	<u>Utech</u>
Name:	
Roll No.:	To Plante Of Samulage 2nd Explant
Inviailator's Signature:	

2013

POWER PLANT INSTRUMENTATION AND CONTROL

Time Allotted: 3 Hours Full Marks: 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP - A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following:

 $10 \times 1 = 10$

- i) Which one of the following is not a fuel for nuclear poneer plant
 - a) ₉₂U²³³

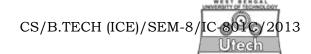
b) Coal

c) ₉₂U²³⁵

- d) $_{94}$ Pu²³⁹.
- ii) Which one of the following is a component of nuclear reactor?
 - a) Moderator
- b) Boiler
- c) Turbine
- d) Superheater.

8272 [Turn over

iii)	Ten	perature of the fireball	is of	
	a)	540°C	b)	460°C
	c)	1500°C	d)	150°C.
iv)	Fur	nace draft pressure is re	egula	ted by
	a)	Radial control of FD fa	ın	
	b)	Axial control of FD fan	1	
	c)	Radial vane control of	ID fa	n
	d)	Axial vane control of I	D fan	
v)	Max	kimum heat loss in a the	ermal	power plant occurs in
	a)	condenser	b)	superheater
	c)	turbine	d)	none of these.
vi)			ng is	a low head and high
		charge turbine?		
	a)	Kaplan turbine	b)	Pelton turbine
	c)	Deriaz turbine	d)	Francis turbine.
vii)	The	fanction of superheater	r is	
	a)	heating water to produ	ice st	eam
	b)	removing water dropl	ets fi	rom steam and thereby
		producing superheate	d stea	am.
	c)	to reheat feed water		
	d)	none of these.		
)		2		



- viii) The extraction turbine is useful
 - a) when only one output of steam is needed
 - b) when two or more outlets are provided to use the steam for different uses.
 - c) when steam at very low pressure is needed
 - d) all of these.
- ix) The power of a wind turbine generator is proportional to
 - a) *V*

b) *V*

c) V^3

d) V^4

[*V* is the wind velocity]

- x) The function of a deaerator is
 - a) to reheat feed water
 - b) to eliminate dissolved $O_2 \& CO_2$ from feed water
 - c) to heat steam
 - d) all of these.
- xi) Which one of the following can be used as a pollution monitoring device?
 - a) Gas chromatograph
 - b) RTD
 - c) Thermocouple
 - d) None of these.

- xii) In a multiple burner system which one is best flam detector?
 - a) Flame Ionization Rod
 - b) IR detectors
 - c) UV detectors
 - d) All of these.

GROUP - B

(Short Answer Type Questions)

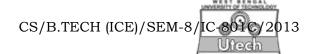
Answer any *three* of the following. $3 \times 5 = 15$

2 + 3

- 2. State the different components of a nuclear power plant?

 What are the advantages and disadvantages of CANDU
 - (Canadium deuterium uranuim) reactor?
- 3. How pH and dissolved oxygen can be measured from feed water in a thermal power plant?
- 4. What are the process parameters that must be measured for a turbine? Why is vibration measurement essential for turbine? Describe the process of vibration measurement in a turbine.
 1 + 2 + 2

8272 4



Theoretically calculate the power that can be obtained from a windmill having the following specifications:
 (Assume the density of air is 1.2 kg/m³)

A =Swept Area = 10 m^2

V = Velocity of wind = 200 km/hr.

Calculate the rate of make up water to a boiler plant if the average feed water rate is 100T/hr, the water loss in the baler system including blow down is 3% of the input and the steam loss in the turbine is 2% of its input. 2+3

6. What is blow down? Name the three different drafts in case of boiler? Describe the process of controlling of any nuclear reactor. 1 + 1 + 3

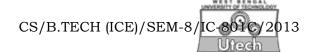
GROUP - C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

- 7. a) Explain the B-T-C-P cycle of a steam power plant. 3
 - b) How are the shrinking and swelling problems taken care
 of in a steam power plant by using 3-element boiler
 drum level control.
 - c) Describe the process of steam flow measurement in a boiler.

3.	a)	Describe the process of feed forward plus feedback steam temperature control.
	b)	Describe the different processes used for the measurement of dissolved oxygen in a boiler. 8
9.	a)	Explain the method of measuring dust particle in flue gas.
	b)	Explain with a neat sketch the alarm annunciation system of a boiler in a thermal power plant. 7
	c)	With a neat sketch describe the role of attemperator in the water side steam temperature control in a thermal power plant.
10.	a)	Name the classification of turbines based on process conditions.
	b)	What are the basic differences between the safety control systems and process control system in a turbine?
	c)	Name the four critical parameters which are to be monitored and controlled in a turbine.
	d)	Describe the method of conductivity measurement of feed water in a thermal power plant. 5
	e)	What are the main auxiliary system of a thermal power plant?



11. Write short notes on any three of the following:

- a) Electrostatic Precipitator
- b) Fast breed reactor
- c) Infrared flue gas Analyzers
- d) Measurement of ${\rm CO_2}$ in flue gas.
- e) Advantages of three-element drum level control over two-element drum level control.
- f) Mechanical type dust collectors.

8272 7 [Turn over