Reg. No.										

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

VII SEMESTER B.TECH. (MECHATRONICS ENGINEERING)
END SEMESTER EXAMINATIONS, DEC 2018
SUBJECT: HYDRAULIC AND PNEUMATIC SYSTEMS [MTE 4103]
REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Draw neat sketches using scale and pencil where ever applicable.

1A. Enumerating the common parts, discuss the construction of a hydraulic reservoir. **04**

1B. With relevant sketches show the working principle of a full flow filter. **02**

1C. An input cylinder with diameter 40 mm is connected to an output cylinder with a diameter of 100 mm. A force of 2000 N is applied to the input cylinder. What is the output force? How far would we need to move the input cylinder to move the output cylinder by 100 mm? **04**

2A. Double acting cylinder is to be controlled using 5/2 directional control valve, single solenoid, spring return. When push button PB1 is pressed, cylinder should extend and remain in that position when PB1 is released. The cylinder is to retract completely when PB2 is pressed. In addition, the cylinder is to remain in the retracted position even when PB2 is released. Develop and explain an electro-pneumatic control circuit with an electrical latching with dominant ON. **04**

2B. With relevant sketches discuss the operation of a pilot-operated solenoid DCV. What is the advantage of these valves over the simple solenoid type? **04**

2C. Describe the construction of a double –rod cylinder. For what type of application is it best suited? **02**

3A. Design and explain a hydraulic control circuit for clamp and bend operation. **04**

3B. Clarify the working and application of a “regenerative neutral”. **03**

3C. A fluid with weight density of 8800 N/m^3 flows at a constant flow rate of 0.005 m^3/sec through a system. The areas at the two sections are A_1 = **03**

0.002 m^2 and A_2 = 0.001 m^2. If the pressure at point 1 is 1000 kPa, determine the pressure at point 2.

4A. Sketch and explain the operation of a spring loaded accumulator? **03**

4B. In a hydraulic press, cylinder must extend quickly under no load then bottoms out and exert full force to the work-piece. A low capacity pump is used to reduce the cost of the system. Develop a suitable circuit without using an accumulator for the given application and explain its working in detail. **04**

4C. Draw pneumatic circuit to carry out following operation. Use Idle return Roller lever valve to eliminate signal overlapping A+, B+, B-, A- **03**

5A. Enumerate the differences between spool valve and poppet valve. **02**

5B. How does an external gear pump differ from an internal gear pump? What types of gears are generally used in gear pumps? Explain. **04**

5C. What is the use of quick exhaust valve? Sketch and explain the working of a quick exhaust valve. **04**