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10AU56

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 : **(06 Marks)**

i) Cloud point ii) Aniline point iii) API Gravity iv) Diesel index.

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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