Programme Code: **IS**									
Course Code: **IS 11 303**			Course Title: **Process Control Systems**						
Compulsory / Optional: **Compulsory**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
4	**--**	**2**	**6**	**80**	**20**	**--**	**50***	**--**	**150**

Note:

1) PR/OR marks with (*) indicates an assessment by Internal and External examiners, while PR/OR marks without (*) indicates an assessment by Internal examiner only.
2) TW marks by Progressive Assessment**.**
3) Theory paper duration is 03 Hrs. and term test duration is 01 Hr.
4) Theory Paper assessment by Internal and External examiners.

Rationale:

Process Control is vital to the automated operation and monitoring of chemical processes. These processes represent the unit operations of material and/or energy transformation. Raw materials are transformed into products, often using other materials and energy. The processes may, for example, involve the production of ethanol from biomass; the separation of petrol from mineral oil by rectification; or the treatment of waste water. With the aid of process control, processes are monitored and influenced as they happen. This is enabled by the measurement and control of variables such as flow rate, pressure, temperature, liquid level, and concentration.

Objectives: - Students will be able to

1. Understand the importance of process control.
2. Understand the importance of process dynamics in process control.
3. Develop feedback control loop for process and select its elements.
4. Select an appropriate control mode for feedback controller.
5. Tune PID controllers in process control loop.
6. Develop an alternative control schemes for process control.
7. Draw process control loop using P & ID (ISA) symbols and identification standards.
8. Prepare and draw various documents of front end and detailed engineering.
9. Understand the role of Instrumentation engineer in project planning and engineering.
10. Identify hazardous area and suggest suitable intrinsic safety instruments.
11. Configure smart transmitter for process control.

Section I (Marks=40)			
Ch. No.	**Contents**	**Hrs.**	**Marks**
1.	**Introduction to Process Control** 1.1 Process- Definition, types-continuous and batch, and their examples. 1.2 Process Control – Definition, importance of Process Control in terms of of product variability, efficiency, and safety. 1.3 Elements of Process Control System- Sensor or Transducer or Transmitter, Controller, Final Control Element, and other instruments that support a process control loop – Recorders, Indicators, Alarms, and Interlocks. 1.4 Process Control Terminology- Controlled variable/ Measured Variable, Set-point, Deviation, Manipulated Variable, Disturbance/Load Variables. 1.5 Familiarization of Basic Process Control System- Feedback control , concept, advantages , limitations, practical applications.	06	08
2.	**Process Dynamics/Characteristics:** 2.1 Elements of Process- Resistance(R), Capacitance(C), Combination of both R and C, and Dead time. 2.2 Types of processes- Dead time, Single and multi-capacity, self-Regulating and non self regulating, Interacting and non-interacting processes. **2.3** Process Dynamics: Load changes and their effect on single capacity & multi-capacity processes. First order lag, second order lags and dead time.	06	08
3.	**Feedback Controller Modes:** 3.1 **Modes of feedback controller** - ON- OFF, Proportional(P), Proportional- Integral (PI) , Proportional-Derivative (PD), three term controllers (PID). Control mode selection criteria for different processes. 3.2 Electronic, pneumatic, and hydraulic type PID controllers and their comparison. 3.3 **PID controller tuning**- definition, tuning criteria. 3.4 PID controller tuning methods-Ziegler-Nichols open loop response and closed loop response methods, advantages, limitations and applications.	10	12
4.	**Advanced Control Systems** 4.1 Feed-forward, Cascade, Ratio, Split-range, and Self- tuning Adaptive control systems: concepts, control loop diagrams (P & IDs), operation, advantages, disadvantages and applications.	10	12

