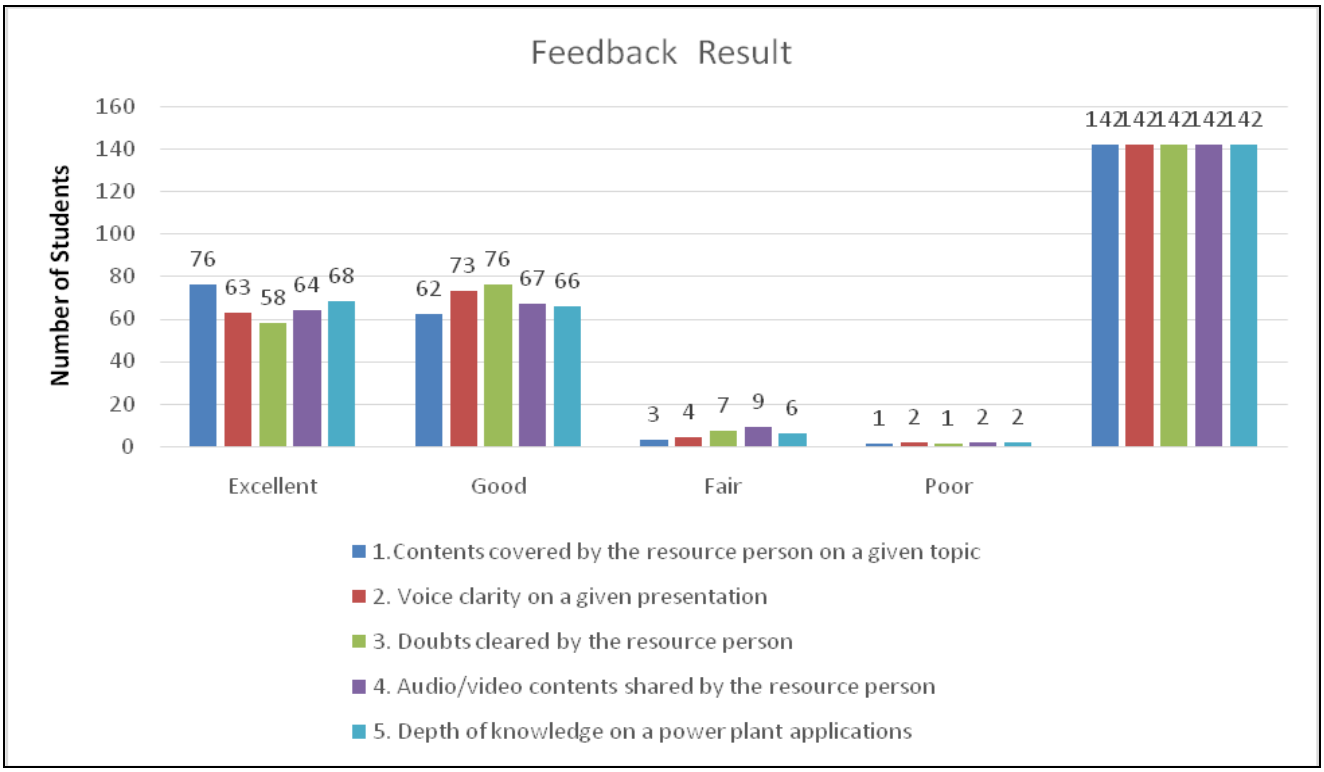
Quiz Responses:



Feedback / Suggestions:

1. Maintenance of Gas Turbine plant is needed
2. More number of workshops on solar power projects.

Feedback Report



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