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**Fourth Semester M.Tech. Degree Examination, June/July 2016**  
**Engine Flow and Combustion**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions.**

- 1 a. Define volumetric efficiency of IC engine. Discuss different factors which affect the volumetric efficiency of an engine. (10 Marks)
- b. Write a short notes on:  
 i) Residual gas fraction.      ii) Flow through ports. (10 Marks)
- 2 a. Explain how induction swirl is created in CI engines. (08 Marks)
- b. Explain briefly the crevice flows and blowby. (06 Marks)
- c. Explain Scavenging in two stroke cycle engines. (06 Marks)
- 3 a. Describe the essential features of the combustion process in a C.I. engine. (10 Marks)
- b. Define the following terms in connection with surface ignition:  
 i) Pre-ignition      ii) Post-ignition      iii) Run away  
 iv) Wild ping      v) Rumble (10 Marks)
- 4 a. Explain direct and indirect injection system in diesel engines. (10 Marks)
- b. Explain the essential features of fuel spray behavior in diesel engine. (10 Marks)
- 5 a. Explain NO<sub>x</sub> formation in compression ignition engine. (06 Marks)
- b. What is the cause of diesel smoke? Describe the factor affecting odour production. (06 Marks)
- c. Explain the following:  
 i) Thermal reactor package.      ii) Catalytic converter package. (08 Marks)
- 6 a. Explain the following engine variables, which affect the engine heat transfer:  
 i) Spark timing      ii) Speed and load      iii) Swirl and squish  
 iv) Compression ratio. (12 Marks)
- b. Explain heat transfer and engine energy balance. (08 Marks)
- 7 a. What do you mean by super charging? What is its effect on engine performance? (08 Marks)
- b. What are the various methods of turbo charging? (06 Marks)
- c. What is meant by pulse turbocharging? What are its advantages? (06 Marks)
- 8 a. Explain the different methods to find the frictional power of an engine. (08 Marks)
- b. The following data were recorded from a test on a single cylinder four stroke oil engine:  
 Cylinder bore = 150 mm, Engine stroke = 250 mm, Area of indicator diagram = 450 mm<sup>2</sup>,  
 Length of indicator diagram = 50 mm,      Indicator spring rating = 1.2 mm,  
 Engine speed = 420 rpm, Brake torque = 217 N-m, Fuel consumption = 2.95 kg/hour,  
 C.V. of fuel = 44000 KJ/kg, Cooling water rate of flow = 0.068 kg/sec, Cooling water  
 temperature rise = 45 K. Specific heat capacity of cooling water = 4.1816 KJ/kgK  
 Calculate: i) Mechanical efficiency      ii) Brake thermal efficiency  
 iii) Specific fuel consumption.      iv) Heat balance in kW. (12 Marks)

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