Section II (Marks=40)			
Ch. No.	**Contents**	**Hrs.**	**Marks**
5.	**Instrumentation Symbols and Identification** 5.1 Introduction to ANSI/ISA S5.1–1984 (R 1992)—Instrumentation Symbols and Identification Standards 5.2 **Outline of the identification system** 5.3 Functional identification 5.4 Loop identification **5.5 Instrumentation Symbols** 5.6 Instrument line symbols 5.7 General instrument or function symbols 5.8 Control valve body symbols, damper symbols 5.9 Actuator symbols 5.10 Symbols for self-actuated regulators, valves, and other devices 5.11 Symbols for actuator action in event of actuator power failure. 5.12 Primary element symbols **5.13 Examples of process control loops** like temperature, flow, level, pressure etc.	06	08
6.	**Project Planning and Engineering** 6.1 Project- definition, types of projects, 6.2 Typical life cycle of process control project-planning phase, front end engineering, detailed engineering, erection, commissioning, startup and project closing phase. 6.3 Role of process control/ instrumentation engineer in setting up a project. 6.4 Front end and detailed engineering/ design documents- Process Flow Diagram (PFD), Piping and Instrumentation Diagrams (P&IDs), Instrument index, Loop diagrams, logic diagrams, Instrument specification sheets for different instruments, bill of materials, purchase order. 6.5 Installation practices (hook ups) for common instruments - pressure gauges, temperature indicators, temperature elements, orifice assemblies. D. P. Transmitters, control valves, etc. 6.6 Loop checking and commissioning of instrumentation & control system (procedure, precautions) 6.7 Cable Engineering (Class of conductors, Types, Specification and Application), Selection of cables with respect to specific application, Cable identification schemes, Cable trays, Basic Wiring Practice, wire numbering & numbering methods. Failsafe wiring Practice.	20	24
7.	**Safety in Instrumentation & Control Systems:** 7.1 Hazardous Area & Material classification as per NEC Standards, 7.2 Intrinsically safe systems, installations, Barrier designs for	06	08

	thermocouple, RTD,, 4-20 mA transmitters, 7.3 80/20 rules for barrier designs. 7.4 Instrumentation in hazardous area , protection circuits using shunt and Zener diode, and earthing considerations.		

List of Practicals (Any Eight):

1. To find the differential gap of on-off controller for temperature control system.
2. Process control trainer setup:
    a) To observe the response of P- controlled level control system.
    b) To observe the response of PI-controlled flow control system.
    c) To observe the response of PI-controlled pressure control system.
    d) To observe the response of PID-controlled temperature control system.
3. To perform tuning of PID controller using Z-N's open loop response method.
4. To perform tuning of PID controller using Z-N's closed loop response method.
5. Design of feed-forward controller for given process.
6. To develop cascade control system for given process.
7. To determine ratio and develop ratio control system for given process.
8. To identify the types of cables & study the features of different types cables
9. Study of D.P. Transmitter and its application for flow or level measurement.
10. Study of standards and symbols (ANSI / ISA Std.)
11. Draw PI & D for given process control system.
12. Prepare instrument index sheet for given process control plant.
13. Draw loop wiring diagram for typical loop.
14. Development of Cable scheduling
15. Study of PFD, P& ID diagrams of a project.
16. Draw an instrument specification sheet.
17. Preparation of GA and mimic diagram of a control panel.

(Students are expected to have Hands on experience for Project Engineering & management software such as INTools, MS Project, and Primavera.)

Note:

1 All the topic shall be covered without any complex, mathematical analysis.
2 The teaching shall be practical oriented.
3 The emphasis shall be on applications in industry.

