Reg.No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

I SEMESTER M.TECH (ME) END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: FLUID POWER AUTOMATION [MME 5124]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A Explain the working of pneumatic pressure regulator with sketch. **4**

1B Discuss the principle of working of 5/2 pilot operated direction control valve used in pneumatics with sketch. **3**

1C An electrically heated welding rail as shown in Fig. Q(1C) is pressed onto a rotatable cold drum by a double acting cylinder and welds a continuous plastic sheet into pieces of tubing. The forward stroke is triggered by means of a push button. The maximum cylinder force is set at 4 bar via a pressure regulator with pressure gauge (This prevents the welding rail damaging the metal drum). The return stroke is not initiated until the forward end position has been acknowledged and the pressure in the piston area has reached 3 bar.The supply air is restricted for the movement of the cylinder. Restarting is only possible when the retracted end position has been reached and a time of t = 2 seconds has elapsed. Reversing a 5/2 valve with selector switch causes the control to be switched to continuous cycle. Draw the manual pneumatic circuit for this application. **3**

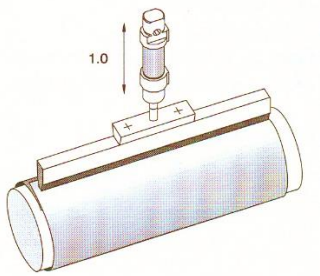

Fig. Q(1C)

2A Discuss the principle of working of direct acting pressure relief valve used in hydraulics with sketch and state its limitation over compound **4**

pressure relief valve.

2B Explain the working principle of the following types of proximity sensors used in electro pneumatics with sketch and state their advantages. **3**

i)Capacitive sensor ii) Optical sensor.

2C A station is to be used to check whether the lids of cans are present. If a can without a lid is encountered, this must be pushed one side by a pneumatic cylinder. The lids and cans are interrogated by means of sensors. Draw the electro pneumatic circuit for this application. **3**

3A Explain the principle of working of a closed center type 4/3 direction control valve with sketch and state its advantages and limitations. **4**

3B Write the pneumatic circuit for achieving the two cylinder sequence A+B+B-A- using step counter method. **3**

3C Explain the principle of working of time delay valve used in pneumatic control with sketch. **3**

4A Explain the principle of working principle of Counterbalance valve used in hydraulics with sketch. **4**

4B Explain the principle of working principle of AND valve used in pneumatics with sketch. **3**

4C A vane pump is to have a volumetric displacement (V_p) of 82 cm^3. It has a rotor diameter(D_R) of 5 cm, a cam ring diameter (D_C) of 7.5 cm and a vane width (L) of 4 cm. What must be the eccentricity? What is the maximum volumetric displacement possible? **3**

5A Explain the working principle of axial piston pump used in hydraulic system with sketch and state its advantages over other types of pumps. **4**

5B Explain the principle of relay latching with sketch. **3**

5C For the system given in Fig. Q(5C), determine the force required to drive a load of 2000 N. **3**

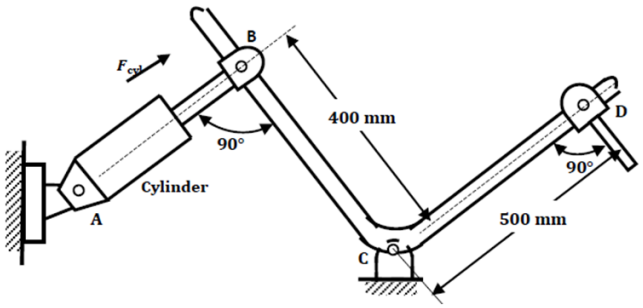

Fig. Q(5C)