QUESTION BANK

Semester - 3rd

Subject :- Thermal engineering-1

Branch - Mechanical

Short Questions :-

① (a) State and prove the 'clausis' theorem.

(b) What do you understand by point fuction and path fuction ?

(c) What are positive and negative work interactions ?

(d) What is universal gas constant ?

(e) What is Quasi- static process ?

(f) Difine Thermodynamic equilibrium.

(g) Difine intensive property.

(h) State Charle's law.

(i) State zeroth of thermodynamics.

(j) Difine Isothermal process.

(K) Difine point fuction and path fuction.

(L) What is mechanical equivalent of heat ?

(M) Explain the Clausius statement of 2nd law of thermodynamics.

(N) State the Boyle's law and Charle's law.

(O) Define enthalpy.

(P) Define piston speed and state its formula.

(Q) Draw the P-V and T-s diagram of otto cycle.

(R) Difine cetane number and Octane number.

(S) What is meant by free Expansion ?

Long Question :-

(a) 2Kg of air at a pressure of 1.5 bar, occupies a volume of 2.5 m3. If this air compresses isothermally to 1/3 times the intial volume. Find temperature, work done, heat transfer.

(b) A reversible heat engine operates between two reservoirs at temperatures of 600C and 40C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 40C and -20C. The heat transfer to the engine is 2000 KJ and the network output of the combined engine-refrigerator plant is 360KJ. Evaluate the net heat transfer to the reservoir at 40C.

(c) State Boyle's Law with sketch.

(d) Explain second law of themodynamics.

(e) Derive an expression for work done during an isothermal process.

(f) Explain the Thermodynamic systems.

(g) Derive the steady flaw energy equation.

(h) Differentiate between SI and CI engine.

(i) Classify and explain the different types of fuel.

(j) Derive the relationship between Cp, Cv and R.

(K) Define COP. Derive the relation between COP of Refrigerator and COP of Heat Pump.

(L) An ideal gas at 30°C and 1bar is compressed adiabat from $5m^3$ to $1m^3$. Find the temperature, pressure an work done. Take $\gamma = 1.4$

(M) Derive the efficiency of otto cycle with p–v and T–s diagram.

(N) An ideal diesel cycle operates within the temperature limits of 1700K and 300K and with a compression ratio of 16. Determine the
(a) pressure and temperature at each point in the cycle
(b) thermal efficiency of the engine
(c) mean effective pressure.

(O) Air flows steadily at the rate of 1Kg/s through an air compressor entering at 7m/s velocity, 100K Pa pressure and specific volume of $0.95 m^2/Kg$ and leaving at 5m/s, 700 Pa and $0.19 m^2/Kg$. The difference in internal energy between outlet and inlet is 90 KJ/Kg. Cooling water absorbs heat from the air at the rate of 60KW. Calculate.

(P) (a) rate of work input
(b) ratio of inlet and outlet pipe diameter.

(Q) (a) What is the first law of thermodynamics?
(b) Derive the expression for the work done for an Isothermal process. Explain the working principle of 2 stroke and 4 stroke SI engine with neat sketch.