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**Fifth Semester B.E. Degree Examination, June/July 2016**  
**Automotive Fuels & Combustion**

Time: 3 hrs.

Max. Marks:100

**Note: Answer FIVE full questions, selecting  
at least TWO questions from each part.**

**PART - A**

- 1 With neat sketch, explain the working of,
  - i) Wind turbine
  - ii) Geo thermal energy plant.
  - iii) Bio gas energy plant.
  - iv) Hydrogen-oxygen fuel cell. (20 Marks)
  
- 2 a. With neat sketch explain petroleum refining by fractional distillation. (08 Marks)  
 b. With neat sketch, explain catalytic cracking. (08 Marks)  
 c. Define API gravity and diesel index. (04 Marks)
  
- 3 a. With neat sketch explain gas chromatograph. (10 Marks)  
 b. A sample of coal has the following analysis by weight carbon 84%; hydrogen 5%; Incombustible material 11%. The coal is supplied to a furnace and burned with 50% excess air. Estimate the volumetric composition of dry flue gases. (10 Marks)
  
- 4 a. Write short notes on: i) LPG                      ii) CNG                      iii) Bio diesel (09 Marks)  
 b. During the test trial of a single cylinder 4-stroke oil engine the following results were obtained: Cylinder diameter = 20 cm; Stroke = 40 cm; Mean effective pressure = 6 bar; Torque = 407 Nm; Speed = 250 rpm; Oil consumption = 4 kg/hr; Calorific value of fuel = 43 MJ/kg; Cooling water flow = 4.5 kg/min; Air used per kg of fuel = 30 kg; Rise in cooling water temperature = 45°C; Temperature of exhaust gases = 420°C; Room temperature = 20°C; Mean specific heat = 1 KJ/kg°C; Specific heat of H<sub>2</sub>O = 4.18 kJ/kg K. Find IP, BP and draw heat balance sheet in KJ/hr. (11 Marks)

**PART - B**

- 5 a. With neat sketch, explain the stages of combustion in SI engines. (10 Marks)  
 b. Explain the various factors that influence the flame speed. (10 Marks)
  
- 6 a. What is knocking in SI engine? Briefly explain the various factors affecting knocking in SI engines. (12 Marks)  
 b. With neat sketch, explain precombustion chamber. Give its advantages and disadvantages. (08 Marks)
  
- 7 a. With neat sketch, explain the three phases of CI engine combustion. (10 Marks)  
 b. Explain ignition lag in CI engines. Briefly explain the important factors on which the ignition lag depends. (10 Marks)
  
- 8 a. Discuss the five factors affecting combustion in dual fuel engine. (10 Marks)  
 b. Explain the modifications required for fuel system of a multifuel engine. (05 Marks)  
 c. What are the advantages of a dual fuel engine? (05 Marks)