

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

(2)

Instructions to Candidates:

- ✤ Answer ALL the questions.
- Missing data may be suitably assumed.
- 1A. State the assumptions made for air standard cycles.
- 1B. With a neat sketch explain the effect of specific heat (γ) on the power output (2) of a fuel-air cycle.
- 1C. Calculate the stoichiometric air-fuel ratio for the combustion of a sample of (6) dry anthracite of the following composition by mass:

C=90%; $H_2 = 3\%$; $N_2 = 1\%$; Sulphur=0.5%; ash=3%.

If 20% excess air is supplied, determine:

(i) Air-fuel ratio

(ii) Wet analysis of the products of combustion by volume.

- 2A. How solid fuels can be adopted to IC engine applications? Explain the (3) conversion routes.
- 2B. What is pour point? What is the significant of this property on engine (3) combustion?
- 2C. Explain with a neat diagram explain fractional distillation. Mention its (4) limitations.
- 3A. With suitable sketch describe the various stages of SI engine combustion. (3)
- 3B. Explain the role of air swirl in CI engine combustion. (3)
- 3C. Explain the following with neat sketch
 - (i) Open combustion chamber (ii) Pre-combustion chamber

(4)

4A.	Explain the factors affecting combustion in a dual fuel engine.	(4)
4B.	What is the role of pilot injection in CRDI engines?	(3)
4C.	List the basic technical features of GDI engine. Also mention the major characteristics of GDI engine.	(3)
5A.	Why SI engine has higher CO and HC emissions than CI engines? Explain.	(3)
5B.	Explain the factors affecting the formation of CO.	(3)
5C.	Explain exhaust gas recirculation technique? What are the drawbacks of this technique?	(4)