



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/B.Tech(EE-NEW)/SEM-7/EE-704-D/2009-10  
2009**

**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.*

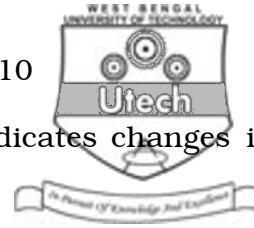
**GROUP – A**

**( Multiple Choice Type Questions )**

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

$$10 \times 1 = 10$$

- i) The performance of capacitance level indicator is affected by dirt because they change
  - a) area of the plates
  - b) distance between the plates
  - c) dielectric constant of the medium
  - d) none of these.
- ii) The flame temperature of a coal fired boiler is measured by
  - a) mercury thermometer
  - b) thermocouple thermometer
  - c) optical radiation pyrometer
  - d) none of these.



- iii) A capacitive pressure transducer indicates changes in pressure by changing
- a) voltage out of a.c. circuit
  - b) frequency
  - c) capacitance
  - d) none of these.
- iv) Radianpyrometers are used for measuring temperature in the range
- a)  $100^{\circ}\text{C} - 200^{\circ}\text{C}$
  - b)  $400^{\circ}\text{C} - 800^{\circ}\text{C}$
  - c)  $800^{\circ}\text{C} - 1000^{\circ}\text{C}$
  - d)  $1400^{\circ}\text{C} - 1450^{\circ}\text{C}$
  - e) none of these.
- v) Thermistors are
- a) temperature sensitive
  - b) pressure sensitive
  - c) voltage sensitive
  - d) none of these.
- vi) A pH meter measures
- a) Hydrogen content in the boiler water
  - b) Acidity of the water only
  - c) Alkalinity of the water only
  - d) Acidity or Alkalinity.
- vii) Optical pyrometer is suitable for the measurement of temperature in the range
- a)  $0^{\circ}\text{C} - 10^{\circ}\text{C}$
  - b)  $100^{\circ}\text{C} - 200^{\circ}\text{C}$
  - c)  $480^{\circ}\text{C} - 680^{\circ}\text{C}$
  - d) none of these.



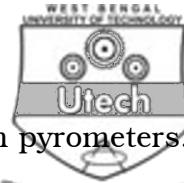
- viii) A Bourbon type tube pressure guage is used to measure
- a) both high and low pressures
  - b) only high pressure
  - c) only low pressure
  - d) none of these.
- ix) The hygrometer measures
- a) humidity directly      b) temperature directly
  - c) humidity indirectly      d) temperature indirectly.
- x) The semiconductor type strain guage utilises
- a) piezoresistivity      b) resistivity
  - c) conductivity      d) none of these.
- xi) Synchro is a / an
- a) muchanical device
  - b) electro-mechanical device
  - c) electrical device
  - d) none of these.

### GROUP – B

#### ( Short Answer Type Questions )

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

2. Explain in brief the principle of Zirconium cell type oxygen analyser.
3. Explain the working of a flow nozzle. Why are flow nozzles preferred than orifice plates for high pressure steam flow measurement ?
4. Describe the working principle of a pH meter.



5. Discuss the principle of operation of radiation pyrometers.
6. What are Photoelectric transducers ? Explain the working principle of a Photoelectric transducer.

**GROUP – C**

**( Long Answer Type Questions )**

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

7. Explain with control loop diagram, superheated steam temperature control of a thermal power plant.
8. What are the common gas analysers used in power plant ? How can you analyse CO in a gas mixture using dual channel absorption type IR gas analyser ?
9. Discuss the principle of operation of different types of flow-meters used in power plants.
10. What are the important features of piezoelectric transducers ? Briefly discuss two important applications of these transducers.
11. Write short notes on any *three* of the following :
  - a) DP transmitters
  - b) Data acquisition system ( DAS )
  - c) LVDT
  - d) Rotometer
  - e) Reynolds number.

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