

B. Tech Degree III Semester Examination, December 2006

ME 303 THERMAL ENGINEERING I

(Prior to 2002 Admissions)

Time : 3 Hours

Maximum Marks : 100

(All questions carry EQUAL marks)

- I. (a) Explain the II Law of Thermodynamics.
(b) Determine the adiabatic flame temperature when liquid octane at 25°C is burned with 300% theoretical air at 25°C in a steady flow process.
- OR**
- II. (a) Explain the concept of availability.
(b) A cyclic heat engine operates between a source temperature of 800°C and a sink temperature of 30°C . What is the least rate of heat rejection per KW net output of the engine?
- III. (a) List out the comparison between two stroke and four stroke IC engines.
(b) Explain the steps involved in preparing a Heat Balance sheet.
- OR**
- IV. (a) Explain knocking in IC engines.
(b) Explain how Morse test is conducted.
- V. (a) Derive an expression for the volumetric efficiency of a reciprocating compressor in terms of clearance ratio.
(b) Derive an expression for isothermal work in case of a single stage compressor, neglecting clearance volume.
- OR**
- VI. (a) List out the advantages of multistage compression over single stage compression.
(b) Explain the working of a vane type rotary compressor.
- VII. (a) Explain Fourier's Law of heat conduction
(b) Explain the concept of black body.
- OR**
- VIII. (a) Calculate the total radiation energy exchanged per m^2 between two large parallel plates at temperatures of 833K and 573 K. Take emissivity of the two plates as 0.8 and 0.6 respectively.
(b) Explain what is a gray body.
- IX. (a) Derive an expression for the LMTD of a parallel flow heat exchanger.
(b) Explain Newton's law of cooling.
- OR**
- X. (a) What is Reynolds number? What is its critical value when the flow through a tube becomes turbulent?
(b) Explain with neat sketches the classification of heat exchangers.