

Code No: RT22032

R13**SET - 1**

II B. Tech II Semester Supplementary Examinations, November-2017
THERMAL ENGINEERING-I
(Mechanical Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**

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**PART -A**

1. a) Discuss about heat loss factor.  
b) Explain about mixture requirements at different loads and speeds.  
c) Write a short note on abnormal combustion.  
d) Discuss about heat balance sheet  
e) Explain about isothermal efficiency as referred to air compressor  
f) Explain about surging.

**PART -B**

2. a) Define volumetric efficiency and discuss the effect of various factors affecting the volumetric efficiency.  
b) With the help of a plot explain the variation of composition of exhaust gases in a petrol engine with respect to air-fuel ratios
3. a) Explain the working principle of a four stroke SI engine and indicate the processes on PV and TS plots.  
b) What is the importance of a cooling system in an IC engine? With a neat sketch explain the working of forced circulation cooling system.
4. a) Bringing out clearly the process of combustion in CI engines and also explain various stages of combustion.  
b) Explain the phenomenon of knock in CI engine and compare it with SI engine knock.
5. a) Why Morse test is not suitable for single cylinder engine? Describe the method of finding fictional power using Morse test.  
b) A four stroke gas engine having a cylinder of 250mm diameter and stroke 450 mm has a volumetric efficiency of 80%, ratio of air to gas is 8: 1, and calorific value of gas is 20MJ/m<sup>3</sup> at NTP. Find the heat supplied to the engine per working cycle. If the compression ratio is 6, what is the heating value of the mixture per working stroke per m<sup>3</sup> of total cylinder volume?
6. a) A single stage reciprocating compressor takes 1 m<sup>3</sup> bar and 15<sup>0</sup>C and delivers at 7 bar. Assuming that the law of compression is  $PV^{1.35} = \text{constant}$ , and the clearance is negligible, calculate the indicated power.  
b) Derive the expression for work done per kg of air delivered for a single acting single cylinder reciprocating compressor considering clearance.
7. a) With a neat sketch explain the working of roots blower and derive the expression for roots efficiency.  
b) What is degree of reaction? Derive the expression for degree of reaction for axial flow compressor.