

SARDAR PATEL UNIVERSITY

B.Sc. (Instrumentation (Vocational)) Semester V Examination

US05CINV03 (Control System Components)

Monday, 18th November 2013

10.30 am to 1.30 pm

Total Marks: 70

Que.1 Choose a correct option for the questions given below: 10

1. ON-delay relay is a
 - a) Latching relay
 - b) Timing relay
 - c) Reed relay
 - d) All are true
2. Contactors are used if
 - a) High contact rating is required
 - b) Timed operation is required
 - c) Low contact rating is required
 - d) Logical operation is required
3. Solid state relays
 - a) Use transistors
 - b) Use coils and contacts
 - c) Pneumatic timers
 - d) Latching mechanism
4. Which is not an advantage of stepper motor?
 - a) Precise positioning
 - b) No contact brushes
 - c) High speed limit
 - d) Open loop operation
5. Which is correct expression for equal percentage valve?
 - a) $Q = Kf(x) \sqrt{\frac{\Delta p}{\rho}}$
 - b) $\frac{Q}{Q_{\max}} = \frac{s}{s_{\max}}$
 - c) $Q = Q_{\min} R^{\frac{s}{s_{\max}}}$
 - d) None of these
6. Which of the following is not a type of globe valve?
 - a) Single port valve
 - b) Angle valve
 - c) Butterfly Valve
 - d) Three way valve
7. Springless diaphragm actuator is a _____ actuator.
 - a) Electrical
 - b) Electromechanical
 - c) Hydraulic
 - d) Pneumatic
8. What is not the advantage of pneumatic actuator?
 - a) Low cost
 - b) Simple design
 - c) Low speed
 - d) Small package
9. Torque produced by a stepper motor depends on
 - a) Step rate
 - b) Drive current in winding
 - c) Drive type
 - d) All the above
10. Which of the following valve is used for slurries
 - a) Globe valve
 - b) Diaphragm valve
 - c) Butterfly valve
 - d) Needle valve

Que.2 Answer any seven in brief: 20

- A. With help of neat diagram explain AND relay logic.
- B. Write a brief note on latching relay
- C. Explain arc suppression in contactors.
- D. Enlist advantages and disadvantages of stepper motor.
- E. Explain generation of rotating magnetic field for stepper motor.
- F. Draw the block diagram of acceleration servo loop and explain in brief.
- G. Draw a typical globe valve and label its parts.
- H. Explain balanced plug cage style valve bodies in brief.
- I. Write a brief note on valve plug guiding.

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- J. Enlist merits and demerits of pneumatic and electropneumatic actuators.
- K. Write a brief note on linear output actuator.
- L. Briefly explain fail-safe operation in spring & diaphragm actuator.

Que.3 A Write a detailed note on solid state relays. 5
B With help of necessary diagrams explain working of magnetic motor starter. 5

OR

A Give a detailed note on Electromechanical relays. 5
B Give a detailed account on relay logic. 5

Que.4 Enlist types of stepper motor. With help of neat diagrams explain permanent magnet and variable reluctance type stepper motors 10

OR

A Explain the operation of basic servo system. 5
B Explain the working of synchro torque transmitter. 5

Que.5 A Explain the quick opening and linear flow characteristics. 5
B Write a detailed note on rangeability, turndown and valve sizing. 5

OR

A With help of necessary diagrams explain single and double port globe valve. 5
B Write a note on cage guided valve bodies. 5

Que.6 A Give a detailed account on direct and reverse acting spring and diaphragm actuators. 5
B With help of necessary diagrams explain solenoid actuators. 5

OR

A Give an account on electrical motor actuators. 5
B With help of necessary diagrams explain piston actuators. 5

Best Wishes