Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

V SEMESTER B.TECH (MECHANICAL ENGG.) END SEMESTER MAKE-UP EXAMINATIONS, DEC 2017

SUBJECT: FLUID DRIVES AND CONTROL [MME 4017]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

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Instructions to Candidates:

- ✤ Answer ALL the questions.
- Draw neat sketches using appropriate instruments.
- Free hand sketches are strictly not encouraged.
- 1A. What are the advantages of hydraulic control system? List any 8 applications 3 of hydraulics.
- **1B.** With a neat sketch explain the working of quick exhaust valve.
- **1C.** With neat sketches explain various types of flow control valves used in **4** pneumatics.
- 2A. A press with a stamping die is available to produce badges from a very thin metal sheet. A double acting cylinder should extend when two push buttons are pressed simultaneously. The return stroke is to occur automatically only after the forward end position and preset pressure has been reached to get the consistent quality on the badge. The cylinder should immediately retract if emergency push button E is pressed any time. Draw a suitable electropneumatic circuit.



- 2B. A pump supplies oil at 0.0016 m³/s to a cylinder with 40 mm bore diameter 3 and 20 mm rod diameter. If the load attached to the cylinder is 5 kN, find the required hydraulic pressure, piston speed and power developed during forward and retraction strokes.
- Write a suitable manual pneumatic circuit to control three cylinders for the following sequence: A+ B+ C+ A- B- C-.

- **3A.** With a neat sketch explain the working of a relay and mention any 4 of its **3** functions.
- 3B. Operation of two identical valves by push buttons causes the forming tool of an edge folding device to thrust downwards and fold over the edge of a flat sheet. If both or even just one push button is released, double acting cylinder slowly returns to the initial position. Draw a suitable manual pneumatic circuit.



- **3C.** Write a note on various types of optical proximity sensors mentioning their **4** working principles and limitations.
- **4A.** Write the basic structure and signal flow in pneumatics control system **3**
- **4B.** Explain how accumulators are used in shock absorbing applications. **3**
- **4C.** Using suitable circuits explain dominant-on and dominant-off relay latching. **4**
- **5A.** With a neat sketch explain the working of pressure reducing valve.
- 5B. In a hydraulic press, when a push button is pressed, the cylinder should 3 extend and exert force on the die. After reaching the end position, the cylinder should stay in the position for 10 seconds and then retract automatically. Next cycle is only possible after a delay of 30 seconds. Write an electro-hydraulic circuit.
- **5C.** Sketch and explain the working of compound pressure relief valve and also **4** mention its advantages over direct acting pressure relief valve.

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