Reg. No.										

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

I SEMESTER M.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: AUTOMOTIVE ENGINES & SUBSYSTEMS [AAE 5103]

REVISED CREDIT SYSTEM

(24/11/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** questions.
- Sketch using only pencil.

1A. Explain the event of time loss occurring in engines which are based on actual cycles. **(03)**

1B. A diesel engine develops 45kW. Its indicated thermal efficiency is 35% and mechanical efficiency 63%. Estimate the fuel consumption of engine in **(04)**
a) kg/hr
b) liters/hr
c) indicated specific fuel consumption
d) brake specific fuel consumption.

1C. List the considerations of fuel air cycles. **(03)**

2A. Discuss air standard cycle for diesel engine in terms of series of process with governing equations for 4 stroke operation. **(05)**

2B. Define: **(02)**
i. Indicated mean effective pressure (IMEP)
ii. Brake mean effective pressure (BMEP)

2C. A four stroke S.I engine has a bore of 6cm and stroke of 8cm and is operating at 2500 rpm, with a clearance volume of 85 cc. Calculate the cylinder volume at 35^0 crank angle and find compression ratio for the engine. **(03)**

3A. Explain the acceleration pump system/ circuit of a complete carburetor. **(02)**

3B. Sketch and label the different circuits of solex carburetor. **(03)**

3C. The venturi of a simple carburetor has a throat diameter of 20mm and the coefficient of air flow is 0.85. the fuel orifice has a diameter of 1.25mm and the coefficient of fuel flow is 0.66. the petrol surface is 5mm below the throat. Find **(05)**
i. The air fuel ratio for a pressure drop of 0.07bar when the nozzle lip is neglected
ii. The air fuel ratio when nozzle lip is taken in account
iii. The minimum velocity of air or critical air velocity required to start the

fuel flow when the nozzle lip is provided.

Consider density of air and fuel as 1.2 and 750kg/m3 respectively

4A. Differentiate pintle nozzle to pintaux nozzle. **(02)**

4B. Sketch and explain the principle of helix by pass pump. **(03)**

4C. An 8-cylinder, 4 stroke diesel engine has a power output of 368kW at 800 rpm. The fuel consumption is 0.238kg/kw-hr. The pressure in the cylinder at the beginning of injection is 35bar and the maximum cylinder pressure is 60bar. The injector is expected to be at 210bar and the maximum pressure of the injector is set to 600bar. Calculate the orifice area required per injection, if the injection takes place over 12^0 crank angles. **(05)**

Assume the co-efficient of discharge for the injector 0.6, specific gravity of the fuel 0.85 and the atmospheric pressure 1.013 bar. Take the effective pressure difference to be the average pressure difference over the injection period.

5A. Sketch and explain thermo syphon cooling system. **(03)**

5B. Explain the use of crankcase ventilation with a diagram. **(03)**

5C. Sketch and discuss the working of vane type of supercharger. **(04)**