

Register Number:.....

B.E., DEGREE EXAMINATIONS MAY/JUNE 2013

Seventh Semester

ELECTRONICS AND INSTRUMENTATION ENGINEERING

EIE114: Power Plant Instrumentation

Time: Three Hours

Maximum Marks: 100

Answer ALL Questions:-

PART A (10x1=10 Marks)

1. In a steam thermal power plant,
Boiler efficiency=82%
Turbine efficiency=30%
Alternator efficiency=95%. The overall efficiency is

a. 28.3% b. 35.2% c. 23.37% d. 31.2%
2. The multiplication factor in a nuclear reactor is given by

a. $K = \frac{\text{Rate of neutron production}}{\text{Rate of neutron absorption}}$ b. $K = \frac{\text{Rate of neutron absorption}}{\text{Rate of neutron production}}$
c. $K = \frac{\text{Rate of electron production}}{\text{Rate of electron absorption}}$ d. $K = \frac{\text{Rate of electron absorption}}{\text{Rate of neutron production}}$
3. A rise in steam temperature above design value result in.
a. Failure of super leaser b. increase Flow c. Electrostatic type d. Reflected light
4. The -----equation holds good when insufficient oxygen is present for combustion.
a. $C + O_2 \rightarrow CO_2$ b. $2H_2 + O_2 \rightarrow 2H_2O$ c. $S + O_2 \rightarrow SO_2$ d. $2C + O_2 \rightarrow 2CO$
5. The relation between flow(Q) and head(h) is given by
a. $Q = k\sqrt{h}$ b. $h = k\sqrt{Q}$ c. $Q = h$ d. $Q = 0.2h$
6. The material used in type –K thermocouple is
a. Chromel-Alumel b. Platinum-Chromel
c. Iron-Constantan d. Platinum-Chromel
7. The removal of dissolved gases by heating and agitation is done by -----process.
a. Filtration b. Ion Exchange c. Deaeration d. Demineralisation
8. The fire side control strategy for steam temperature control mechanism is-----
a. spraying cold water using desuperheater b. excess air control
c. by diverting part of the steam away d. by diverting part of feedwater

9. At what speed the turbine should be controlled if the coupled alternator/generator is two-pole machine?
- a. 1500 rpm b. 3000 rpm c. 2000 rpm d. 1800 rpm
10. -----cooling system is used for turbo generators of 100MW .
- a. Carbondioxide b. Closed-air c. open-air d. Hydrogen

PART B (10 x 2 = 20 Marks)

11. Differentiate conventional and non-conventional energy sources.
12. Draw the Instrument line symbol for a)Pneumatic signal)Electric signal
13. A coal conveyor system moves at a speed of 450m/min. A weighing platform is 15m in length and a particular weighing shows a reading of 200kg.Find the coal delivery in kg/hr.
14. Write the correction factor for steam when measured in tons/hr.
15. Define Chromatography.
16. Mention the need for fuel analyser.
17. Draw the general block diagram of three element drum level control.
18. What is an induced draft fan?
19. List the two categories of turbines based on the method of energy transfer.
20. What are the objectives of using a condenser in a steam plant?

PART C (5 x 14 = 70 Marks)

21. a) (i) Elaborate the importance of instrumentation in power generation.
(ii) Draw the basic block diagram of a nuclear power plant and explain the functions of each components.
- (OR)**
- b) (i) Compare the salient features of various conventional power plants.
(ii) Draw the schematic layout of a thermal power plant and explain each unit.
22. a) (i) With a neat sketch explain how steam pressure can be measured using piston-type gauge.
(ii) Can smoke be detected in thermal power plant? How?

(OR)

- b) (i) Describe the various methods of flow measurement of coal.
- (ii) Explain the working of dust monitor in thermal power plant.

23. a) (i) Explain the ill-effects of feed water with impurities entering the boiler?
(ii) Enumerate the precautions to be taken for maintaining conductivity.

(OR)

- b) Explain in detail about different types of chromatography with necessary diagrams.

24. a) (i) “The desuperheater temperature control loop can be configured as a cascade loop”.
Comment on this statement.
(ii) Write short notes on interlocks in boiler operation.

(OR)

- b) (i) Explain the structure of DCS in power plant automation with a neat diagram.
(ii) Draw the block diagram of metered cross limited air/fuel ratio control system and state its benefits.

25. a) (i) Explain how shell temperature is monitored and controlled in a turbine.
(ii) Discuss the control loop used to maintain level of lubricating oil main tank .

(OR)

- b) (i) With a neat diagram explain the principal parts of steam turbines.
(ii) Explain the operation of cooling systems in turbo-alternator process.
