Reg. No. : | | | | | | | | | | |

Question Paper Code: 49516

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2018

Elective

Electronics and Instrumentation Engineering

14UEI916- INSTRUMENTATION FOR POWER PLANTS

(Regulation 2014)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. The function of moderators in nuclear reactor is to

   (a) absorb the secondary neutrons (b) slow down the secondary neutrons

   (c) control the chain reaction (d) none of the mentioned

2. In a thermal power plant the efficiencies of boiler is 80%, turbine is 80% and generator is 80% then the efficiency of power plant is _____

   (a) 80% (b) 51.2% (c) 64% (d) 75%

3. In compressible fluid flow measurement, the boyle's law states that,

   (a) $P_1V_1=P_2V_2$ (b) $P_1T_1=P_2T_2$ (c) $P_1V_2=P_2V_1$ (d) $P_1T_2=P_2T_1$

4. The principle of operation of smoke detector is_____

   (a) Photovoltaic effect (b) Projecting (c) Receiving (d) Induction

5. Which gas has a weakest paramagnetic strength?

   (a) Oxygen (b) Nitric Oxide (c) Nitrogen dioxide (d) Nitrogen

6. Which pollutant is transparent in Visible and Ultra Violet region?

   (a) NO_2 (b) SO_2 (c) CO (d) NO

7. Pressure inside the furnace draft is _____

(a) Atmospheric pressure
(b) Vacuum pressure
(c) Slightly above the atmospheric pressure
(d) Slightly below the atmospheric pressure

8. Dissolved gases in feed water is removed by_____

(a) Aerator (b) Attemperator (c) Deanerator (d) Super heater

9. In speed measurement of turbine in a power plant, _____ method is most suitable.

(a) Capacitive drag cup type (b) Revolution counters
(c) Magnetic pickup (d) Optical type

10. A steam turbine converts _____ energy into _____ energy.

(a) Heat, Shaft work (b) Mechanical, Electrical
(c) Mechanical, shaft work (d) Heat, Electrical

PART - B (5 x 2 = 10 Marks)

11. Mention the four significant need of instrumentation in power generation.

12. Why float type level measurement is not suitable for boiler drum level measurement?

13. Specify the sensor used for the measurement of oxygen in flue gas.

14. Define stoichiometric ratio.

15. Briefly compare condenser and cooling tower.

PART - C (5 x 16 = 80 Marks)

16. (a) Draw the block diagram of power generation for thermal power plant. Explain its various blocks. (16)

Or

(b) What is meant by Cogeneration? Also explain the topping cycle and bottoming cycle operation of cogeneration system. (16)

17. (a) (i) Explain the construction and working of suitable flowmeter to measure steam flow in power plant. (10)

(ii) State the necessity of correction factor in steam measurement and define how it's calculated. (4)

(iii) Draw a P&I diagram for a steam flow measurement. (2)

Or

(b) Draw and Explain the working principle of radiation detectors. (16)

18. (a) Explain the operation of gas chromatography and its detector with suitable diagram. (16)

Or

(b) What are the different pollution monitoring instruments? Explain the same with neat sketch. (16)

19. (a) (i) Write short notes on the schematic representation of a drum-type bolier. (6)

(ii)Three element control is better than two element control in boiler drum level measurement. Justify the same with neat sketches. (10)

Or

(b) Select suitable schemes to control steam temperature in power plant. Describe the same in detail. (16)

20. (a) (i) Describe in detail about the shell temperature monitoring and control in turbines. (8)

(ii) Discuss the lubricant oil cooling system in turbines with neat sketch. (8)

Or

(b) Why is vibration measurement essential in Turbine control? Also explain the method of vibration measurement in steam turbine. (16)