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Total Number of Pages : 01

M.TECH

AR-19

M.TECH 1<sup>ST</sup> SEMESTER EXAMINATIONS NOV/DEC 2019

TE, MPETE1041

THERMAL AND NUCLEAR POWER PLANT

Time: 3 Hours

Max Marks : 70

The figures in the right hand margin indicate marks.

PART-A

(10 X 2=20 MARKS)

1. Answer the following questions.

- What Is The Thermal Efficiency Of Steam Power Plant?
- Why Generation Voltage In Thermal Power Plant Is Between 11kv To 33kv?
- What Different Types Are Of Pulverizes?
- Define Load Factor?
- What is an HTGR? Why is it called magnox?
- Define the term TTD? Under what case it is positive and negative?
- What Type Of Cooling Is Provided For Generator In Power Plant?
- What Is Foaming Of Boiler?
- What Is Meant By Critical Speed?
- What Are the Advantages Using Co<sub>2</sub> as Coolant?

PART-B

(5 X 10=50 MARKS)

Answer any five questions from the following.

- (a) Calculate the height of chimney required to produce a draught of equivalent to 20 mm of water if the flue gas temperature is 260°C and ambient temperature is 27°C and the stoichiometric requirement is 18 kg per kg of fuel. Assume 50% of excess air for combustion.  
(b) Explain different types of furnace and its applications.
- What are recuperative air-preheater? Why are baffles provided? Why is the overall heat transfer coefficient in APH low?
- The net power output of a regenerative – reheat cycle power plant is 80mW. Steam enters the high pressure turbine at 80 bar, 500°C and expands to a pressure P<sub>2</sub> and emerges as dry vapour. Some of the steam goes to an open feed water heater and the balance is reheated at 400°C at constant pressure P<sub>2</sub> and then expanded in the low pressure turbine to 0.05 bar. Determine (i) the reheat pressure P<sub>2</sub>, (ii) the mass of bled steam per kg boiler steam, (iii) the steam flow rate in HP turbine, (iv) cycle η. Neglect pump work. Sketch the relevant lines on h-s diagram. Assume expansion in the turbines as isentropic.
- (a) An ideal reheat cycle utilizes steam as the working fluid. Steam at 100 bar, 400°C is expanded in the HP turbine to 15 bar. After this, it is reheated to 350°C at 15 bar and is then expanded in the LP turbine to the condenser pressure of 0.5 bar. Determine the thermal η and steam rate.  
(b) With neat sketch describe different types of super heater used for boilers.
- What are the different types of stokers used in a thermal power plant? Explain one with neat diagram?
- Steam at 20 bar and 300°C is supplied to a turbine in a cycle and is bled at 4 bar. The bled-steam just comes out saturated. This steam heats water in an open heater to its saturation state. The rest of the steam in the turbine expands to a condenser pressure of 0.1 bar. Assuming the turbine efficiency to be the same before and after bleeding, find: a) the turbine η and the steam quality at the exit of the last stage; b) the mass flow rate of bled steam 1kg of steam flow at the turbine inlet; c) power output / (kg/s) of steam flow; and d) overall cycle η.
- Write a short notes on
  - Water tube boiler
  - CANDU reactor