

Instrument & System Design [ISD]

B.E. Sem. VIII [INST]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical & Oral Exam	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

1. Design of Transducers

An overview of static and dynamic performance characteristics of instruments. Selection criteria for flow, temperature, level, and pressure transducers. Design considerations for transducers such as thermocouple, RTD, orifice plates, Calibration and installation procedure for thermocouple and RTD.

2. Design of Instrument Air Systems

Quality of instrument air, Sizing criteria. Air supply source, compressor systems. Air distribution system. Control room air supply and air handling. Air dryers.

3. Design of Control Valve

Review of flow equations. Valve selection and sizing for liquid service, gas or vapor service, flashing liquids, mixed phase flow. Control valve noise. Control valve cavitations. Actuator sizing. Design of safety relief valves and rupture discs.

4. Control Panel Design

Panel selection-size, type, construction and IP classification. GA Diagrams, Power wiring and distribution, Typical wiring diagrams for AI,DI,AO,DO,RTD, and T/C modules. Earthing scheme. Panel ventilation, cooling and illumination. Operating consoles- ergonomics. Wiring accessories-ferules, lugs, PVC ducts, spiral etc. Wire sizes and color coding. Packing, Pressurized panels- X, Y, and Z Purging for installation in hazardous areas. Ex-proof panels.

5. Electronic product design

System Engineering, ergonomics, phases involved in electronic product design.

6. Reliability engineering

Reliability concepts, bath tub curve, MTTF, MTBF, and MTTR. Quality and reliability. Causes of failures. Availability and Maintainability. Redundancy and redundant systems.

7. Control Room Design

Layout and environment.

8. Enclosure Design

Packing and enclosures design guide lines, Grounding and shielding, front panel and cabinet design of an electronic product.

Reference Books :

1. Instrument Engineer's Hand Book – Process Control (*Bela G. Liptek*) Chilton Company, 3rd Edition, 1995.
2. Applied instrumentation in the process industries (*Andrew Williams*) 2nd Edition, Vol. 1 & 3, Gulf publishing company.
3. Valve selection hand book third edition (*R. W. Zape*) Jaico publishing house,
4. Control valve sizing (*Les Driskell*) ISA.
5. Process Control Instrumentation Technology (*Curtis Johnson*) PHI /Pearson Education 2002.
6. Electronic Instrument Design (*Kim R Fowler*) Oxford University- 1996.
7. Manual on product design: IISc C.E.D.T.
8. Measurement Principles and Practices (*Harshvardhan*) Macmillan India Ltd-1993
9. Reliability (*Balaguruswamy E*) Tata Mc Graw-Hill Pub.co. New Delhi, 1999.
10. Principles of Testing Electronic Systems (*Mourad Samiha & Zorian Yervant*) New York. John Wiley & Sons, 2000.
9. Introduction to Reliability Engineering(2nd) (*Lewis E E*) New York. John Wiley & Sons, 1996.
9. Electronic Instruments And Instrumentation Technology (*Anand M S*) New Delhi. Prentice Hall Of India, 2004.
10. Noise Reduction Techniques In Electronic System (*Ott H W*) (2) John Wiley & Sons New York, 1988.