Reference Books:-

Sr. No.	Name of Book	Name of Author	Edition/Year	Publication
1.	Instrument Engineers Handbook Vol . Proecss Control	Bela G. Liptak.,Kriszta Venczel	Revised Edition	Chilton Book Company
2.	**Measurement and Control Basics**	**Thomas A. Hughes**	**3rd Edition** 2002	ISA
3.	Chemical process control: an introduction to theory and practice	Stephanopoulos, G.	1984	Prentice-Hall, New Delhi.
4.	Applied Instrumentation Vol 1-4	Andrew Willium	2nd	GPC
5.	Process control Instrumentation Technology	C.D. Johnson	2006	Prentice-Hall, New Delhi
6.	Process Control	Harriot	17th	Tata McGraw Hill
7.	Process dynamics and control	Seborg, D.E., Edgar	2003	T.F. and Mellichamp, D.A.
8.	**Successful Instrumentation and Control Systems Design**	**Michael D. Whitt**	**2004**	**ISA**
9.	*The Condensed Handbook of Measurement and Control*	N. E. Battikha	*3rd edition 2006*	**ISA**
10.	**Instrumentation Symbols and Identification: ISA-5.1-1984 (R1992) Formerly ANSI/ISA-5.1-1984 (R1992)**	ISA	*1992*	**ISA**
11.	Instrumentation for Process Measurement & Control	Norman A. Anderson	Third Edition	Chilton Book Company

Programme Code: **IS**									
Course Code: **IS 11 304**			Course Title: **Unit Operations and Instrumentation**						
Compulsory / Optional: **Compulsory**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
4	**--**	**2**	**6**	**80**	**20**	**--**	**--**	**50**	**150**

Note:

1) PR/OR marks with (*) indicates an assessment by Internal and External examiners, while PR/OR marks without (*) indicates an assessment by Internal examiner only.
2) TW marks by Progressive Assessment**.**
3) Theory paper duration is 03 Hrs. and term test duration is 01 Hr.
4) Theory Paper assessment by Internal and External examiners.

Rationale:

Instrumentation diploma holders are expected to work in process industries such as petrochemical, cement, paper chemical, textile, fertilizer industry. Fundamental knowledge of different unit operations used in the process industries is essential. This course is introduced with the view that the students will familiar with various processes and process equipments and instrumentation required for the unit operations.

Objectives: Students will be able

1. To know basic concepts of unit operation.
2. To distinguish between batch and continuous process.
3. To identify the various units.
4. To state application of various units in the process industries.
5. To draw the diagrams of different units.
6. To know the operation of different units.
7. To know the meaning of the process.
8. To explain the construction of the different units.
9. To apply the concepts and knowledge of process control to unit operation automation.
10. To explain the role of instrumentation & control for different units.

.

Section I (Marks=40)			
Ch. No.	**Contents**	**Hrs.**	**Marks**
1.	**Introduction to Unit Operations** 1.1 Basic concept of unit operations and examples 1.2 Material & energy Balances . 1.3 Batch & continuous processes. 1.4 Endothermic & exothermic reactions. 1.5 Reversible & irreversible process.	03	04
2.	**Distillation** 2.1 Definition, basic concept of distillation process , distillation column Process flow sheet symbol 2.2 Methods of distillation - flash, fractionating column : Equipment setup, diagram & operations. 2.3 Different controls for distillation column.	06	07
3.	**Evaporation** 3.1 Definition, evaporation process, evaporator types. 3.2 Methods of feeding 3.3 Single & multiple effect evaporators : diagram & operation 3.4 Forced circulation, agitated, climbing film: diagram and operations. 3.5 Capacity of evaporator 3.6 Evaporator Economy: Definition, methods of increasing economy, Vapor recompression operation 3.7 Different controls for evaporation unit.	05	07
4.	**Leaching** 4.1 Definition, basic concepts of leaching process. 4.2 Counter current leaching plant, ballman extractor : diagram and operations, controls. 4.3 Extraction :- a) Definition, b) Perforated plate extractions, tower agitated tower Extractor: diagram & operations, controls for this unit.	05	06
5.	**Gas absorption** 5.1 Definition, 5.2 Tower Packing: Different types of tower packing, diagram, operations, advantages & disadvantages applications	03	04
6.	**Humidification & de-humidification** 6.1 Definitions: humidity, saturated gas , relative humidity, humid volume, heat, dew point, enthalpy. 6.2 Brief introduction to humidity chart. 6.3 Forced draft cooling tower, dehumidification, Equipment setup: diagram, operations, applications.	05	06

