

Semester-I, Paper-3
PROCESS PLANNING ESTIMATION & ECONOMICS

Teaching scheme

Lectures: 4 Hrs / Week
Practical: 1 Hrs/ week

Examination scheme

Theory: 100 Marks
Term work: 25 Marks

Unit 1.

(10 Hrs, 20 Marks)

Definition of Project; Purpose, scope, time, quantity, and organization structure.
Basic and Detailed Engineering: Degree of Automation, Manpower considerations, Inter-department and inter organization interactions.
Process flow sheets, P & I diagrams, Interlock diagrams, Instrumentation standards and practices, Legends and Symbols, Instrument Index Sheets, Instrumentation symbols and Identifications (ANSI/ISA-5.1), Plant layouts, general arrangement drawing (Plans and Elevations).

Unit 2.

(10 Hrs, 20 Marks)

I & C Documentation: specification sheets, loop diagrams, ladder diagrams, wiring diagrams, isometrics, and installation detail drawing, bill of material, control panel drawing, instrument data sheet. Document control as per ISA standards. Check lists, legend sheets, instrument catalogues, Test and process reports.
Cable Engineering: Different classes of conductors and their routines and NEMA Standards, Types and specifications of cables, cable schedule, routing of cables, types of glands, ferruling and terminations.

Unit 3.

(10 Hrs, 20 Marks)

Procurement Activities: Vendor registration, tendering and bidding process, bid evaluation, purchase order, vendor documents, and drawing and reports as necessary at above activities.
Construction Activities: Site conditions and planning, front availability, Installation and commissioning activities and documents required/generated at this stage, On-site inspection and testing (SAT) installation sketches, bill of material, contracting, cold commissioning and hot commissioning, CAT (Customer Acceptance Test), Perform trials and final handover.
Control console, centers, panels and indicators: Types, Design, Inspection, and specification. Intelligent operator interface (IOI).
Fieldbus Wiring: Terminator, Power Conditioners, Spurs, Segments, and repeaters.
Networking: Hubs, routes, LAN cards, and Cat cables.

Unit 4.

(10 Hrs, 20 Marks)

Management Functions: Controlling, Directing, project authority, responsibility, Accountability, interpersonal influences and standard communication format, project Reviews.
Project Planning and Scheduling Life Cycle Phases, the statement of work (SOW), Project specifications, milestone schedules, work breakdown structures, cost breakdown structure and the planning cycle, overview planning and execution mode (conceptual focus, design, implementation, operation and support transition).

Unit 5.

(10 Hrs, 20 Marks)

Cost and Estimation: Types of Estimates, pricing process, salary overheads, labor hours, material and support costs.

Program evaluation and review techniques (PERT) and critical Path Method (CPM): Network fundamentals, slack time network planning, estimating activity time and total program time, Total PERT and CPM planning crash times, software used in project management, software features and classification evaluation and implementation.

References:

1. Applied instrumentation in process industries, "Andrew and Williams" (gulf publishing).
2. Process control instruments engineer's handbook, "liptak", (Chilton).
3. Project management a system approach to planning scheduling and controlling, "hardlod kerzner", 5th edition, (van nostrand reinhold publishing).
4. Management systems, "john bacon", (ISA).
5. Batch control systems, "T.G. Fisher", (ISA).
6. Instrument installation project management, "john bacon", (ISA).

List of Experiments:

1. Study of std. and symbols (ANSI/ISA-5.1).
2. Study of specification sheets of sensors, transmitters control valves etc.
3. P & I diagram of typical process.
4. Wiring diagram.
5. Cable scheduling.
6. GA and mimic diagram of a control panel.
7. Control diagrams of typical process unit (boiler, heat exchanger, distillation column etc).
8. Experiments on Engg. Software packages and management software such as INTOOLS.
9. Study of typical Indian projects like fertilizer cement power industries and project methodologies adopted by them.
10. Preparation of inquiry, quotation, comparative statement, purchase orders, SAT, FAT and CAT Inspection report for control panel/transmitter/control valve / recorder.

Term work shall include minimum **eight** experiments from above list.