

## **MECHANICAL DEPARTMENT**

### **PROBLEM1:**

#### **PROBLEM DESCRIPTION**

### **1. REDUCTION OF FLUE GAS TOXICITY IN AIR TO REDUCE GLOBAL WARMING AND OTHER EFFECTS AT BERRY ALLOYS LIMITED BOBBILI .**

Exhaust gas generated through combustion processes is called flue gas or stack gas. Its composition depends on the type of fuel and the combustion conditions, e.g. the air ratio value. Many flue gas components are air pollutants and must therefore, due to governmental regulations be eliminated or minimized by special cleaning procedures before the gas is released to the atmosphere. The exhaust gas in its original status is called raw gas, after cleaning it is called clean gas. The main flue gas components are following.

Nitrogen (N<sub>2</sub>)

Carbon Dioxide (CO<sub>2</sub>)

Oxygen (O<sub>2</sub>)

Carbon Monoxide (CO)

Oxides of nitrogen (NO and NO<sub>2</sub>, sum formula NO<sub>x</sub>)

Sulfur dioxide (SO<sub>2</sub>)

Hydrogen sulfide (H<sub>2</sub>S)

Hydrocarbons (C<sub>x</sub>H<sub>y</sub> or HC)

### **PROBLEM2:**

### **2. How to reuse of waste heat at berry alloys limited.**

Lot of heat during heating and through flue gases is directly transferred to open atmosphere. There is no useful work is generating through that waste heat at berry alloys limited.

Give an appropriate solution to reuse the waste heat and to reduce the power consumption.

# Power department

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## Question 1

An industry has a manufacture plant . It uses a boiler to produce steam. It is found that one of the pipes has a hole and steam started leaking from it .If you were to solve problem, what will you do?

Conditions :

You can't shut down the boiler as it takes 3 days to bring it into working condition.

The solution must be economic and safe.

## Question 2

Imagine how dangerous the job in an industry can be. The conditions can be harsh and the weather unpredictable. Not to mention the hazards that exist with complex industrial equipment.

The biggest problem that they face is the leakage of poisonous gas . Some of those gases doesn't even have color or odor. Many industrial workers are getting effected by unknowingly inhaling these gases.

Device a method to accuratly detect the emission of such case . Also find what the emitted gas is.

# EEE DEPARTMAENT

## EEE Problem 1

- i) A and B are two software companies in an upcoming state of INDIA. C is another construction compnay who leases his building to the two software companies. The specification of the building are as follows
- Total floors – 3
  - Ground floor – common facilities space and parking – 10760 sft
  - First floor – Leased to software companies A and B and completely occupied.
  - Second floor – construction work in progress so that it can be leased at a later stage.  
Typical construction work include fixing tools, testing of AC, wood work etc. It is to be noted that the work will carried out more on weekends.
- ii) Specifications of company A
- Floor area – 12188 sft
  - Seating capacity – 115 (Only 40 employees working at present)
  - Working days in a week – 5
- iii) Specifications of company B
- Floor area – 22000 sft
  - Seating capacity – 170
  - Working days in a week – 6
- iv) Energy Consumption (units /month)

Equipment	Company A	Company B	Company C
Chillers-Air conditioning (common to building)	24755		
Common Area facilities – lighting, lift, UPS etc. (common to building)	18490		
LDB equipment	1880	1820	1425
AHU equipment	2520	3925	1145
<b>Total energy consumption by the building in a month</b>			<b>55960 units</b>
<b>Total electricity bill (55960 * 10.2431) (rate per unit = Rs 10.2431)</b>			<b>Rs 573204</b>
<b>Water bill issued by municipality</b>			<b>Rs 13852</b>
<b>Diesel cost for generator backup facility</b>			<b>Rs 0</b>

- v) Electricity bill sharing

Company	Units	Cost Rs
A	21959	224931.3882
B	27694	283673.7953
C	6307	64958.8165
<b>Total</b>		<b>Rs 573204</b>

## vi) Problem

Company A claims that the sharing of the bill is not justified. According to their intuition since the number of employees are less the amount of energy consumed by them should be less.

Suggest the best method based on scientific principles to share the total electricity bill among the three companies and check for possibility of reducing the bill to company A.

**vii) Hints**

- a. Usage of common facilities by number of people
- b. Second floor construction works
- c. (ii)a and (iii)b – number of employees = number of systems working (requirement of UPS)
- d. Working days in a week for all three companies

## **PROBLEM2:**

### **EEE Problem 2**

A hydro electric project consists of 6 generators (3\*18 MW and 3\*24 MW) totaling to 120 MW of generating capacity. The plant has an average load factor of 60%.

Turbine Data – Vertical Francis, Reaction type, 600 rpm.

Generator Data –           1) 11kV, 18MW, 20 MVA , 1050A, 600rpm, 0.85 lag  
                                      2) 11kV, 24MW, 27 MVA , 1410A, 600rpm, 0.85 lag

Transformer Data –        1) 6670 kVA, 11/132 kV  
                                      2) 8350 kVA, 11/132 kV

The total power is evacuated through three 132 kV transmission lines.

One of the transmission line is connected to a substation of rating 132/11kV. The power stepped down through the substation is directly fed to a company via 11kV feeder.

### **Problem**

The company is a heavy industry with high inductive load. To improve the power factor and to avoid penalty billing the company installed huge capacitor banks at the source point of supply to the company. However when the company is switching the capacitor bank at around 10 am daily corresponding to peak production time one of the fully loaded 18 MW generator is tripping in the power station. Analyze the reason for the problem and suggest a best possible solution.

# ECE DEPARTMENT

## PROBLEM1:

The device size in an integrated circuit is being shrunk as predicted by Moore in 1965. In the very near future, we will be reaching the era of 5nm technology. Moreover, the higher speed of the circuit is also the constantly demanding parameter of the consumer market.

How will the industry address such issues to offer the integrated circuits of future technologies with promised reliability?

## PROBLEM2:

At higher clock rates, signal radiation from the wire and interfering with the nearby signals is a serious problem. Moreover, At lower geometries, there are higher chances of unwanted capacitances which cause the signal delay and degradation. These effects may seriously trouble the system reliability.

How will the industry address such issues to offer the integrated circuits of future technologies with promised reliability?

# CSE DEPARTMENT

## **PROBLEM1:**

With email service as an essential communication system, suggest a voice based email service that could help visually challenged people which gives the user an easy to use application with reduced cognitive workload.

## **PROBLEM2:**

Looking for an effective application/prototype of application which identifies and segregates multiple copies of files in a storage system. Some free tools like Duplicate Cleaner, Anti-Twin are available.