Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent institution of MAHE, Manipal)

VI SEMESTER B.TECH. (MECHATRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, APRIL 2018

SUBJECT: AUTOMOBILE ENGINEERING [MTE 4001]

(24/04/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Illustrate your answers with sketch wherever necessary.

1A Classify and explain the automotive engines based on valve arrangement in cylinder head assembly. **03**

1B It is observed that, during inspection of automobile engine, engine cylinder has worn out due to improper cooling of the system. Suggest available solutions used to reduce the wear of the engine cylinder and justify the same. **03**

1C During the start of the engine the supply of fuel must be rich, later normal fuel supply is required. Suggest a compensating device which will fulfill the above condition in carburetor and explain its working. **04**

2A During partial opening of the throttle, the suction pressure is low and results in lean air-fuel mixture supply. Similarly, lean air-fuel mixture is obtained at higher engine speed. In both the cases the obtained lean air-fuel mixture require more time to burn. Analyze the situation and discuss the types of ignition advance mechanisms used to compensate burning time. **03**

2B Explain the need of forced water circulation system in petrol engine and mention its merits. **03**

2C Sketch and explain the working of dry sump lubrication system. **04**

3A	An automobile clutch has a clutch plate of 160 mm inside and 240 mm outside diameters. Six springs in the clutch provide a total force of 4.8 kN, when the clutch is new and each spring is compressed 5mm. The maximum torque developed by the automobile is 250Nm. Determine (i) factor of safety of the new clutch and (ii) the amount of wear of the clutch facing that will take place before the clutch starts slipping. Assume coefficient of friction for the facing is 0.3 and analysis must be carried out for uniform wear.	**04**
3B	The breaking and wear of the gear tooth is more in case of sliding gear box. Double declutch is required to equalize the speed of the driver and driven gears in case of constant mesh gear box. Suggest and explain with sketch a type of gear box which would eliminate the fore mentioned problem.	**04**
3C	Discuss the working and significance of “differential” in automobile.	**02**
4A	Dine the following terms with respect to steering geometry, and interpret its use in vehicle. (i) Caster (II) Camber (III) Toe (IV) King pin inclination angle.	**04**
4B	With sketch explain the working of recirculating ball steering gear.	**03**
4C	Differentiate between rigid axle and independent suspension systems.	**03**
5A	The vehicle moving on irregular road experiences more vibrations than usual. Select the type of shock absorber and explain its construction and working which has a characteristic of faster rate of heat dissipation.	**03**
5B	With sketch, explain the construction and working of master cylinder used in hydraulic braking system.	**05**
5C	Discuss the construction and working of swing caliper type of disc brake system.	**02**