

Note : Attempt all the questions

- Q1 (a) A point P in space is defined as ${}^B P = [2,3,5]^T$ relative to frame B, which is attached to the origin of the reference frame A and is parallel to it. Apply the following transformations to frame B and find ${}^A P$: Rotate 90° about x-axis, then rotate 90° about local a-axis, then translate 3 units about y-axis, 6 units about z-axis, and 5 units about x-axis. (3)
- Q1 (b) Discuss at least three advantages and three disadvantages of DCS over conventional control system. (3)
- Q2 (a) What is hot backup in PLCs ? What objective is achieved by hot backup? (3)
- Q2 (b) A magnetic float switch has potential free contact which opens when the level is high and closes when the level is low. Two such switches are installed at 20% and 80% of the height of an overhead oil tank. The pump supplying oil from reservoir to the tank is controlled using these two switches only. The pump starts when the level falls below 20% and switches off when it crosses 80%. Develop a ladder logic diagram to program PLC to achieve this objective. (3)
- Q3 (a) Not using bulky enclosures, yet achieving the same objectives, what considerations must be deliberated upon in design of instrumentation system? (3)
- Q3 (b) Electrical Audit needs a compact portable energy analyzer. What are the desirable features of this analyzer? (3)
- Q4 (a) How is RS 485 superior to RS 232? Are these hardware or software protocols? Give three examples of software communication protocols. (3)
- Q4 (b) Furnish at least three key reasons for going in for standard industrial communication. (3)
- Q5 (a) Suggest an appropriate communication network for automobiles. What are its key technical aspects? (3)
- Q5 (b) Along with sending the data over HART, number of other information tags are also sent. Elucidate the structure of HART message, mentioning these tags. (3)
- Q6 (a) In GPIB, we use NRFD instead of RFD. What could be the reason for using this kind of negative logic? (3)
- Q6 (b) Where are multi-stage valves used? What could be alternative to their use? (3)



◆ The students may see their corrected answer sheets on Dec 15th 2006 at 5.30 PM in my chamber.