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Fifth Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. With a neat sketch explain how wind turbine works.   **(06 Marks)**
    b. With neat sketch explain the working of the following. Also give their advantages and disadvantages
        i) OTEC plant
        ii) H_2. O_2 fuel cell.   **(14 Marks)**

2   a. With neat sketch explain fractional distillation of crude petroleum.   **(08 Marks)**
    b. With neat sketch explain fluidized bed catalytic cracking.   **(06 Marks)**
    c. Define the following terms :
        i) Cloud point   ii) Aniline point   iii) API Gravity   iv) Diesel index.   **(06 Marks)**

3   a. Explain the combustion of carbon with sufficient and insufficient quantity of oxygen.   **(06 Marks)**
    b. With neat sketch explain gas chromatograph.   **(08 Marks)**
    c. Determine the theoretical mass of air required for the complete combustion of 1 litre petrol. Given that the composition of petrol by mass, carbon – 86% hydrogen – 14%, specific gravity of petrol is 0.8. if 1kg air at atmospheric temperature and pressure occupies $0.77m^3$. Calculate the volume of air required.   **(06 Marks)**

4   a. Explain the terms : i) Mean effective pressure   ii) Brake thermal efficiency.   **(04 Marks)**
    b. During the test trial of a single cylinder 4 strake oil engine the following result were obtained

Cylinder diameter	= 20cm
Stroke	= 40cm
Mean effective pressure	= 6bar
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	= 30kg
Rise in cooling water temperature	= 45°C
Temperature of exhaust gases	= 420°C
Room temperature	= 20°C
Mean specific heat of exhaust gases	= 1 kJ/kg K
Specific heat of water	= 4.18 kJ/kg K

        Determine IP, BP and draw the heat balance sheet in kJ/hr   **(12 Marks)**
    c. With neat sketch explain the working of Prony brake.   **(04 Marks)**

PART – B

5 a. Explain the stages of combustion in SI engines with a neat sketch. (10 Marks)
   b. Explain normal and abnormal combustion in SI engines. (10 Marks)

6 a. Discuss the effect of following engine variables on flame propagation
   i)   Fuel – air ratio
   ii) Compression ratio
   iii) Engine load
   iv) Turbulence
   v)   Engine speed (10 Marks)
   b. Explain the various factors effecting knocking in SI engine. (10 Marks)

7 a. With a neat P – θ diagram explain the combustion in CI engine. (10 Marks)
   b. Briefly explain the primary considerations in the design of combustion chambers for CI engines. (05 Marks)
   c. With neat sketch explain Turbulent chamber. (05 Marks)

8 a. Explain the working of duel fuel engine with the help of P – θ diagram. (10 Marks)
   b. What are the advantages of dual fuel engines? (05 Marks)
   c. Discuss the requirements of multi-fuel engines. (05 Marks)

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