

(3 Hours)

[Total Marks: 80]

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

(2) Answer any three questions from Question Nos. 2 to 6.

(3) Assume suitable data if necessary.

- 1** Answer the following questions (Any FOUR):-
- a) Explain the relay based auto-tuning controller. **5**
 - b) Explain the ideal closed loop system performance criterion. **5**
 - c) Discuss interaction of plant design and control system design. **5**
 - d) Define the terms –process dynamics and process control. **5**
 - e) Explain the features of multi-loop cascade controller. **5**
- 2**
- a) Explain the procedure to develop transfer function models. **10**
 - b) Explain the major steps in control system design and development? **10**
- 3**
- a) Explain the different basic PID modifications widely used in industry. **10**
 - b) Explain controller tuning relations based on integral error criterion. **10**
- 4**
- a) Discuss continuous cycling method to tune PID. **10**
 - b) Explain the model based control system design. **10**
- 5**
- a) Explain the design steps of plant wide process control. **10**
 - b) Explain in brief the basic principles and strategies useful in troubleshooting control loops. **10**
- 6** Write short notes (any TWO):- **20**
- a) Digital PID.
 - b) Hierarchy of process control activities.
 - c) Internal Model Control (IMC).
