POWER PLANT INSTRUMENTATION
(AEIE 4143)

Time Allotted : 3 hrs   **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and
__any 5 (five)__ from Group B to E, taking __at least one__ from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

    (i)   The balance draught system uses
        (a) only FD fan   (b) only ID fan
        (c) both FD fan and ID fan   (d) neither FD nor ID fan.

    (ii)   In coal fired thermal power plant the pulverized coal is used for
        (a) saving fuel   (b) efficient combustion
        (c) obtaining more heat   (d) all of these.

    (iii)   The function of surge tank in hydro-power plant is to
        (a)   supply water at constant pressure
        (b)   produce surges in the penstock pipe
        (c)   relieve water hammer pressure in the penstock pipe
        (d)   supply water at constant head

    (iv)   Economizer is used to heat
        (a) feed water   (b) air   (c) flue gases   (d) all of these.

    (v)   The modern steam turbines are
        (a) impulse turbines   (b) reaction turbines
        (c) impulse-reaction turbines   (d) pelton turbine

    (vi)   Shrinking of boiler drum level occurs when
        (a) load demand increases   (b) steam demand decreases
        (c) boiler pressure increases   (d) both (b) and (c)

    (vii) The function of moderator in a nuclear reactor is to
        (a) start the chain reaction   (b) speed up the fast moving neutrons
        (c) terminate chain reaction   (d) slow down the fast moving neutrons

    (viii) In boilers the feed water treatment is done mainly to eliminate _____ troubles
        (a) corrosion   (b) scale formation   (c) carry over   (d) all of these

(ix)   The fluctuation of load demand successfully counter by
      (a) 1-element drum level control   (b) 2-element drum level control
      (c) 3-element drum level control   (d) any of these.

(x)   Cycle makeup water is needed because of
      (a) water loss through water leakage   (b) steam venting
      (c) on recoverable steam usage during operation   (d) all of these.

Group – B

2. (a)   Draw and describe the T-S diagram for reheat Rankine cycle. Find the efficiency expression.

    (b)   Briefly discuss the feed-water and steam circuit of a thermal power plant with a suitable block diagram.

(2 + 4 + 2) + (2 + 2) = 12

3. (a)   State the function of deaerator.

    (b)   Describe the operation of central system of pulverised coal handling plant.

    (c)   Explain operation of electrical dust collectors with schematic diagram.

4 + 4 + 4 = 12

Group – C

4. (a)   Why boiler should always run in 'air-rich' condition? Describe the control scheme with detailed PI diagram to achieve this goal.

    (b)   Why should furnace pressure be maintained at negative value?

(2 + 2 + 5) + 3 = 12

5. (a)   Describe the method of super-heated steam temperature control with proper schematic diagram.

    (b)   Explain the necessity of the excess air for combustion of fossil fuel?

    (c)   Describe the operation of attemperator with necessary diagram.

(3 + 3) + 3 + 3 = 12

Group – D

6. (a)   Why did the turbine speed need to be monitored and controlled? Hence describe the method of turbine speed control with necessary PI diagram.

    (b)   Draw and explain the lube oil temperature control loop.

(2 + 2 + 3) + (3 + 2) = 12

7. (a)   Describe the measurement method of turbine shell expansion with suitable schematic diagram.

(b)   Draw and explain the lube oil pressure/flow control loop.

(c)   Name two sensors used to measure bearing temperature.

(2 + 3) + (2 + 3) + 2 = 12

Group – E

8. (a)   Describe with schematic diagram, the control mechanism used for generating variable amount of power in Nuclear Power Plant.

(b)   State the functions of moderator used in Nuclear Power Plant.

(c)   State four requirements of fission process for Nuclear Power Plant.

(3 + 2) + 3 + 4 = 12

9. (a)   State four criteria for Selection of Site for Hydro-Electric Power Plant.

(b)   Classify Hydro-Electric Power Plant based on availability of water head.

(c)   State the functions of trash rack and penstock used in Hydro-Electric Power Plant.

4 + 3 + (2 + 3) = 12

Department & Section	Submission link:
AEIE	https://classroom.google.com/c/OTMyNDgzNjcyODVa/a/MjczODQzNTY4Mjc1/details