Printed Pages : 3

EAG203/AG204

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 180215

Roll No. | | | | | | | | | | |

B. Tech.

(SEM. II) THEORY EXAMINATION, 2014-15

THERMODYNAMICS & HEAT ENGINE

Time : **3** Hours] [Total Marks : **100**

Note: The question paper is divided in three sections. Attempt each section. Assume missing data suitably if necessary. The use of calculator is permitted.

SECTION-A

Q. (1) Attempt each short answer type question: (2X10 = 20)

(a) Define isolated system?

(b) State the first law of thermodynamics?

(c) What is mean effective pressure? How is it measured?

(d) What is reversed heat engine?

(e) Mention any four causes of entropy increase?

(f) What is the entropy of an isolated system?

(g) Where does the Lancashire boiler is used?

(h) What is boiler drought?

(i) What is operating principles of two stroke cycle?

(j) Define the thermal efficiency of a heat engine cycle?

SECTION-B

(Q.2) Attempt any three parts of the following: (10X3 =50)

(a) State and discuss the Carnot cycle? A Carnot engine absorbs 200 J of heat from a reservoir at the temperature of the normal boiling point of water and rejects heat to a reservoir at the temperature of the triple point of water. Find the heat rejected.

the work done by the engine and the thermal efficiency?

(b)) In a cyclic process, heat transfers are + 14.7kJ, -25.2 kJ, - 3. 56 kJ and + 31.5 kJ. What is the net work for this cyclic process?

(c) State and prove Clausius' theorem?

(d) What do you understand by entropy transfer? Why is entropy transfer associated with heat transfer and not with work transfer?

(e) What is the function of boiler mountings in steam boilers? Enlist their names and describe with the help of neat and labeled sketch, any one of them?.

SECTION-C

(Q.3) Attempt any five parts of the following: (10 X 5 = 50)

(a)) Explain the desirable properties of working fluids used for power plants?

OR

Discuss a Rankine cycle and compare with Carnot cycle?

(b) What is a spark ignition engine? What is the air standard cycle of such an engine? What are its four processes?

OR

An engine equipped with a cylinder having a bore of 15 cm and a stroke of 45 cm operates on an Otto cycle. If the clearance volume is 2000cm3, compare the air standard efficiency?

(c) Prove the change of entropy of a gas at reversible adiabatic process.?

OR

Two kg of water at 80^0C are mixed adiabatically with3 kg of water at 30^0C in a

constant pressure processes of 1 atmosphere. Find the increase in the entropy of the total mass of water due to mixing processes.(Cp of water= 4.187KJ/kg-K)?

(d)) A blower handles 1 kg/s of air at 20^{0}C and consumes a power of 15 KW. The inlet and outlet velocities of air are 100 m/s and 150 m/s respectively. Find the exit air temperature, assuming adiabatic conditions. Take Cp of air is 1.005 KJ/Kg-K.?

OR

Define internal energy. How energy stored in molecules and atoms.What is is the difference between heat and internal energy?

(e)Discuss the Kelvin-Plank statement of the second law of thermodynamics?

OR

A heat engine receives half of its heat supply at 1000 K and half at 500 K while rejecting heat to a sink at 300 K. What is the maximum thermal efficiency of the heat engine?