

Code No: R22033

R10**SET - 1****II B. Tech II Semester Supplementary Examinations, April-2018****THERMAL ENGINEERING - I**

(Com. to ME, AME)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** QuestionsAll Questions carry **Equal** Marks

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1. a) Discuss the effect of spark advance on the performance of an Otto cycle engine. (8M)  
What is meant by the optimum spark advance?
- b) How does the composition of exhaust gases vary for various fuel-air ratios in a gasoline engine? (7M)
2. a) Explain the various mechanism of lubrication and their functions. (8M)
- b) Mention the various important qualities of a good ignition system. With a neat sketch explain the battery ignition system. (7M)
3. a) Explain the fuel requirements of an SI engine? Discuss how fuel rating of an SI engine is done. (8M)
- b) What is meant by abnormal combustion? Explain the phenomena of knock in SI engines. (7M)
4. a) Explain with figures various types of combustion chambers used in CI engines. (8M)
- b) Explain the various factors that influence the flame speed. (7M)
5. a) List various methods available for finding friction power of an engine. State the limitations experienced in the evaluation of friction power using Willan's line method. (8M)
- b) What is transmission dynamometer? Explain. (7M)
6. a) Explain the effect of intercooling in a multistage reciprocating compressor. (7M)
- b) A two stage air compressor with perfect intercooling takes in air at 1 bar pressure and 27°C. The law of compression in both the stages is  $p v^{1.3} = \text{constant}$ . The compressed air is delivered at 9 bar from the H.P. cylinder to an air receiver. Calculate per kg of air i) The minimum work done and ii) The heat rejected to intercooler. (8M)
7. a) Give the mechanical details and explain the principle of working of Lysholm compressor. (7M)
- b) Compare the work inputs required for a Roots blower and a vane type compressor having the same induced volume of 0.03 m<sup>3</sup> per revolution, the inlet pressure being 1.013 bar and the pressure ratio 1.5 to 1. For the vane type, assume that internal compression takes place through half the pressure range. (8M)
8. a) Briefly explain the flow through a compressor and bring out the details of various losses in an axial flow compressor. (7M)
- b) A 10 stage axial flow compressor provides an overall pressure ratio of 5:1 with an overall isentropic efficiency of 87%. When the temperature of air at inlet is 15°C, the work is equally divided between the stages. A 50% reaction is used with a blade speed of 210 m/s and a constant axial velocity of 170 m/s. Estimate the blade angles. Assume work done factor of 1. (8M)