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M.E./M.Tech. Degree Examinations, January 2017

First Semester

MECHATRONICS ENGINEERING

MS16105-DRIVES AND CONTROLS FOR AUTOMATION

(Regulation 2016)

QP Code: 484448

Time: Three hours

Maximum : 100 marks

Answer ALL questions

- ## **PART A - (10 X 2 = 20 Marks)**
1. Compare hydraulic and electrical drives.
 2. Draw the graphical symbols for fixed displacement, variable displacement, pressure compensated pump and bidirectional pumps.
 3. Draw the symbol for a pressure relief valve and pressure reducing valve.
 4. List the factors affecting selection of pumps.
 5. Name the common methods used for designing logic circuits.
 6. What is a ladder diagram?
 7. Define Actuator.
 8. What is the working principle of piezoelectric actuator?
 9. Among AC and DC motors, suggest a suitable actuator to be used for the application requires both direction and speed control? Justify.
 10. List the classifications of AC motor drives.

PART B - (5 X16 = 80 Marks)

11. (a) With neat sketch explain the construction and working principle of unbalanced vane pump and radial piston pumps. (16)

(OR)

- (b) (i) With neat sketch explain the construction and working of single acting and double acting cylinder. (8)

- (ii) With supporting sketch list various types of mounting configuration. (8)

12. (a) (i) Draw the sketch and explain the non-pressure compensated and pressure compensated flow control valve. (12)
(ii) Draw and explain meter-in circuit (4)

(OR)

- (b) (i) What are the different types of servo valves? With neat sketch explain (12)
the working of any two types of electrohydraulic servo valves.
- (ii) Draw the symbol of pilot operated check valve, Two way spool type (4)
directional control valve, Four way directional control valve (Two
position and Three position type).
13. (a) Design a system using cascade method for a stamping application in which (16)
cylinder A is used to clamp the work piece, cylinder B is used for punching
and cylinder C removes the work piece from the station.
- (OR)**
- (b) (i) With neat sketch explain the types and use of relays, switches and timers (8)
in hydraulic and pneumatic circuit design.
- (ii) Double acting cylinder is used to perform pressing operation. Cylinder (8)
has to move forward when PB1 button is pressed and return for set time
of 20 seconds before it automatically returns to initial position. Limit
switch S2 is used for end sensing of the forward motion of the cylinder.
Draw the pneumatic circuit, PLC wiring diagram and ladder diagram to
implement this task.
14. (a) What are the classifications of DC motor? Explain the construction, working (16)
and characteristics of DC motor.
- (OR)**
- (b) Explain the construction, operation characteristics and control of (16)
variable reluctance stepper motor.
15. (a) (i) Draw the circuit diagram and explain how H-bridge circuit used for (10)
direction and speed control of DC motor in PWM mode.
- (ii) Write short notes on need of variable frequency drives for AC motor (6)
control.
- (OR)**
- (b) Write short notes on (i) BLDC motor (ii) Stepper motor driver circuit (8+8)