

**B.TECH SEM - III (2007 COURSE) (MECHANICAL ENGG.) :**  
**WINTER - 2017**

**SUBJECT : APPLIED THERMODYNAMICS**

Day : **Monday**  
Date : **15/01/2018**

Time : **10.00 AM TO 01.00 PM**

**W-2017-2380**

Max. Marks : 80

**N.B.:**

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

**SECTION - I**

- Q.1** a) Explain heat engine, refrigerator and heat pump with neat sketch. [05]  
b) Explain throttling calorimeter with neat sketch. [04]  
c) Explain and derive ASE for diesel cycle. [05]
- Q.2** a) Explain assumptions made in air standard cycles. [06]  
b) Explain the comparison between Otto and Diesel cycle. [07]
- Q.3** a) A boiler generates 2500 kg dry steam per hour at a pressure of 10bar. The grate area is 2m<sup>2</sup> and 80kg of coal, is burnt per m<sup>2</sup> of grate area per hour. The calorific value of coal is 30,000 kJ/kg and the temperature of feed water is 20<sup>0</sup>C. Determine: i) Efficiency of boiler [07]  
ii) Equivalent evaporation from and at 100<sup>0</sup>C.  
b) Explain parameters affecting efficiency of Rankine cycle. [06]
- Q.4** a) Explain PMM - II with neat sketch. [06]  
b) Prove that efficiency of reversible engine depends on temperature of source and sink and is independent of working substance. [07]

**SECTION - II**

- Q.5** a) Explain with neat sketch Bomb calorimeter. [05]  
b) Explain with P-V diagram working of multistage reciprocating air compressors. [05]  
c) Explain any one rotary compressor with neat sketch. [04]
- Q.6** a) What are the requirements of good fuel for boilers? [04]  
b) Explain functions of accessories in boiler and explain any one accessories with neat sketch. [05]  
c) Explain LCV and HCV of fuels. [04]
- Q.7** a) Explain need of multistage air compressors. [06]  
b) A single stage air compressor compresses air from 1 bar and 25<sup>0</sup>C to 8 bar. If the law of compression is  $PV^{1.2} = \text{constant}$ . Find : [07]  
i) Work done per kg of air  
ii) Temperature after compression
- Q.8** a) Derive the expression for efficiency of roots blower in terms of pressure ratio and ratio of specific heats. [07]  
b) Explain the phenomenon of surging and its effects in the compressor. [06]

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