Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

(A constituent unit of MAHE, Manipal)

V SEMESTER B.TECH. (AUTOMOBILE ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2018

SUBJECT: ACTUATION SYSTEMS [AAE 3153]

REVISED CREDIT SYSTEM
(26/12/2018)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. An 8 cm diameter pneumatic cylinder has a 4 cm diameter rod. If the cylinder receives flow at 100 LPM and 6 bar, find the (a) Extension and retraction speeds (b) Extension and retraction load carrying capacities. **(03)**

1B. With suitable diagram, explain the working of dual pressure and shuttle valve. **(04)**

1C. With neat sketch, explain the difference between fixed and variable flow control valve. **(03)**

2A. A push button is to control the forward stroke. After the piton rod has reached the forward end position, the components are to be pressed together for 20 seconds. Then the piston rod should return to initial position automatically. The return stroke must occur even if the start push button is still depressed. A new start signal may only become effective after the initial position has been reached and after the push button has been released. Develop pneumatic circuit to perform the task. **(04)**

2B. What are the two ways to implement memory function in electro-pneumatic circuits? Explain them. **(03)**

2C. Classify proximity switches and with suitable sketch explain the working of reed switch. **(03)**

3A. Double acting cylinder is used to perform continuous to and fro motion. Cylinder has to move forward when PB1 button is pressed and reciprocation motion starts and 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)**

3B. Draw displacement diagram for the sequence A- B+ A+ B-. Draw electro-pneumatic circuit to implement the task using cascade method. **(04)**

3C. Differentiate between through beam and diffuse type sensors. **(03)**

4A. Define an accumulator and explain the construction and operation of diaphragm-type accumulators. **(03)**

4B. With neat sketch, explain the working of balance vane pump and list its advantages and disadvantages. **(04)**

4C. A pressure-relief valve contains a poppet with an area of 4.2 cm^2 on which the system pressure acts. During assembly, a spring with a spring constant of 3300 N/cm is installed in the valve to hold the poppet against its seat. The adjustment mechanism is then set so that the spring is initially compressed to 0.5 cm from its free-length condition. In order to pass full pump flow through the valve at the pressure-relief valve pressure setting, the poppet must move 0.30 cm from its fully closed position. **(03)**

(a) Determine the cracking pressure.

(b) Determine the full pump flow pressure (pressure-relief valve pressure setting).

5A. With suitable sketch differentiate between open neutral and float neutral 4/3 direction control valve. **(04)**

5B. Explain the function of pressure-control valves in hydraulic power systems. **(03)**

5C. With neat sketch, explain the important features and functions of hydraulic power pack. **(03)**