

# CBCS SCHEME

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15AU54

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018

## Automotive Fuels and Combustion

Time: 3 hrs.

Max. Marks: 80

- Note: 1. Answer any FIVE full questions, choosing one full question from each module.  
2. Use of thermodynamics charts and tables are permitted.*

### Module-1

- 1 a. With neat sketch explain the wind energy turbine. (08 Marks)  
b. Discuss the different types of petroleum refining processes. (08 Marks)

OR

- 2 a. Briefly explain the renewable energy and non renewable energy sources. (08 Marks)  
b. Briefly explain the structure of crude petroleum groups with two examples each. (08 Marks)

### Module-2

- 3 a. Give brief introduction to the reaction equation with respect to hydrocarbon fuels. (08 Marks)  
b. Explain with a neat sketch, the working of Orsat approach used for flue gas analysis. (08 Marks)

OR

- 4 a. With neat sketch explain fluidized bed catalytic cracking. (08 Marks)  
b. The following is the percentage of a coal sample on mass basis : C = 82, H<sub>2</sub> = 6, O<sub>2</sub> = 9 and Ash = 3. Determine (i) the minimum air required for complete combustion (ii) the volumetric analysis of the products supplied. Assume that air contains 23% oxygen on mass basis with 10% excess air. (08 Marks)

### Module-3

- 5 a. Explain the flame propagation and variable effecting on the flame propagation. (08 Marks)  
b. Explain the various stages of combustion in a CI engine with the help of P-θ diagram. (08 Marks)

OR

- 6 a. Derive an equation for thermal efficiency and mean effective pressure of Otto cycle. Write assumptions made. (10 Marks)  
b. Define knocking in SI engine. Explain the effect of compression ratio, engine speed on knocking with suitable graph. (06 Marks)

### Module-4

- 7 a. With neat sketch explain prony brake dynamometer. (06 Marks)  
b. A test on a single cylinder 4 stroke oil engine having bore – 18cm, stroke – 36cm. Yielded the following results. Speed – 286 rpm, brake torque – 0.44 kNm, MEP – 7.2 bar, fuel consumption – 3.5 kg/hr, cooling waterflow – 4.5 kg/min, cooling water temperature – 415°C, Specific heat of exhaust gas – 1.05 kJ/kgK, Calorific value – 45,200 kJ/kg. Determine: Indicated thermal efficiency, Brake power, Indicated power, Heat balance on minute basis. (10 Marks)

OR

- 8 a. Briefly explain the William's line method for measurement of frictional power. (08 Marks)  
b. Describe the Morse test for 4 cylinder engine. (08 Marks)

**Module-5**

- 9 a. With a neat sketch, explain the working principle of dual fuel engine. (08 Marks)  
b. What is multifuel engine? What are the requirements of a multi fuel engine? (08 Marks)

OR

- 10 a. List the advantages and disadvantages of dual fuel engine. (08 Marks)  
b. Discuss the requirements of the multifuel engines modification. (08 Marks)

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