

MANIPAL INSTITUTE OF TECHNOLOGY

A Constituent Institution of Manipal University

I SEMESTER M.TECH. (AUTOMOBILE ENGINEERING) MAKE UP EXAMINATIONS, DECEMBER 2018 SUBJECT: COMBUSTION AND EMISSION [AAE 5104] REVISED CREDIT SYSTEM (29/12/2018)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions, Missing data may be suitable assumed.
- Use of Combustion data hand book is permitted.
- 1A. A truck fuel (D2 grade) has a specific gravity of 0.84 and a 50% (05) distillation temperature of 528 K. Calculate the Cetane Index for this fuel.
- 1B. Explain the various constituents of the earth's atmosphere. Discuss (05) Green House Effect.
- 2A. Find the adiabatic flame temperature of carbon monoxide burning with (05) 50 % excess air at 25 degree C and 1 atmospheric pressure. Neglect dissociation.
- **2B.** Briefly describe the formation of CO in internal combustion engines. **(05)**
- 3A. Derive an expression for equilibrium constant (K_p) in terms of mole (05) fraction and pressure.
- 3B. Consider a reaction of carbon with stoichiometric air to produce CO₂, (05)
 CO and O₂ at 2200 K and 2 atmospheric pressure. How much CO exists when the products are in equilibrium due to dissociation of CO₂
- 4A. Write short notes on a) first order reactions b)second order reaction (05)c)elementary reaction d) global reaction
- **4B.** What is SMOG and acid rains? How is it caused?(05)
- 5A. List the methods that can be employed to control emission in I C (05) Engines. With a neat sketch explain EGR and its limitations
- 58. With a neat sketch explain Non-dispersive Infrared Detectors and (05) dilution tunnels.