

(3 Hours)

[ Total Marks : 100

N.B 1. Question No. 1 is compulsory.

2. Attempt any four out of remaining six questions.

3. Assume any suitable data whenever required but justify the same.

1. solve any five :

- Define piezoelectric Principal , Hall effect principle Seeback effect , Peltier effect. (4)
- Give the list pressure control valves & volume control valves write where it is used. (4)
- Write a fundamental laws , which is used most mechatronics application involve rigid body system. (4)
- Define proportional Band , Dead band give any one practical example . (4)
- Explain in short control modes of fluid power circuit. (4)
- Draw a ladder diagram of basic NOT & AND logics. (4)

- Distinguish between static & dynamic models. (4)
  - Explain Key element of mechatronics. (4)
  - Explain in details Mechatronics design process diagram, operation & importance. (12)

- Explain in brief over framing how it will avoid. (6)
  - Explain installation procedure of I/o cards & Vis - sim Software steps. (6)
  - Explain importance in mechatronics artificial intelligence in mechatronics. (8)

- Explain & Draw the permanent magnet stepper motor principle diagram & derive the motor equation with block diagram model of 4 phase PM Stepper motor. (12)
  - Explain microsensors fabrication techniques with diagram. (8)

- To illustrate how the three types of friction are used , we consider an example in which a book is slid across a desk at a specific velocity  $V$  . the book consists of a simple mass and encounters friction with the table as it slides. The situations illustrated in fig 1 draw
    - sliding book impedance diagram
    - sliding book initial block diagram
    - sliding book block diagram

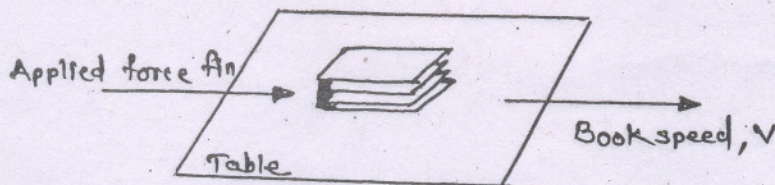


Fig. 1.

- Explain range sensor with any application. (5)
- Explain PID tuning methods. (5)

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6. 6A) Explain in details adaptive control & velocity control different types with diagram. (12)
- 6B) Three mode controller having  $K_P$  as 4,  $K_I$  as 0.6,  $K_D$  as 0.5s a set point output 50 % and subject to the error change shown in fig. A what will be the controller output a) change starts to occur b) 2 sec after the starts. (8)

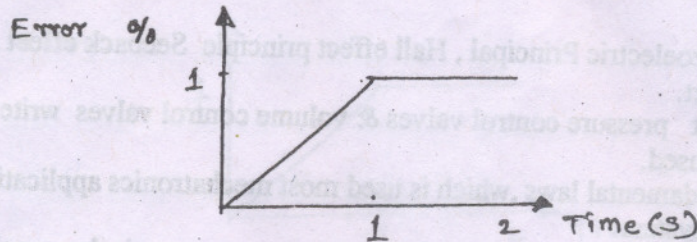


Fig. A.

7. 7A) Explain PLC programming features of programmable controller & selection procedure. (8)
- B) A bottling plant uses an automated mechanism for filling the containers and transporting them from one point to another as shown in fig AA. the sensors monitor the amount of solid or liquid filled a conveyer mechanism the transport the containers, design a mechatronics system with the help of PLC, the case described. identify the types of sensors you used, explain how interface control system. (12)

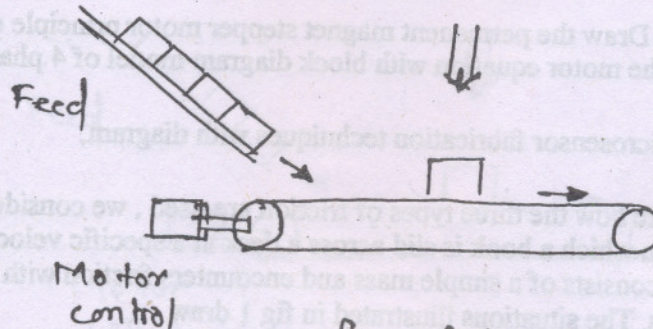


Fig. A.A.