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B. TECH.
(SEM II) THEORY EXAMINATION 2017-18
THERMODYNAMICS AND HEAT ENGINES

Time: 3 Hours**Total Marks: 100****Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A****1. Attempt all questions in brief. 2 x 10 = 20**

- a. What do you mean Open and closed System?
- b. What do you men by Flow and Non Flow Process?
- c. Draw a T-S Diagram of Carnot Cycle?
- d. What is the condition for Reversibility?
- e. What do you mean by Thermal Equilibrium?
- f. Explain Triple Point?
- g. What is the dryness fraction?
- h. List out three Mounting of Boiler?
- i. Write the formula for Break Power?
- j. What do you mean by Mean effective Pressure?

SECTION B**2. Attempt any three of the following: 10 x 3 = 30**

- a. What is an Otto cycle? Explain with sketch the four processes which constitute this cycle.
- b. What do you mean by compound heat Engine? Where are they used?
- c. What is the function of boiler Mounting in steam boilers? Enlist their name and describe, with the help of neat and labeled sketch, anyone of them.
- d. State and Prove the Carnot Theorem?
- e. What is Spark Ignition Engine? What is the Air Standard Cycle of Such engine? What are its four Processes?

SECTION C**3. Attempt any one part of the following: 10 x 1 = 10**

- (a) Define Internal Energy. How is energy stored in molecules and Atom? What is the difference between heat and internal Energy?
- (b) A blower handled+ 1 kg/sof Air at 20⁰C and Consume a power of 15 kW. The inlet and met velocities of air temperature, assuming adiabatic condition. Take Cp of air is Kj/Kg-K

4. Attempt any one part.of the following: 10 x 1 = 10

- (a) Discuss the Classias Statement for the second Law of thermodynamics.
- (b) A Heat Engine receives half of its Heat Supply at 1000K and Half ate 500 K while rejecting Heat to a sink at 300 K. What is the maximum thermal efficiency of the heat Engine?

5. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Derive an Expression for enthalpy change during steam generation from feed water to superheated Steam?
 - (b) Two Kg of Water at 80° are mixed adiabatically with 3kg of water at 80° in const. pressure processes of 1 atmosphere. Find the increase in the entropy of the total mass of due to mixing processes. (C_p of Water = 4.187KJ/kg-K)?
6. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Sketch and completely label the Lancashire boiler. Also Explain its working?
 - (b) A stem Engine working on boiler pressure of 80 Bar and condenser pressure of 0.075 bar determine the cyclic efficiency considering it to work on Carnot Cycle.
7. Attempt any *one* part of the following: 10 x 1 = 10
- (a) 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 200 cm^3 , Compare the air Standard Efficiency?
 - (b) Derive the expression for the efficiency of Diesel Cycle?