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Total Number of Pages : 02

B.Tech.
PEME5409

8th Semester Regular / Back Examination 2017-18
POWER PLANT ENGINEERING
BRANCH : MECH
Time : 3 Hours
Max Marks : 70
Q.CODE : C115

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions : **(2 x 10)**

- a) What are the advantages of reheat cycle over simple ranking cycle?
- b) What do you understand by : (i) sub sonic nozzle (ii) super sonic nozzle
- c) What are the methods used in ash handling system?
- d) Enlist the various types of losses taking place in a steam turbine
- e) What is draught in boiler operations?
- f) Differentiate between jet and surface condensers.
- g) What do you understand by mountings in boiler? Mention 04 mountings used in a boiler.
- h) What is "Half Life" of nuclear fuels?
- i) Define the term "Breeding"
- j) Mention four factors to be considered while selecting a site for hydroelectric power plant?

Q2 a) Explain with neat sketch the construction and working of any of the high pressure boiler. **(5)**

b) A boiler produces 200 kg of dry and saturated steam per hour at 10 bar and feed water is heated by an economizer to a temperature 110°C, 225 kg of coal of a calorific value of 30100 kJ/kg are fired per hour. If 10% of coal remains unburnt, find the thermal efficiency of the boiler and grate combined. **(5)**

Q3 a) What do you understand by supersaturated or metastable expansion in a nozzle? Mention the effects of supersaturation. **(5)**

b) Dry saturated steam at 11 bar enters a convergent-divergent nozzle and leaves at a pressure of 2 bar. If the flow is adiabatic and frictionless, determine : (i) the exit velocity of steam (ii) ratio of cross-section at exit and that at throat. Assume index of adiabatic expansion to be 1.135. **(5)**

Q4 The following particulars apply to a two-row velocity compounded impulse wheel :
Steam velocity at nozzle exit = 500 m/s
Nozzle angle=16°
Mean blade velocity = 120 m/s
Exit angles: first row moving blades =18°, fixed guide blades = 22°, second row moving blades = 36° **(10)**
Steam flow = 5 kg/s
Blade friction coefficient = 0.85
Determine : (a) the tangential thrust (b) the axial thrust (c) the power developed (d) the diagram efficiency

Q5 During a trial on a steam condenser, the following observations were recorded.

Condenser vacuum: 680mm Hg, Barometer reading:764 mm Hg, Mean condenser temperature:36.2°C, Hot well temperature: 30°C, Condensate formed per hour:1780 kg, circulating cooling water inlet temperature: 20°C, circulating cooling water outlet temperature: 32°C, Quantity of cooling water: 1250 kg/min. Determine :

- (i) condenser vacuum corrected to standard barometer
- (ii) vacuum efficiency
- (iii) undercooling of condensate
- (iv) condenser efficiency
- (v) condition of steam as it enters the condenser
- (vi) mass of air present per kg of condensed steam.

(10)

Q6 a) Define : (i) Approach (ii) Range (iii) Cooling efficiency of a cooling tower

(5)

b) Define : (i) Peak load (ii) Demand factor and (iii) Load factor

(5)

Q7 Describe with the help of neat sketch the construction of a Pressurized water Reactor. Describe briefly the functions of each part.

(10)

Q8 Write short answer on any TWO :

(5 x 2)

- a)** Impulse turbine and reaction turbine
- b)** Nuclear waste disposal
- c)** Types of tariff