

Secondary Systems: Steam System

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1 Quiz

1.1 Questions

1. Name the major isotope present in steam generated in a Boiling Water Reactor.
2. The steam from steam generator of a nuclear power plant is best described as
(a) superheated steam (b) supercritical steam (c) saturated dry steam
(d) saturated wet steam
3. The mass flow rate of steam required for unit MW of power generated using a (water-cooled) nuclear power plant is greater than that of a thermal power plant due to

(a) relatively better steam quality from steam generators of nuclear power plant
(b) high dryness fraction of steam from steam generators of nuclear power plant
(c) relatively poor steam quality from steam generators of nuclear power plant
(d) none of the above
4. Which of the following are consequences of high volumetric flow rate of steam in (water-cooled) nuclear power plant?

(a) larger turbine diameter & higher speed (b) smaller turbine diameter & lower speed
(c) larger turbine diameter & lower speed (d) small turbine diameter & higher speed
5. Double-flow turbines are characterized by _____
(a) one steam inlet & one exhaust (b) two steam inlets & two exhausts
(c) one steam inlet & two exhausts (d) one steam inlet & more than two exhaust
6. The problems associated with wet steam in turbines are _____ and _____
7. Why are fins used in reheater?
8. Condenser in nuclear power plant operate _____
(a) below atmospheric pressure (b) atmospheric pressure
(c) above atmospheric pressure (d) none of the above
9. The hot and cold fluids in reheater are _____ & _____ respectively
10. Under certain conditions, the specific enthalpies of dry steam, saturated water and wet steam are 2783 kJ/kg, 1219 kJ/kg and 2750 kJ/kg respectively. Determine the dryness fraction of wet steam.

1.2 Answers

1. N-16
2. (d) saturated wet steam
3. (c) relatively poor steam quality from steam generators of nuclear power plant
4. (c) larger turbine diameter & lower speed
5. (c) one steam inlet & two exhausts
6. corrosion of turbine blades and lower turbine efficiency
7. The spent steam from the high-pressure turbine gets superheated during its passage in reheater. Superheated vapors have lower thermal conductivity and hence lead to lower heat transfer coefficient. To compensate for lower heat transfer coefficient, the heat transfer area must be increased on the superheated vapor side.
8. (a) below atmospheric pressure
9. high-pressure steam from steam generator & exhaust steam from high-pressure turbine respectively
10. Specific enthalpies of saturated water (h_l) and dry steam (h_g) are 1219 kJ/kg and 2783 kJ/kg. Substituting these values in the equation " $h_{ws} = x_d h_g + (1-x_d) h_l$ " gives the dryness fraction as 0.021