7.	**Boiler :-** 7.1 Basic concept of boiler, flow sheet symbol 7.2 Types, Basic concept of low and high pressure boilers 7.3 Water tube boiler : diagram, construction and operations 7.4 Boiler controls: safety interlocks, steam pressure , drum level (feed water), steam temperature control systems.	05	06

Section II (Marks=40)			
Ch. No.	**Contents**	**Hrs.**	**Marks**
8	**Drying** 8.1 Classification: Direct(Adiabatic), Indirect(non adiabatic dryers) dryers 8.2 Factors on which rate of drying depends 8.3 Types of dryers :Tray dryer, rotary dryer, drum dryers: diagram, operation & advantages & disadvantages, applications. 8.4 Different controls	04	07
9	**Crystallization** 9.1 Definition, crystallization process curve 9.2 Formation of crystal, magma, crystal geometry. 9.3 Continuous crystallizer, draft tube baffle crystallizer: Diagram, operations, controls, applications.	05	07
10	**Mixing** 10.1 Definition 10.2 Types : pony, muller, tumbling, banbury internal screw mixer : diagram, operations, applications.	05	06
11	**Mechanical Separations** **11.1 Screening :-** a) Definition. b) Motions of screen. c) Gravity screens. d) Horizontal gyrating screens: diagram and operations. **11.2 Sedimentation:-** a) Definition. b) Types, batch and thickener. c) Sedimentation equipment: diagram and operations. **11.3 Filteration :-** a) Definition. b) Classification. c) Sand filter, cake filter : diagram, operations.	08	09
12	**Heat Exchange Equipments** 12.1 Basic concept.	03	05

	12.2 Types of heat exchange equipments: 12.3 Shell and tube heat exchanger : diagram , construction, operations, controls , applications		
13	**Applications** 13.1 Applications of the above units to various process industries like cement, oil refinery chemical, fertilizer, paper industries.	07	06

List of Assignments (Minimum Eight) for Drawing:
Different Control Schemes of following process equipments:

1. Distillation column.
2. Mixer.
3. Mechanical filters.
4. Crystallizer.
5. Dryer.
6. Extraction tower.
7. Evaporator.
8. Gas absorption unit.
9. Heat exchanger.
10. Boiler.

Students should draw the detailed drawing of above units with loop diagram on the drawing sheet and write the operation of the unit in brief.

Note :- Industrial visit shall be arranged in different process industries so that the students will see the actual unit operations, process equipments and observe their functioning and controls.

Reference Books:

Sr. No.	Name of Book	Name of Author	Edition	Publication
1.	Outline of chemical Technology	Gopala Rao & Sittiney	3rd	EWP
2.	Unit operations of chemical Engineering	MCcabe & Smith	Fourth Edition	Tata McGraw Hill
3.	Elementary Principles of chemical process	Relder, Roussequ Harridt , Willey	6th	Tata McGraw Hill
4.	Chemical Engineer's Handbook	Rerry	Sixth Edition	Tata McGraw Hill
5.	Unit operations -Vol 1 & 2	Gawane	22nd	Nirali publications
6.	Applied Instrumentation Vol 1-4	Andrew Willium	2nd	GPC
7.	Instrument Engineers Handbook Vol . –II Proecss Control	Bela G. Liptak.,Kriszta Venczel	Revised Edition	Chilton Book Company

8Programme Code: **IS**									
Course Code: **IS 11 307**			Course Title: **Control Systems**						
Compulsory / Optional: **Compulsory**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
4	**--**	**2**	**6**	**80**	**20**	**50***	**--**	**--**	**150**

Note:

1) PR/OR marks with (*) indicates an assessment by Internal and External examiners, while PR/OR marks without (*) indicates an assessment by Internal examiner only.
2) TW marks by Progressive Assessment**.**
3) Theory paper duration is 03 Hrs. and term test duration is 01 Hr.
4) Theory Paper assessment by Internal and External examiners.

