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MANIPAL INSTITUTE OF TECHNOLOGY
MANIPAL
(A constituent unit of MAHE, Manipal)

III SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: THEORY OF AUTOMOTIVE ENGINES [AAE 2151]

REVISED CREDIT SYSTEM
(22/11/2018)

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

- ❖ Answer **ALL** the questions.
- ❖ Missing data may be suitably assumed.

- 1A.** Justify that the physical delay is longer than chemical delay in stages of combustion in Internal Combustion engine. **(02)**
- 1B.** Explain the port timing diagram of compression ignition engine. **(04)**
- 1C.** Distinguish between the working principle of Otto cycle and Diesel cycle. **(04)**

- 2A.** What is the function of glow plug in pre-combustion chamber of Internal Combustion engine? **(02)**
- 2B.** Discuss the advantages of overhead camshaft valve actuating mechanism over side camshaft valve actuating mechanism. **(04)**
- 2C.** A four-stroke engine delivers 35 kW with a mechanical efficiency of 80 %. The fuel consumption of the engine is 0.4 kg /kW-hr and the heating value of the fuel is 43000 kJ /kg. find the indicated power, the frictional power, the brake thermal efficiency and fuel consumption per hour. **(04)**

- 3A.** Why the pintle and pintaux nozzle fuel injectors are preferred in pre-combustion chamber and swirl combustion chamber of an Internal Combustion engine? **(03)**
- 3B.** Enumerate the working of Carter carburetor during engine starting, idling, slow speed and sudden acceleration. **(04)**
- 3C.** Calculate the size of the venturi relative to the jet size in a single jet carburetor if it is to deliver an air / fuel mixture in the ratio 15:1. Assume density of fuel = 0.75 gm/cc, density of air = 1.3 kg/m³, $C_a = 0.8$ and $C_f = 0.65$. **(03)**

- 4A.** Name the different types of fuel filters use to trap foreign particulate in fuel. **(02)**
- 4B.** Classify the different type of Gasoline Direct Injection engine and explain the working principle of any one type of Gasoline Direct Injection engine. **(04)**
- 4C.** Sketch and explain the working principle of Forced water-cooling system in Internal Combustion engine. **(04)**
- 5A.** List the different types of centrifugal governors which regulate the speed of an Internal Combustion engine. **(02)**
- 5B.** Describe the constructional features of Variable Turbine Geometry turbocharger. **(04)**
- 5C.** Discuss the process of Compound Vortex Controlled Combustion mechanism in I.C engine stratification by carburetion. **(04)**