

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/  
COMMERCIAL PRACTICE – APRIL -2020.

**THERMAL ENGINEERING**

(Steam table with Mollier chart allowed)

(Maximum Marks :75)

[Time : 2.15 hours]

**PART-A**

Marks

**I.** Answer **any three** questions in one or two sentences. Each question carries 2 marks.

1. Define isolated system.
2. List out any four air standard cycles.
3. Define indicated power and brake power in an IC engine.
4. State the function of intercooler in an air compressor.
5. Define recuperater type heat exchanger.

(3x2=6)

**PART - B**

**II** Answer **any four** of the following questions . Each question carries 6 marks.

1. Distinguish between intrinsic and extrinsic properties. Give examples.
2. State the relationship between specific heats of gases.
3. Illustrate Carnot cycle with P-V and T-S diagram.
4. Sketch and explain the actual valve timing diagram of a 4 stroke cycle Diesel engine.
5. Distinguish between wet steam, dry steam and superheated steam.
6. Derive an expression for velocity of steam leaving through a nozzle.
7. Explain Fourier's law of thermal conduction.

[4x6 =24]

**PART - C**

(Answer **any of the three** units from the following. Each full question carries 15 marks)

**UNIT I**

**III** (a) Illustrate a quasi-static process. (7)

(b) Derive the expressions for work done, change in internal energy, heat transferred and change enthalpy for an isobaric process. (8)

**OR**

- IV** (a) Define Boyle's law, Charle's law and hence derive general gas equation. (7)
- (b) A certain volume of gas at NTP is heated until its pressure becomes 2 bar and its volume is doubled. Find the final temperature of gas. (8)

**UNIT- II**

- V** (a) State the assumptions made in air standard cycles. (7)
- (b) Calculate the air standard efficiency of an engine working on Otto Cycle if the pressure at the beginning and end of the compression are 1 bar and 7 bar respectively. Take  $r = 1.41$ . (8)

**OR**

- VI** (a) Sketch and explain the P-V and T-S diagram of a Diesel Cycle. (7)
- (b) An engine working on Carnot cycle receives heat at  $700^{\circ}\text{C}$  and rejects heat at  $50^{\circ}\text{C}$ . Find the air standard efficiency of the cycle. It absorbs 4000 KJ of heat per minute from the hot body calculate the work done and power of the engine. (8)

**UNIT- III**

- VII** (a) Explain the formation of steam at constant pressure with graph indicating temperature and total heat. (7)
- (b) A 4 cylinder, 4 stroke petrol engine runs at 1200 rpm. Bore diameter of cylinder is 0.09m and stroke is 0.120m. The mean effective pressure in each cylinder is 500 Kpa. Mechanical efficiency being 75%. Calculate indicate power and brake power of the engine. (8)

**OR**

- VIII** (a) Explain heat balance sheet and give a model of it. (7)
- (b) Using Mollier diagram, determine the specific enthalpy and specific entropy of wet steam of quality 0.85 at 2 bar pressure. (8)

**UNIT – IV**

- IX** (a) Define absorptivity, reflectivity and transmissivity. (7)
- (b) List the advantages of multistage compressor. (8)

**OR**

- X** (a) Give a classification for air compressors. (7)
- (b) Give an expression for heat transfer by conduction through a composite wall. (8)

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