Rationale:

The advancement of both knowledge and technique has resulted in the development of controls in process industry. The progression of human existence from a primitive state to the present complex technological world was paced by learning new and improved methods to control the environment.

Control means methods to force parameters in the environment to have specific values. Varying the room temperature or guiding a space craft to Saturn necessities to examine elements of control system. Nature of controller action for systems with operation and variables is highlighted for continuous values. This subject is beneficial for process control variation in any process control industry which equips the student for maintenance and quality analysis.

Objectives:

The student will be able to:

1. Learn and understand about open loop and closed loop(feedback) control systems.
2. Feedback control and transfer function.
3. Steady state, time response, and frequency response analysis.
4. Study of stability.
5. Control actions of electronic controllers.
6. Understand the compensation technique that can be used to stabilize control systems Servo system and its application.
7. Robotics.

Section I (Marks=40)			
Ch. No.	**Contents**	**Hrs.**	**Marks**
1.	**Basics of Control Systems** 1.1 Control System- Definition. 1.2 Open-loop and Closed-loop (feedback) control systems- Definition, block diagram, practical examples, and Comparison. 1.3 Effect of negative feedback on sensitivity, bandwidth, Disturbance. 1.4 Elements of Automatic or Feedback Control System	10	12

	1.5 Mathematical models: Differential equations of physical systems- electrical and mechanical systems. Developing differential equations of R-C and RLC electric circuits. Force-voltage and force-current analogy. 1.6 Laplace Transform- Significance in control system, definition, some properties. 1.7 Transfer function- Definition, derivation of transfer function for close loop control system. Order of a system- Definition, 0, 1, 2 order systems, Standard equations and practical examples. **1.8** Block diagram representation- Rules of block diagram reduction, advantages and disadvantages. **S**imple numericals.		
2.	**Time Response Analysis of Feedback Control Systems** 2.1 Time response analysis – Definitions of transient and steady state responses. 2.2 Stan Standard test input signals: Step, ramp, parabolic, impulse. Mathematical and graphical representation, transfer function form of standard test signals 2.3 Poles & zeros of control system – Definition and their types. 2.4 Time domain analysis of first order control system for unit step input, concept of time constant. 2.5 Transient response analysis of second order control system for unit step input, time response specifications, their definitions, formulae (no derivations) & effect of damping factor on second order system performance, simple numericals on transient response specifications **2.6** Steady-stare error analysis- Classification of control systems according to "Type" of systems, Steady- state error for closed loop control system, static-error constants-K_p, K_v and K_a. Steady-state analysis of different types of control systems using step, ramp and parabolic input signals. Simple numericals.	10	12
3.	**Stability of Control Systems** 3.1 s-plane – Introduction 3.2 Concept of stability – Absolutely stable, unstable, critically/ marginally stable control systems. Closed loop poles locations in s-plane and step responses for all stable/unstable systems. Relative stability. 3.3 Routh's stability criterion- necessary and sufficient conditions for stability, formation of Routh's array, limitations, different special cases , and simple numericals.	04	06
4.	**Root-Locus Analysis** 4.1 Root Locus Introduction- definition, angle and magnitude conditions, summary of general rules for constructing Root–Locus, simple numericals. 4.2 Root–Locus analysis to determine stability of control systems.	08	10

