

**4<sup>TH</sup> SEM / MECH./DIP. IN MECH./ MECH(MAINT.)/  
MECH.(PROD.)/MECH(SAND.)/MECH(IND.INT.) / 2023(S)**

**TH-4 Thermal Engineering -II**

Full Marks: 80

Time- 3 Hrs

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. Define specific fuel consumption?
  - b. Define wet steam and dry saturated steam?
  - c. Explain Newton's law of cooling?
  - d. Define FAD?
  - e. Write the mountings of boiler?
  - f. What is thermal conductivity and state its SI unit?
  - g. Define brake thermal efficiency?
  - h. Define mechanical efficiency of air compressor?
  - i. What are the various modes of heat transfer?
  - j. Differentiate between gas and vapour?
  
2. Answer **Any Six** Questions 6 x 5
  - a. Briefly explain different powers developed in IC engine?
  - b. Explain the construction of single acting reciprocating air compressor?
  - c. Differentiate between fire tube and water tube boiler?
  - d. Derive the efficiency of Rankine cycle?
  - e. Briefly explain the working of Cochran boiler?
  - f. State and explain Fourier's law of heat conduction?
  - g. A power plant is supplied with dry saturated steam at a pressure of 16 bar and exhaust at 0.3 bar.using the steam table find the efficiency of Carnot cycle?

- 3 A two stroke diesel engine develops a brake power of 420KW.the engine consumes 195kg/h of fuel and air fuel ratio is 22:1.calorific value of fuel is 42000KJ/Kg. If 76 KW power is required to overcome the frictional losses, calculate  
1.mechanical efficiency  
2.air consumption  
3.brake thermal efficiency 10
- 4 Derive the expression of work input for a single acting air compressor without clearance volume? 10
- 5 The steam power plant operates on Rankine cycle has a boiler and condenser pressure of 60 bar and 0.1 bar respectively.steam coming out of the boiler is dry and saturated. Calculate thermal efficiency of the plant? 10
- 6 Explain different boiler draughts? 10
- 7 Write short notes. 4 x 2.5  
(a)air fuel ratio  
(b)dryness fraction  
(c)Kirchhoff's law  
(d)Volumetric efficiency