Code: 9A03402 **R09**

B.Tech II Year II Semester (R09) Supplementary Examinations May/June 2016

THERMAL ENGINEERING – I

(Mechanical Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Explain in detail the effect of exhaust valve opening time on blow down in case of gasoline engine.
(b) Explain the loss due to rubbing friction in gasoline engine.

2 (a) Sketch the battery ignition system and explain its working.
(b) Explain the various types of cooling systems employed in IC engines.

3 (a) What are the various factors that influence the flame speed in SI engine?
(b) Explain the effect of turbulence, air-fuel ratio, temperature and pressure on the flame speed in SI engine combustion.

4 (a) What are the factors that affect the combustion process in C.I engines?
(b) What is knocking in diesel engine? Explain in detail.

5 (a) How do you analyze the exhaust gases that come from I.C engine? Explain the experimental procedure with the help of a neat sketch.
(b) An engine with 80% mechanical efficiency has rating of 40 kW brake power. Estimate its indicated power and frictional power loss. Also determine the mechanical efficiency at quarter load assuming frictional power to remain same.

6 (a) Draw p-v and T-s diagram for a single stage reciprocating air compressor without considering clearance volume.
(b) Determine the minimum number of stages required in an air compressor which admits air at 1 bar, 27°C and delivers at 180 bar. The maximum discharge temperature at any stage is limited to 150°C. Consider the index for polytropic compression as 1.25 and perfect and optimum intercooling in between the stages. Neglect the effect of clearance.

7 (a) What are different types of rotary compressors and explain briefly the working of any two rotary compressors.
(b) With the help of h-s diagram, compare actual and isentropic compressions.

8 (a) Describe briefly the working of an axial flow compressor.
(b) Define degree of reaction.
(c) An axial flow compressor having eight stages and with 50% reaction compresses air in to pressure ratio of 4:1. The air enters the compressor at 20^{o}C and flows through it with a speed of 90 m/s. The rotating blades of a compressor rotate with mean speed of 180 m/s. Isentropic efficiency of compressor may be taken as 82%. Calculate: (i) Work done by the machine. (ii) Blade angles.

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