Section II (Marks=40)			
Ch. No.	**Contents**	**Hrs.**	**Marks**
5.	**Introduction to Frequency-Response Analysis** 5.1 Response of control systems to sinusoidal inputs, 5.2 frequency domain specifications, 5.3 correlation between time domain and frequency domain specifications. 5.4 Advantages and disadvantages of frequency response analysis.	06	08
6.	**Frequency-Response Plots and Stability Analysis** 6.1 Bode plot- Log magnitude and phase angle plots, definition , procedure to plot 6.2 Bode plot for different standard factors, simple numericals, Gain Margin and Phase Margin determination, and stability analysis. 6.3 Polar Plot- definition, procedure to construct polar plot, simple numericals and polar plots for standard control systems. 6.4 Nyquist stability criterion-basic concept, mapping theorem, and condition for stability.	12	14
7.	**Compensators and Controllers** 7.1 Need of compensation 7.2 Types of compensation- Series/cascade , parallel/feedback, series - parallel , feed forward compensation networks. (Definition and block diagram) 7.3 Electrical lead, lag and lead-lag compensators- Realization/Circuit diagram, standard transfer function form, s-plane representation, Bode plot representation, advantages and limitations. 7.4 Controllers- PI, PD and PID controllers- Circuit diagram, standard transfer function form, s-plane representation, advantages and limitations.	08	10
8.	**Introduction to Robotics** 8.1 What is a robot 8.2 Degrees of freedom & Robotic joints 8.3 Classification & coordinate systems / frames 8.4 Forces and moments 8.5 Actuators, DC motors, Stepper and Servo Motors 8.6 End Effectors 8.7 Robot Applications.	06	08

List of Practicals (Any eight):

1. Study the performance of open loop and closed loop control system using electronic amplifiers- OpAmps.
2. Determine the transfer function for given closed loop system in block diagram representation.
3. Plot unit step response of given first-order system and find out its time constant. Verify the performance using experiments with the first-order system circuit made of passive elements.
4. Plot unit step response of given second-order system and find out peak overshoot, peak time, rise time, settling time and steady-state error.

5. Determine the steady-state errors for Type-0,1 and 2 systems for different standard inputs.
6. Plot root Locus of given transfer function, locate closed loop poles for different values of K.
7. Plot root locus of given transfer function and to find out $s_{d1,d2}$, w_d , w_n at given root & discuss stability.
8. Plot Bode plot of given open loop transfer function and find out stability margins.
9. Plot Nyquist plot for given transfer function and to compare their relative stability
10. Plot the Nyquist plot for given transfer function and to discuss closed loop stability, gain and phase margin.
11. To design a Lead compensator and to obtain the characteristics by simulation using MATLAB/Scilab. Verify the performance using experiments with the compensator circuit made of passive elements.
12. To design a Lag compensator and to obtain the characteristics by simulation using MATLAB/Scilab. Verify the performance using experiments with the compensator circuit made of passive elements.
13. To design a Lag-Lead compensator and to obtain the characteristics by simulation using MATLAB/Scilab. Verify the performance using experiments with the compensator circuit made of passive elements.
14. To design PI and PID controllers for conceptual systems and simulate the closed loop system using MATLAB and SIMULINK or Scilab software.
15. To set up an open loop control system using Micro-processor for controlling the stepper motor
16. To set up a closed loop feedback control system using the FEEDBACK MS150 AC Modular Servo System-with velocity(rate) feed back.

(Students are expected to perform above some experiments using either MATLAB / LabView /Simulink or SCILAB software)

Reference Books:-

Sr. No.	Name of Book	Name of Author	Edition	Publication
1.	Control System Engineering	I. J. Nagrath, M. Gopal	3rd	New Age International Publishers
2.	Modern Control Engineering	K. Ogata	2nd	PHI, New Delhi
3.	Automatic Control Systems	B. C. Kuo	3rd	PHI, New Delhi
4.	Control System Engineering	Norman S. Nise	4th	John Wiley and Sons, 2003.
5.	Problems and Solutions of Control Systems	A. K. Jairath	4th	CBS Publishes, New Delhi, 2004.

