



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech (ICE/EI (O))/SEM-8/IC-801C/2010**

**2010**

**POWER PLANT INSTRUMENTATION**

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.*

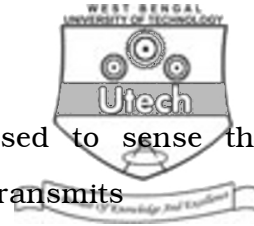
**GROUP – A**

**( Multiple Choice Type Questions )**

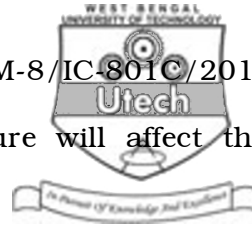
1. Choose the correct alternatives for any *ten* of the following :

10 × 1 = 10

- i) UV detector is used to measure the temperature of
  - a) Boiler metal tube      b) Furnace flame
  - c) Feed water              d) Steam.
- ii) SO<sub>x</sub> & NO<sub>x</sub> emission is determined by
  - a) Gas chromatography    b) NDIR analyzer
  - c) Zirconia probe            d) Balance.
- iii) In fire tube boiler, the fluid exists outside the capillary tube is
  - a) Hot flue gas              b) Natural water
  - c) DM water                d) Steam .



- iv) When a pressure transmitter is used to sense the pressure of fluid flowing in a pipe, it transmits
- a) Absolute pressure      b) The gauge pressure
  - c) Atmospheric pressure      d) Vacuum pressure.
- v) ESP is used to control
- a) CO in air      b) SPM in air
  - c) CO<sub>2</sub> in air      d) SO<sub>x</sub> / NO<sub>x</sub> in air.
- vi) A thermistor can be used to control the
- a) Level of water in tank      b) Altitude
  - c) Temperature      d) All of these.
- vii) Air velocity in ducts is measured by
- a) Venturimeter      b) Pitot tube
  - c) Orifice plate      d) LVDT.
- viii) In thermal power plant, the energy stored in coal that is transformed into electric energy is
- a) Chemical energy      b) Heat energy
  - c) Thermal energy      d) Nuclear energy.
- ix) The energy meter used for domestic power consumption indicates
- a)  $V I \cos \phi$       b)  $V I \sin \phi$
  - c)  $V I$       d) Apparent power.



- x) The variation in ambient temperature will affect the accuracy of
- a) RTD
  - b) Thermocouple
  - c) Thermistor
  - d) Thermometer.
- xi) The modern steam turbines are
- a) Impulse turbine
  - b) Reaction turbine
  - c) Impulse-reaction turbine
  - d) Kaplan turbine.

**GROUP – B**  
**( Short Answer Type Questions )**

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

2. Discuss the principle of operation of strain gauge type pressure transducer.
3. How is a liquid level in a boiler drum measured ? Explain.
4. Mention where are vibration, expansion & contraction to be measured & monitored in a power plant cycle. What technique is used usually for expansion-contraction measurement ?
5. What is hydrazine ? Why is it used in water /system cycle in a power plant ?
6. What is the role of conductivity measurement in thermal power plant ? How is the conductivity of superheated system measured ?  $2 + 3$



**GROUP – C**

**( Long Answer Type Questions )**

Answer any *three* of the following.

3 × 15 = 45

7. a) Describe the power plant cycle by drawing a schematic diagram of the same & indicate in it the positions of measurement of flow in the cycle.  
b) What are the important variables that need to be measured in power plant cycle ?  
10 + 5
8. What is balance draft ? How is the draft of the furnace measured ? Draw a loop for control of the furnace draft & explain its operation.  
2 + 3 + 10
9. What are the main polluting effects of a thermal power station ? Explain the working of an electrostatic precipitator in eliminating effects of pollution due to flue gas discharge with specific emphasis on instrumentation system for such operation.  
3 + 9 + 3
10. a) Discuss salient features of instrumentation in hydro-electric & non conventional power plants.  
10  
b) Explain with sketch, the alarm annunciation system during emergency in thermal power plant.  
5
11. Write short notes on any *three* of the following :  
3 × 5
  - a) Quality monitoring of water in power plant
  - b) Single element drum level control
  - c) All fuel ratio control of a furnace
  - d) Instrumentation in coal handling plants.

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