Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

V SEMESTER B.TECH (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: PNEUMATICS AND HYDRAULICS [AAE 357]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ANY FIVE FULL** the questions.
- Missing data may be suitable assumed.

1A. With the help of neat sketch, explain the function and features of the filter in the air service unit. **04**

1B. Differentiate between supply air throttling and exhaust air throttling with the help of suitable circuit diagram. **03**

1C. Explain different stages of preparation of compressed air. **03**

2A. A double acting cylinder used to operate a stamping die. The cylinder should extend when two bush buttons pressed together. The cylinder is to retract automatically after reaching forward end position and attaining a delay of 10 seconds and a preset pressure of 6 bar. The cylinder should retract immediately if the emergency push button pressed. Develop pneumatic circuit with suitable logics and explain the steps involved in the operation. **05**

2B. With neat sketch, explain the working of quick exhaust valve. **03**

2C. With suitable circuit diagram, explain the difference between dominant OFF and dominant ON concept. **02**

3A. A double acting cylinder guides cylinder pins towards a measuring device. The pins separated by means of a continuous oscillation movement. The oscillating motion started by means of a valve with selector switch. The duration of forward stroke and return stroke of the cylinder is to be adjustable. The cylinder is to remain in the forward end position for t = 5 seconds and a preset pressure of 7 bar. Develop the electro pneumatic circuit using capacitive sensor to identify the end positions of cylinders. **05**

3B. Washers for injection pumps are to be cleaned in a cleaning bath. A double acting cylinder is used to dip a container with washers in and out of the cleaning bath. A push button is used to start the cleaning cycle. After reaching the forward end position, cylinder should oscillate between rollers S2 and limit S3 for 10 times and on completion should stop in retracted position and actuate roller, S1. Next cycle should be possible only after 20 sec. Develop a pneumatic circuit to perform the task. **05**

4A. Explain the working principle of different types of inductive proximity sensor giving its block diagram. **03**

4B. With neat sketch explain the working of electrical relay and draw the circuit to control a single acting cylinder by electrical relay. **02**

4C. A double acting cylinder is to carry out an oscillatory motion after a start signal is given. The cycle should stop automatically after 10 cycles of operation. The circuit should shut down in any emergency case. Use push button as emergency switch. Develop an electro pneumatic circuit by using inductive sensors as a sensing element. **05**

5A. With neat sketch, explain the working of unbalanced vane pump. **04**

5B. A swash plate type axial piston pump has its plunger pitch circle diameter as 250mm and plunger diameter as 20mm; angle of inclination as 20° and a number of pistons as 9. The pump is driven at 1200rpm and its volumetric efficiency is 95%. Calculate the actual delivery of the pump. If the pump has to pump against 137 bar and the overall efficiency is 0.85, calculate the power of the prime mover required to drive the pump. **03**

5C. With simple sketch, explain the working of direct acting pressure relief valve. **03**

6A. With suitable circuit diagram explain regenerative circuit and derive the expressions for extending speed and for speed ratio. **04**

6B. With neat sketch explain the working of bladder type accumulator and with suitable circuit explain its application as leakage compensator. **04**

6C. Sketch the hydraulic circuit for sequencing of two hydraulic cylinders (A+ B+ B- A-) using sequence valve. **02**