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Question Paper Code : 31415

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2013.

Seventh Semester

Electronics and Instrumentation Engineering

EI 2021/EI 701/EI 1001 A/10133 EIE 21 — POWER PLANT INSTRUMENTATION

(Common to Instrumentation and Control Engineering)

(Regulation 2008/2010)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the role of instruments in solar and wind power generation system.
2. Draw the PI diagram of boiler.
3. What is power factor and explain the advantages of high power factor?
4. State the principle of smoke density measurement.
5. Write the working principle of Orsat flue gas analyser.
6. State the need for measuring dissolved oxygen.
7. What is furnace draft and how to quantify furnace draft?
8. What is deaerator and explain why it is required?
9. What is torque in a turbine and explain how do you evaluate the same?
10. What are the parameters required to be controlled in a cooling tower?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Distinguish the different methods of power generation. (8)
(ii) Explain the different parameters required to be measured and maintained by instruments in a thermal power plant. (8)

Or

- (b) (i) Explain the importance of instrumentation in power generation. (8)
(ii) Draw the PI diagram of cogeneration plant. (8)

12. (a) (i) Explain the basic working principle of instrument used to measure dynamic current and frequency? (8)
(ii) Explain how do you measure the radiation occurring in a nuclear plant and how do you control the same? (8)

Or

- (b) (i) What is the working principle of instruments used to measure and control steam pressure and temperature? (8)
(ii) Give an example for a water level controller in a boiler. Explain why it is needed and explain how do you achieve this? (8)
13. (a) (i) What are basic impurities in feed water of a boiler and how do you analyse these impurities? (8)
(ii) What is pH meter and explain pH requirements at different points and how do you control the same? (8)

Or

- (b) (i) Explain how do you measure the air pollutants from a power plant and what are control measures adopted to reduce the same? (8)
(ii) What is ultimate and proximate analysis of a fuel? How do you evaluate the ultimate analysis of a fuel and explain the working principle. (8)
14. (a) (i) Explain how steam flow is measured and controlled. (8)
(ii) How does the 3 element feed water control system work? (8)

Or

- (b) (i) How are superheat and reheat temperatures controlled? (8)
(ii) What are interlocks used in a boiler operation? (8)
15. (a) (i) Explain how do you measure the speed of a turbine and what are the control mechanisms required to maintain optimum speed of the turbine? (8)
(ii) How do you control the lubricant oil temperature and what are the control measures adopted to maintain the lubricant temperature at the desired value? (8)

Or

- (b) (i) How do you monitor the shell temperature of a turbine and how do you control the same? (8)
(ii) What are the mechanisms adopted to control the steam pressure, flow and temperature at the turbine inlet? (8)