APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
08 PALAKKAD CLUSTER

Q. P. Code : IAR0819351B-1   (Pages: 3)   Name:................................

Reg. No:................................

FIRST SEMESTER M.TECH. DEGREE EXAMINATION December 2019

Branch: Mechanical Engineering   **Specialization: Industrial Automation and Robotics**

08ME6351(B) Fluid Power Automation

Time: 3 Hours   Max. Marks: 60

Answer all six questions.

Modules 1 to 6: Part 'a' of each question is compulsory and answer either part 'b' or part 'c' of each question.

Q. No.	Module 1	Marks

1. a   What are the advantages and disadvantages of pneumatic drives?   **3**

Answer b or c

b   Explain the construction, working and applications of hydraulic drives.   **6**

c   What is piston pump? Explain any one type of piston pump with suitable diagram. Derive the equation for pump efficiency, volumetric mechanical and overall efficiency.   **6**

Q. No.	Module 2	Marks

2. a   Write short notes on DCV and FCV.   **3**

Answer b or c

b   A compressor delivers air at 100 psig and 270 scmf.   **6**

   (i)   Determine the actual hp required to drive the compressor if the overall efficiency of the compressor is 75.5.

   (ii)   Repeat the part (i), assume the compressor is required to provide air at 115 psig to offset a 15 psi pressure loss in the pipe line due to friction.

   (iii)   Calculate the cost of electricity per year for part (i) and (ii). Assume the efficiency of the electric motor driving the compressor is 92% and the compressor operates 3000 hr per year. The cost of electricity is 50.11/kWh.

c   What is the function of quick exhaust valve? Explain the constructional features quick exhaust valve with neat sketch.   **6**
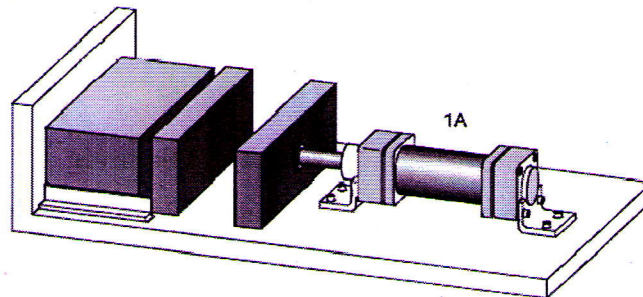
Q. No.	Module 3	Marks

3. a Why do some control valve actuators have a small internal fail action spring and some are external and much larger? **3**

<div align="center">Answer b or c</div>

b With a neat sketch, describe the construction and working of pressure compensated flow control valve. **6**

c 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. **6**

Q. No.	Module 4	Marks

4. a What you mean by amplifier cards? **3**

<div align="center">Answer b or c</div>

b What is PID Controller? Explain different types of gains in PID controllers and its effects. **6**

c What is the effect of root locus method in analog control system? Sketch the Control configurations with the following conditions.
(i) Cascade compensation.
(ii) Feedback compensation.
(iii) Inner-loop feedback compensation. **6**

Q. No.	Module 5	Marks

5. a Differentiate combinational and sequential logic gate circuits. **4**

<div align="center">Answer b or c</div>

b Design and develop a hydraulic circuit for the following sequence using cascade method. $A^+ B^+ C^+$.   **8**

c Using PLC, design a system to detect the faulty items moving along a conveyer belt and keep track it so that when it reaches the appropriate point, a reject mechanism is activated to remove it from the conveyor. Draw the corresponding ladder diagram.   **8**

Q. No.	Module 6	Marks

6. a Write any four applications of position control valves.   **4**

Answer b or c

b Explain with a neat circuit diagram, the counter balance valve application.   **8**

c Explain in detail about directional control valves. Describe its application in paper industry.   **8**