SYLLABUS

DIPLOMA IN INSTRUMENTAION & PROCESS CONTROL

SUBJECT: SUGAR TECHNOLOGY (THEORY)
CODE: IA/101 **MAX.MARKS: 50**

1. Terminology, Introduction to various unit operation Sugar Processing i.e Cane weighment, Milling, Clarification ,Evaporation, Pan Boiling, & Crystallization, Centrifugation, Sugar Drying & Storage etc, Energy and Water Conservation.
2. General Composition of Sugarcane and Sugarcane Juice, measurement and control of process parameters, process flow diagram for raw- refined – plantation white sugar.

SUBJECT: SUGAR TECHNOLOGY (CHEMICAL CONTROL)
CODE: IA/102 **MAX.MARKS: 50**

General Principle of Chemical Control e.g. Types of Imbibition Process, Advantages and disadvantages of hot and cold water imbibition, Mill Sanitaion, ERQV, Mill extraction, reduced Mill Extraction, Brix Curve, Sugar Recovery, Capacity Utilization, Pol % Cane, Pol % Bagasse, Determination of Bagasse by indirect method.

SUBJECT: ALCOHOL TECHNOLOGY & BY-PRODUCTS.
CODE: IA/103 **MAX.MARKS: 50**

1. Fermentation, types of fermentations and role of microorganism and other condition on fermentation. Raw Materials for fermentative production of alcohol, Molasses: Composition grades and classification of molasses, Outline of alcohol production by different fermentation process. Production of grain spirit. Chemical control, Theoretical Yield, Fermentation & Distillation Efficiency, etc. Different method of spent wash treatment including bio-methanation, incineration and bio composting.
2. Brewing technology: Malting, mashing, fermentation and pasteurization of beer, defects of beer.
3. Alcoholometry: Reduction and blending of spirits, denaturation, obscuration & shrinkage, potable liquors, country liquors & Indian Made Foreign Liquors.(IMFL)

SUBJECT: GENERAL ENGINEERING.
CODE: IA/104 **MAX.MARKS: 50**

Boiler:- Basics of boilers, types of boiler, operation of Boiler, performance of Boilers, Fuel and Combustion, Mounting and Accessories, various operating parameters and its impact.
Turbine:-Basics of turbine, type of turbine and its operation, determination of Specific Steam Consumption, various operating parameters, performance of turbine.
Mill:-Cane Handling devices, cane preparation& device details, Milling Techniques, operating parameters etc..
Motors:-Basics of Motors, AC & DC Motors and its types, control of motors using DRIVE AC & DC. power generation, distribution and usage in sugar industry, Concept of harmonics, its effect on power quality & its mitigation techniques

SUBJECT: INDUSTRIAL INSTRUMENTATION.
CODE: IA/105 **MAX.MARKS: 50**

Basic concepts of measurements, system configuration, Accuracy, Precision, Error, Linearity, Hysteresis, Resolution, Threshold, Span, Calibration. Introduction to Transducers and its application Signal Conditioning & Signal Transmission. Measurement of process parameters like such as:- Temperature, Pressure, Level, Flow, Humidity, pH, Displacement, Speed, Weight, viscosity, turbidity, etc. Cane Weighment System, Online weighing of Sugar, Online Moisture Measurement.

SUBJECT: BASIC ELECTRONICS & CONTROL SYSTEMS.
CODE: IA/106 **MAX.MARKS: 50**

Diode, Transistor, Amplifier, Rectifier, Zener Diode, Thyristors (SCR), Logic gates, truth tables, K-map. Open Loop system, Closed Loop system, First order, Second Order system stability criteria & Root locus.
Process Control System: Controllers and its types with application. P, PI, PD & PID and its parameters. Valves: - Introduction to valves and its Characteristics. Solenoid Valves types and its application. Pneumatics and its application.

SUBJECT: PROCESS CONTROL SYSTEM..
CODE: IA/107 **MAX.MARKS: 50**

History of Automatic Control system and its development, System Architecture, Data Acquisitions System, PLC, DCS, Historian, Plant Network, SCADA, Different Control Loop such as ACFC, Juice Flow Stabilization, Auto pH Control, Boiler Drum Level, Combustion Control, Control in Boiling House, Turbine Control system, etc. Introduction to IOT based systems & its application in sugar industry.

Practicals:-

SUBJECT: PROCESS CONTROL SYSTEM.
CODE: IA/108 **MAX.MARKS: 50**

Instrumentation (Practicals)
(1) Pneumatic Calibration Lab.:- Pressure gauge calibration through Dead Weight Tester, Draft gauge calibration with U Tube Manometer, Vacuum Gauge calibration through vacuum pump & U tube Manometer.
(2) Temperature calibration :- Temperature gauge, Thermocouple, Resistance temperature Detector.
(3) Control System :- Open Loop, Closed loop system and PID control system through live models.
(4) Pneumatic Control Valve :- Operation of control Valve.
(5) PLC :- Introduction of parts of PLC, Downloading and uploading of PLC programme, configuration of PLC, Programming of PLC through Ladder, Logics of sample Interlocks application to sugar Industry.

SUBJECT: Sugar Technology (Practicals)
CODE: IA/109 **MAX.MARKS: 50**

(1) Brix/Pol/Purity of juice/molasses/massecuite and other sugar house products.
(2) Pol and Moisture % sugar
(3) Pol and Moisture % Bagasse
(4) Determination of pH, TDS ,and hardness of feed and Boiler water
(5) Determination of Sugar traces in water
(6) Determination of color of juice and sugar