

B. Tech Degree I & II Semester (Combined) Examination

June 2006

IT/CS/EC/CE/ME/SE/EI/EB/EE/MRE 107
FUNDAMENTALS OF ENGINEERING I
(Common)

(b) MECHANICAL ENGINEERING

Time : 1 ½ Hours

Maximum Marks : 50

- I. (a) Derive an expression for work done in an adiabatic process. (7)
(b) A closed vessel containing 2 Kg. of carbon dioxide is at a temperature 20°C and pressure of 0.7 bar. Heat is supplied to the vessel till the gas acquires a pressure of 1.4 bar. Calculate –
(1) Final temperature (2) Work done on or by the gas
(3) Heat added (4) Change in internal energy.
Take specific heat of the gas at constant volume as 0.657 K./Kg K. (10)
- OR**
- II. (a) Explain the Kelvin – Planck and Clausius statements of the second law of thermodynamics and prove their equivalence. (9)
(b) A carnot heat engine receives 500 KJ of heat per cycle from a high temperature source at 652°C and rejects heat to a low temperature sink at 30°C. Determine the carnot efficiency and the amount of heat rejected to the sink per cycle. (8)
- III. (a) Derive an expression for the air standard efficiency of Diesel cycle. (9)
(b) An engine working on the otto cycle has a cylinder diameter of 150 mm and stroke of 225 mm. The clearance volume is $1.25 \times 10^{-3} m^3$. Find the air standard efficiency. (8)
Take $\gamma = 1.4$.
- OR**
- IV. (a) Explain the working of a four stroke, C.I. engine with a neat sketch. (8)
(b) Explain with the help of a neat sketch, a plain carburator showing idling jet and choke. What is the function of choke? (9)
- V. (a) Explain the terms :
(i) Saturation temperature (ii) Wet steam
(iii) Super heated steam (iv) Dryness fraction. (8)
(b) Explain the working of a Babcock and Wilcox water tube boiler with a neat sketch. (8)
- OR**
- VI. (a) Explain difference between impulse turbine and reaction turbine. (8)
(b) Explain the term 'compounding' in steam turbines. Discuss various methods of compounding steam turbines. (8)