Day : **Monday**	Time : **10.00 AM TO 01.00 PM**
Date : 22/01/2018 **W-2017-2386**	Max. Marks: 80

N. B. :

1) **Q. No. 1** and **Q. No.5** are **COMPULSORY**. Out of remaining **Any TWO** questions from each section.
2) Answers to both the sections should be written in the **SEPARATE** answer books.
3) Figures to the right indicate **FULL** marks.
4) Use of Non-programmable electronic pocket **CALCULATOR** is allowed.
5) Assume suitable data, if **WHEREVER** necessary.

SECTION - I

Q.1 **a)** State and explain the Kelvin Plank's and Clasius statements of second law of thermodynamics. **(05)**

b) Explain simple vapor compression system with sketch. **(05)**

c) Explain sensible heating and cooling process. **(04)**

Q.2 **a)** Derive expression for natural draught in the boiler. **(06)**

b) A cold storage is to be maintained at -6°C. While the surroundings are at 30°C. The heat leakage form the surroundings into the cold storage is estimated to be 30 kw. The actual cop of the refrigeration plant is one third of an ideal plant working between same temperatures. Find the power required to drive the plant. **(07)**

Q.3 **a)** Explain with neat sketch Li-Br vapor absorption system. **(07)**

b) Explain effect of following parameters on performance of vapor compression cycle. **(06)**
   i) Super heating
   ii) Under cooling
   iii) Suction pressure
   iv) Discharge pressure

Q.4 **a)** Explain with neat sketch central air conditioning plant. **(07)**

b) Find all the psychometric properties of air at DBT = 35°C, DPT = 20°C. and barometric pressure is 750 mm of Hg. **(06)**

P.T.O.

SECTION- II

Q.5 **a)** Explain the need of multistage in case of compressors. **(05)**

b) Explain mechanical fuel pump with neat sketch. **(06)**

c) Explain William's Line method. **(03)**

Q.6 **a)** Derive the expression for air standard efficiency of Diesel cycle. **(06)**

b) Give classification of dynamometers and explain hydraulic dynamometer with sketch. **(07)**

Q.7 **a)** Give the significance of cooling system and explain water cooling system with neat sketch. **(06)**

b) Explain with neat sketch different types of nozzles for fuel injection system. **(07)**

Q.8 **a)** Explain different uses of compressed air. And explain actual and theoretical indicator diagram of reciprocating air compressor with neat sketch. **(06)**

b) Estimate the minimum work required to compress 1 kg of air from 1 bar, 27°C to 16 bar in two stages, if the law of compression is $Pv^{1.25}$ = constant and the inter cooling is perfect. Take R = 282 J/KgK. **(07)**