U.S.N | | | | | | | | | | |

P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fifth Semester, B.E. - Automobile Engineering

Semester End Examination; Dec - 2017/Jan - 2018

Automotive Fuel and Combustion

Time: 3 hrs *Max. Marks: 100*

***Note**: Answer **FIVE** full questions, selecting **ONE** question from each unit.*

UNIT - I

1 a. Draw the P-V and T-S diagram for Otto cycle and derive an expression for thermal efficiency and work output. 10

b. An air-standard dual cycle has a compression ratio of 10. The pressure and temperature at the beginning of the compression are 1 bar and 27°C. The maximum pressure reached is 42 bar and the maximum temperature is 1500°C. Determine; 10

i) The temperature at the end of Constant volume heat addition ii) Cut off ratio

iii) Work done per kg of air iv) The cycle efficiency

Assume C_p = 1.004 kJ/kgK and C_v = 0.717 kJ/kgK for air.

2 a. Define the following terms :

i) Flash point ii) Fire point iii) Viscosity 10

iv) Calorific value v) Volatility.

b. Discuss the need of renewable sources of energy and explain any two types of it. 10

UNIT - II

3 a. Discuss the important qualities of an SI and CI engine fuel. 6

b. Briefly explain the petroleum refining process. 10

c. Write the chemical structure of the paraffin series petroleum. 4

4 a. What is octane number? Explain the Octane Number Requirement (ONR). 10

b. Briefly explain additives used for fuel. 6

c. Give a brief note on fuel used for gas turbines and jet engines. 4

UNIT - III

5 a. Discuss the effect of the following engine variables on flame propagation :

i) Fuel-air Ratio ii) Compression Ratio iii) Engine Load 10

iv) Turbulence v) Engine Speed.

b. What are F-head combustion chambers? Discuss the two important F-head designs. 6

c. What are the four main factors which affect the tendency to detonate? Describe them briefly. 4

6 a. Explain the stages of combustion in a CI engine. 8

b. What is meant by delay period? It is usually divided in to two parts. Name and describe them. 6

c. Explain the phenomenon of diesel knock. Compare it with the detonation in SI Engine 6

Contd…2

UNIT - IV

7	a.	With a neat sketch, describe a dual fuel engine. Explain any three factors affecting dual fuel combustion.	10
	b.	What is multi fuel engine? Explain the different characteristic of a multi fuel engine.	10
8	a.	Explain super charging and knock control in dual fuel engines.	8
	b.	List the advantages of dual fuel engine over a diesel engine.	6
	c.	Explain the modifications required in fuel system for multi fuel engine.	6

UNIT - V

9	a.	Discuss briefly about the stratified charge engine.	4
	b.	Describe the following methods of charge stratification by fuel injection and positive ignition : i) The first approach ii) Pre-chamber stratified charge.	10
	c.	List the advantages and disadvantages of stratified charge engines.	6
10	a.	Write a short note on variable compression ratio engine.	4
	b.	Write a short note on free-piston engine.	6
	c	List and discuss the challenges in HCCI engine development.	10

* * *