Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

V SEMESTER B. TECH (MECHANICAL ENGG.) END SEMESTER EXAMINATIONS, NOVEMBER 2019

SUBJECT: FLUID DRIVES AND CONTROL [MME 4017]

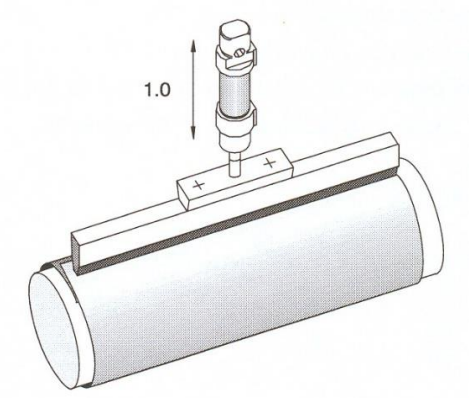
REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

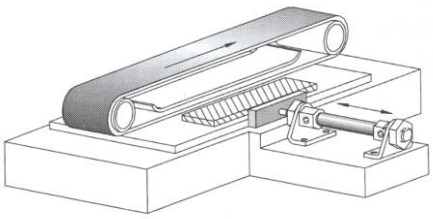
Instructions to Candidates:

- Answer ALL the questions.
- Missing data may be suitably assumed.
- Draw the sketches neatly and hand writing should be clearly readable

1A)	Explain the structure and signal flow in electro-pneumatic control system	3
1B)	With the help of neat sketch explain the working of rod less cylinder	3
1C)	With the help of neat sketch explain the working of pressure sensing valve	4
2A)	Sketch and explain working of quick exhaust valve	3
2B)	Sketch and explain working of pressure-electric convertor (pressure sensor)	3
2C)	An electrically heated welding rail 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 way valve with selector switch causes the control to be switched to continuous cycle.	4



3A)	Describe the working of any two types of optical proximity sensors used in electro-pneumatics and also highlight the features of this sensor	3
3B)	Using a rotary indexing table plastic containers is to be separated in linear sequence. By pressing a pushbutton switch the oscillating piston rod of a cylinder drives the rotary table in sequence via a pawl. When the push button is pressed again, this drive is switched off. Using 5/2 single solenoid direction control value design the electro-pneumatic control circuit for this application.	3



3C)	Explain the working of rack and pinion type and telescopic actuators using neat sketch.	4
4A)	Explain the construction and working of 4/2 direction control valves	3
4B)	Write the electro-hydraulic circuit to illustrate the use of pressure sequence valve to regulate clamping (A) and bending (B) application in the following sequence A+/B+/B-/A-	3
4C)	Sketch and explain the working of gas loaded accumulator and design the suitable circuit to illustrate the use of accumulator for shock absorbing application	4
5A)	What is bleed off control? Write the electro-hydraulic circuit for the same	3
5B)	Show any 6 types of cylinder mounting arrangements	3
5C)	With the help of circuit diagram of hydraulic jack for force multiplication, discuss the concepts of cylinder size, force and displacement using appropriate equations	4