Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER MAKE UP EXAMINATIONS, NOV/DEC 2017

SUBJECT: ACTUATION SYSTEMS [AAEE 3153]

REVISED CREDIT SYSTEM
(23/12/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A. With neat sketch explain the working and function of time delay valve. **(03)**

1B. A pump supplies oil at 0.002m^3/sec to a 50mm diameter double acting cylinder and a rod diameter is 20mm. If the load is 6000N both in extension and retraction, find **(03)**

- Piston velocity during extension and retraction stroke
- Pressure during extension and retraction stroke
- Power during extension and retraction stroke

1C. With suitable sketch differentiate between one way flow control and variable flow control valve. **(04)**

2A. Classify different sensors used in electro pneumatics and explain the different types of optical sensors. **(04)**

2B. List any three advantage and limitations of pneumatic system. **(02)**

2C. Draw the manual pneumatic circuit for the following problem statement
A double-acting cylinder is used to press together glued components. Upon operation of a push button, the clamping cylinder extends. Once the fully advanced position is reached, the cylinder is to remain for a time of T= 6 seconds and then immediately retract to the initial position. The cylinder retraction is to be adjustable. A new start cycle is only possible after the cylinder has fully retracted. **(04)**

3A. With suitable sketch explain the working of multistage compressor. **(03)**

3B. Sketch and explain the principle of working of air filter used in pneumatic systems. **(03)**

3C. A plastic component is embossed using a die driven by a double acting cylinder. The die is to advance and emboss the plastic when a push button is operated. The return of the die is to be effected when a pre-set pressure is reached. The embossing pressure is to be adjustable. Draw the electro pneumatic circuit by using inductive sensors. **(04)**

4A. With suitable circuit diagram explain the working of regenerative circuit and derive the relation between extension and retraction speed. **(03)**

4B. With neat sketch explain the working of compound pressure relief valve. **(04)**

4C. Draw hydraulic circuit for the sequence operation A+ B+ B- A- using suitable valves and explain the working of same. **(03)**

5A. Double acting cylinder is used to perform continuous to and fro motion. Cylinder has to move forward when PB1 button is pressed and once to and fro reciprocation starts it should continue till stop button PB2 is pressed. Limit switches are used for end position sensing. Draw the pneumatic circuit, PLC wiring diagram and ladder diagram to implement this task. **(03)**

5B. A double-acting cylinder is hooked up in a regenerative circuit for drilling application. The relief valve is set at 75 bar. The piston diameter is 140 mm and the rod diameter is 100 mm. If the pump flow is 80 LPM, find the cylinder speed and load-carrying capacity for various positions of 4/3 direction control valve. **(03)**

5C. Classify hydraulic pump and with suitable sketch explain the working of variable displacement vane pump. **(04)**