

Answer any five Questions including Q No.1& 2
Figures in the right hand margin indicates marks

1. **Answer All questions** **2 x 10**
- a. State the Zeroth law of thermodynamics.
 - b. In which process work done is equal to heat transfer and how?
 - c. What is mechanical equivalent of heat?
 - d. Define intensive and extensive properties with example.
 - e. Define C.O.P of a refrigerator.
 - f. What is stroke length of an I.C engine?
 - g. Draw P-V and T-S diagram of otto cycle.
 - h. State Clausius's statement of 2nd law of thermodynamics.
 - i. Define cetane number.
 - j. State Boyle's law.
2. **Answer Any Six Questions:** **6 x 5**
- a. Derive the relationship between C_p , C_v & R .
 - b. Differentiate between 2-stroke and 4-stroke engine.
 - c. State and explain the 1st law of thermodynamics.
 - d. Define fuel and explain the various classifications of fuels.
 - e. In a non-flow process, a gas expands from volume 1m^3 to a volume of 2m^3 according to the law $P = 2/v + 1.5$, where P is the pressure at any point in its path in bar and V is the volume at the same point in m^3 . Determine (1) pressure at the end of expansion in KN/m^2 and (2) work done by the gas doing expansion in kJ. <https://www.sctevtonline.com>
 - f. An ideal heat engine works on carnot cycle between the temperature limits of 327°C and 77°C . If 550kJ of heat is supplied to the working medium during a cycle of operation then find the
(1) thermal efficiency of the cycle and
(2) quantity of heat rejected.
 - g. An engine working on Otto cycle has a cylinder diameter of 200mm and stroke of 300mm clearance volume is 1500000mm^3 . Determine the air standard efficiency for the engine.