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Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016

Automotive Fuels and Combustion

Time: 3 hrs.

Max. Marks: 100

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

PART - A

- 1 a. What is the need for renewable energy sources? (02 Marks)
 b. Explain the following:
 i) Construction and working of wind mill.
 ii) Solar energy, utilization (photoelectric conversion) (08 Marks)
 c. Explain petroleum refining process. (10 Marks)
- 2 a. What are the major hydrocarbon structures in petroleum? Discuss with the help of neat sketch. (08 Marks)
 b. Explain following fuel properties: i) Viscosity, (ii) Flash and fire point, (iii) Cloud and pour point. (05 Marks)
 c. The fuel supplied to the petrol engine have the composition C_7H_{16} , calculate:
 i) The stoichiometric air-fuel ratio by mass
 ii) The percentage volumetric composition of products of combustion if 50% excess air is supplied and combustion is complete.
 Assume air contains 21% O_2 by volume. (07 Marks)
- 3 a. Explain suitability of: i) LPG for petrol engine, ii) Bio-diesel for diesel engine. (04 Marks)
 b. A four stroke cycle petrol engine has six cylinders of 7.5 cm bore and 9 cm stroke. The engine coupled to a brake having torque arm radius of 38 cm. At 3300 rpm, with all cylinders operating the net brake load is 324 N. When each cylinder in turn is rendered inoperative, the net average brake load produced at same speed by the remaining five cylinders is 245 N. Estimate the indicated mean effective pressure of the engine. With all cylinders operating fuel consumption is 0.3 kg/min; fuel calorific value 42000 kJ/kg; the jacket water flow rate and temperature rise are 65 kg/min and 12°C respectively. Ventilation air blowup through the box at the rate of 14 kg/min enters at 10°C and leaves at 55°C. Draw up a heat account of the engine, stating the items as a percentage of the fuel. (16 Marks)
- 4 a. Derive an equation for thermal efficiency and mean effective pressure of Otto cycle. Write assumption made. (08 Marks)
 b. Explain the following with respect to Otto cycle:
 i) Time losses
 ii) Heat losses
 iii) Blow down losses (12 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

PART – B

- 5 a. Explain different stages of combustion in S.I. engines, with neat P-θ diagram. (10 Marks)
b. What do you mean by abnormal combustion? Write in detail factors effecting knocking in S.I. engine. (10 Marks)
- 6 a. Explain importance of swirl in C.I. engines. (04 Marks)
b. Write advantages and disadvantages of induction swirl and compression swirl. (06 Marks)
c. Explain: i) Swirl chambers
ii) Pre-combustion chamber in C.I. engines. (10 Marks)
- 7 a. Explain the design principles for combustion chambers in S.I. engines. (12 Marks)
b. What is the difference between diesel knock and knocking in C.I. engines? (08 Marks)
- 8 a. What do you mean by dual fuel engine? Discuss any three factors effecting combustions in dual fuel engine. (10 Marks)
b. Explain the modifications required for fuel system of a multifuel engine. (10 Marks)
