



PAPER ID : 4069

TME-302

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

Roll No.

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B. Tech.

(SEM. III) (ODD SEM.) (REG. & BACK) EXAMINATION, 2012-13

ENGINEERING THERMODYNAMICS

[Total Marks : 50]

Time : 2 Hours]

Note : Answer all questions. Assume any missing data suitably. Use of steam and other property tables are allowed.

- 1 Attempt any four parts : 2.5×4=10
- What do you mean by phase of a system ?
 - What do you mean by 'property' ? Distinguish between intensive and extensive properties.
 - What do you mean by reversible and irreversible process ?
 - What do you mean by thermodynamic equilibrium ?
 - Define work. What are different forms of work ?
 - What do you understand by quasi static process ?
- 2 Attempt any four parts : 5×4=20
- Explain Helmholtz and Gibbs free energy. What is its physical significance ?
 - Give a physical expression of entropy.
 - Write short notes on Brayton-Rankine combined cycle.
 - Air is heated at constant pressure from 4°C to 250°C. If the temperature of the environment is 4°C, what percentage of heat transfer to the air represents an increase in the available energy of air ?

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- (e) In an air standard Diesel cycle, the compression ratio is 16, and at the beginning of isentropic compression, the temperature is 15°C and the pressure is 0.1 MPa . Heat is added until the temperature at the end of the constant pressure process is 1480° . Calculate (a) the cut-off ratio, (b) the heat supplied per kg of air.
- (f) Prove that "The available energy of a fluid at a higher temperature is more than that at a lower temperature, and decreases as the temperature decreases".

3 Attempt any two parts :

$10 \times 2 = 20$

- (a) An air compressor is provided with a water jacket for cooling. A test indicates that compressor requires 180 kJ of work per kg of air flow through the compressor while the enthalpy of the air increases from 73 kJ per kg as it passes through the compressor. The enthalpy of the circulating water increase by 60 kJ per kg of air. Calculate the heat transfer from the air to the atmosphere.
- (b) Two kg of water at 94°C is mixed with three kg of water at 10°C in an isolated system. Calculate the change of entropy due to mixing process.
- (c) Draw Diesel cycle on p-v and T-S coordinates. Also derive an expression for its efficiency.