Total No. of Printed Pages:02

SUBJECT CODE NO:- H-133
FACULTY OF SCIENCE AND TECHNOLOGY
S.E. (Mech/Prod)
Thermodynamics -II
(REVISED)

[Time: Three Hours]   [Max. Marks: 80]

                        Please check whether you have got the right question paper.
N.B   1) Solve any three questions from each section.
                        2) Use of steam table, mollier diagram permitted.
                        3) Assume suitable data if required.

Section A

Q.1   a) Explain steam generation controls.   06

       b) A Boiler evaporates 3.6 kg of water per kg of coal into dry saturated steam at 10 bar.   07
           The temperature of feed water is 40ºC. Find
           1.   Factor of evaporation
           2.   Equivalent evaporation
           3.   Boiler efficiency, if calorific value of coal is 30 MJ/Kg.

Q.2   a) Explain construction and working of Lo-effler Boiler.   07

       b) Discuss advantages of artificial draught over natural draught.   03

       c) Give classification of draught.   03

Q.3   a) Find the mass of flue gases passing through Chimney when draught produced is 2 cm of   09
           water. Temperature of flue gases is 297ºC and ambient temp is 27ºC. The flue gases
           formed /kg of fuel burnt are 20 kg. Diameter of Chimney is 2 meter. Neglect frictional
           losses.

       b) Explain in detail nozzle efficiency.   04

Q.4   A Nozzle is required to discharge 2 kg of steam per second. The nozzle is supplied with steam at   13
       7 bar and 180ºC. The discharge takes place at pressure of 1 bar. The expansion upto throat is
       isentropic & exit frictional resistance is 63 KJ/kg of steam. Taking inlet velocity of 75 m/s &
       throat pressure of 4 bar. Estimate
       i)   Throat & exit area
       ii)   Overall efficiency of nozzle between inlet & exit.

Q.5   Write short note on(Any two)   14

       a.   Energy balance in Boiler
       b.   Condition for maximum discharge through Chimney
       c.   Metastable flow through nozzle

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Section B

Q.6	a)	What are sources of air leakage in condenser & explain effects of air leakage in condenser.	07
	b)	Explain in detail cooling towers.	06
Q.7	a)	Explain central flow type of surface condenser.	05
	b)	Explain the effect of superheat, inlet pressure and back pressure on performance of Rankine Cycle.	08

Q.8   In a single heater regenerative cycle the steam enters the turbine at 20 bar, 400ºC and exhaust   13
pressure is 0.1 bar. The feed water is a direct contact type which operates at 5 bar. Find
      i)   The efficiency of cycle
      ii)   Steam rate
      iii)   Mean temperature of heat addition

Q.9   a)   Differentiate between reciprocating and rotary compressor.   05

      b) A two stage single acting reciprocating compressor takes in air at the rate of $0.2\ m^3/sec$.   08
The inlet pressure & temperature of air are 0.1mpa, 16ºC. The air is compressed to a final
pressure of 0.7 MPa. The intermediate pressure is ideal & intercooling perfect. The
compression index in both the stages is 1.25 & compressor runs at 600 rpm. Neglecting
clearance determine.
      i)   Volume of each cylinder
      ii)   Power required

Q.10   Write short note on (Any two)   14

      a) Counter flow jet condenser
      b) Reheat cycle
      c) Screw compressor