

[Time: Three Hours]

[Marks:80]

Please check whether you have got the right question paper.

- N.B:
1. Question.No.1 is compulsory.
 2. Attempt any **three** questions out of the remaining **five** questions.
 3. Figures to the **right** indicate **full marks**.
 4. Assume suitable data wherever required but justify the same.

1. Solve any 4 of the following 20
 - (a) Explain Importance of bulk modulus in hydraulics.
 - (b) Write short note on cylinder mounting.
 - (c) Draw the circuit for accumulator as an emergency power source.
 - (d) Write short note on time delay valve.
 - (e) Draw the electrical latching circuit for "Dominant ON" operation and explain its working.
2. (a) Figure 1 shows a hydraulic system used for clamping a cylindrical work-piece during machining operation. If the machine operator applies a 100N force to the lever as shown, what clamping force is applied to the work-piece? 8

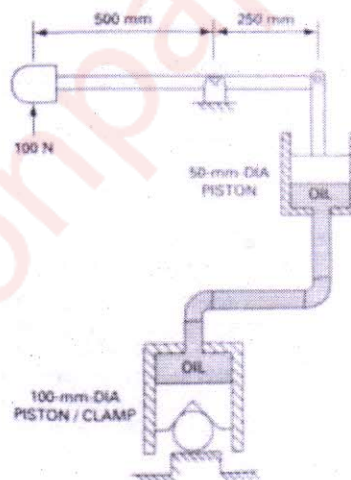


FIGURE 1

- (b) Explain the construction and working of bent axis axial piston pump. Derive the equation of theoretical flow rate of a bent axis piston pump based on its offset angle, piston circle diameter, number of pistons, piston area and pump speed. 12
3. (a) Explain meter-in and meter-out speed control of a double acting hydraulic cylinder 10
 - (b) Draw an example pneumatic circuit, indicate and explain the function of the (i) Supply elements 10
 - (ii) Input elements (iii) Logic processing elements (iv) Control elements (v) Actuators

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4. (a) Explain the working of pressure sequence valve with an example hydraulic circuit. 9
- (b) Components are to be supplied to a processing machine from the discharge rail of a vibrator conveyor as shown in Figure 2. Cylinder A extends and picks up the component from the discharge rail and then retracts. Cylinder B extends and then shifts the component to the machine. Cylinder A extends once again, lowering and dropping the component to the machine. At the end cylinder A and B retract one after other. Develop the pneumatic control circuit to implement the control task. 11

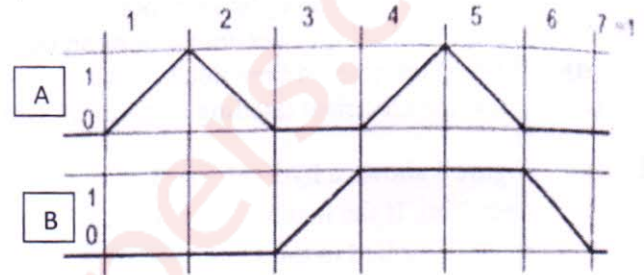
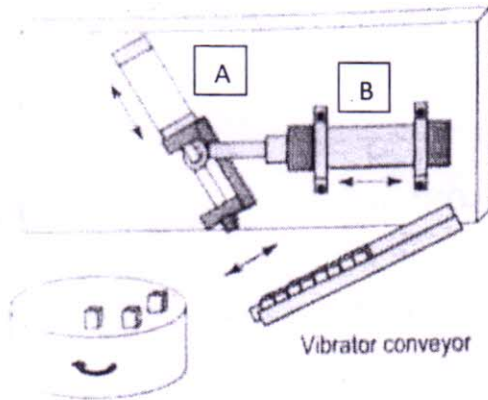


FIGURE 2

5. (a) Write short note on classification of pneumatic actuators. 5
- (b) Draw the pneumatic circuit, PLC wiring diagram and ladder diagram to implement A+B+B-A- sequence. 15
6. (a) What is the limitation of cascade method of pneumatic circuit design? Explain the shift register method of pneumatic circuit design. 10
- (b) Explain the basic structure of PLC with description of each system component. What is program scan cycle? 10