MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

## V SEMESTER B. TECH (MECHANICAL/IP ENGG.) END SEMESTER EXAMINATIONS, NOVEMBER 2019

## SUBJECT: THEORY OF INTERNAL COMBUSTION ENGINES AND

## EMISSIONS [MME 4036]

## **REVISED CREDIT SYSTEM**

Time: 3 Hours

MAX. MARKS: 50

(5)

(4)

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.
- 1A. What are the additional losses that can be assumed in actual cycles (3) compared to Fuel-air cycles?
- 1B. With Pv and TS diagrams, explain the working of Stirling cycle. (2)
- 1C. The following analysis relate to coal gas:

$H_2 = 50.4\%$	CO = 17%
$CH_4 = 20\%$	$C_4H_8 = 2\%$
$O_2 = 0.4\%$	$N_2 = 6.2\%$
$CO_2 = 4\%$	

(i). Calculate the stoichiometric air-fuel ratio.

(ii) Find the wet and dry analysis of the products of combustion if the actual mixture is 30% weak.

- 2A. How hydrocarbons are generally classified? Explain with general chemical (4) formulae.
- 2B. List the test conditions followed in Octane number Research protocol (ASTM (3) D2699-92).
- 2C. Explain the differences between thermal cracking and catalytic cracking of (3) petroleum.
- 3A. Explain the stages of combustion in CI engines.
- 3B. Explain the factors which are responsible for knock free combustion in SI (3) engines

3C.	List the advantages and limitations of L head combustion chambers.	(4)
4A.	State the advantages and applications of dual fuel engines.	(4)
4B.	Throttle body injection system could not become successful. Why?	(3)
4C.	How CRDI system works? What are the requirements of CRDI system?	(3)
5A.	How smoke emissions can be reduced in CI engines? Explain.	(3)
5B.	List the advantages and disadvantages of three way catalytic converter.	(4)
5C.	Which exhaust emission can be reduced by using water injection? Explain its principle of working?	(3)