B.TECH MECHANICAL ENGINEERING
FUNDAMENTALS OF ENFINEERING

TIME: 3 HOUR
MARK: 90

ANSWER ANY FOUR QUESTION
ALL QUESTIONS CARRY EQUAL MARKS

MARK [4*15]

1 a. Derive an expression for work done in an adiabatic process

b. A closed vessel containing 2Kg of carbon dioxide is at a temperature 20 degree celsius and pressure of 0.7 bar. Heat is supplied to the vessel till the gas acquires a pressure of 1.4 bar. Calculate: final temperature, work done on or by the gas, heat added, change in internal energy

2 a. Explain the Kelvin-Plank and Clausius statements of the second law of thermodynamics and prove their equivalence

b. A carnot heat engine recieves 50 KJ of heat per cycle from a high temperature source at 652 degree celsius and reject heat to a low temperature sink at 30 degree celsius. Determine the carnot efficiency and the amount of heat rejected to the sink per cycle

3 a. Derive an expression for theair standard efficiency of Diesel cycle

b. An engine working on the otto cycle has a cylinder diameter of 150mm and stroke of 225mm. The clearance volume is 1.25×10^{-3} m^3. Find the air standard efficiency. Take gama=1.4

4 a. Explain the working of a four stroke C.I engine with a neat sketch

b. Explain with the help of a neat sketch, a plain carburattor showing idiling jet and choke. What is the function of choke?

5 a. Explain the terms:

i) saturation temperature

ii) Wet steam

iii) super heated steam iv) dryness fraction

b. Explain the working of a Babcock and Wilcox water tube boiler with a neat sketch

6 a. Explain the difference between impulse turbine and reaction turbine

b. Explain the term 'compounding' in steam turbines. Discuss various methods of compounding steam turbines