Programme Code: IS									
Course Code: IS 11 401			Course Title: Microprocessor Interfacing and Microcontroller						
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
4	--	2	6	80	20	50*	--	--	150

Note:

1) PR/OR marks with (*) indicates an assessment by Internal and External examiners, while PR/OR marks without (*) indicates an assessment by Internal examiner only.
2) TW marks by Progressive Assessment.
3) Theory paper duration is 03 Hrs. and term test duration is 01 Hr.
4) Theory Paper assessment by Internal and External examiners.

Rationale:-

Now-a- days embedded systems are used in industries for many application. The students should know their design and interfacing . Fundamental knowledge of microprocessor interfacing and microcontroller is essential for diploma holder working in industry. This course is introduced to study the basic concepts of microprocessor interfacing and microcontrollers.

Objectives: - Students will be able

- To explain features of different peripheral devices.
- To write simple interfacing programs.
- To use microprocessor for measurement & control applications.
- To know the concept of micro controller.
- To understand the architecture of 8051 microcontroller.
- To differentiate between microprocessor & microcontroller.
- To write program for microcontroller
- To know the applications of microcontroller

Section I (Marks=40)			
Ch. No.	Contents	Hrs.	Marks
1.	Peripheral devices 1.1 8255 - Programmable peripheral Interface. 1.2 8259 - Programmable interrupt controller. 1.3 8279 - Programmable keyboard/display interface. 1.4 8253 - Programmable interval timer. 1.5 8251 - Programmable communication interface 1.6 8155 - Multipurpose programmable device Functional block diagram, features , operation, CONTROL WORD, COMMAND/INTIALIZATION WORD.(NO QUESTION ON MODES OF ANY ic TO BE ASKED, NO PIN DIAGRAM)	14	15
2.	Interfacing 2.1 Interfacing concept, 2.2 A/D and D/A conversion methods: TYPES Weighted binary resistance type, and Ladder resistance (R-2R) type, Digital-Ramp, ADC Successive Approximation ADC ,Flash ADC 2.2 Block diagram, operation, programs of 8 bit ADC/DAC (0808/0809) 2.3 Interfacing of A/D and D/A converter to microprocessor- program , algorithm & flowchart	08	10
3.	Data acquisition system 3.1 Basics Concept ,need of data acquisition system 3.2 Single channel & Multichannel data acquisition 3.4 Elements of DAS Block diagram and working of data acquisition system, advantages, disadvantages & Applications	02	05
4.	Applications 4.1 Applications of microprocessor 8085 i) Temperature monitoring & control system ii) Traffic light control system iii) Stepper motor speed control Diagram, algorithm, flowchart, interfacing program.	08	10

Section II (Marks=40)			
Ch. No.	Contents	Hrs.	Marks
5.	Introduction to Microcontroller 5.1 Definition 5.2 Difference between microprocessor & microcontroller Advantages & disadvantages of microcontroller 5.3 Various microcontrollers & their manufactures 5.4 Specification of MCS-51 microcontroller. 5.5 Basic concept of embedded system, advantages, application	02	04
6.	Microcontroller 8051 6.1 Introduction 6.2 8051 microcontroller block diagram-function of each block 6.3 Input/ Output pins -identify 6.4 Ports & circuits- features On chip RAM organization 6.5 External memory- RAM,EPROM interfacing 6.6 Counters & timer- CIRCUIT DIAGRAM & working 6.7 Serial data input/ Output, Interrupts- types, priority (no pin diagram of 8051)	10	14
7.	Instruction set & programming of 8051 Addressing modes 7.1 Instruction set 7.2 Moving data – Bit operation 7.3 Logical operations 7.4 Arithmetic operations. 7.5 Jump & call instructions. 7.6 Programs for simple arithmetic & logic problem.	12	14
8.	SFR's of 8051 8.1 Types of SFRs – PSW, TMOD , TCON, SCON, SBUF, IE , IP , PCON. 8.2 Format of SFR, significance of each bit of SFR's 8.3 Program for using timer 8.4 Serial data communication.	08	08

LIST OF PRACTICALS (Eight practicals)

Section I (Any TWO)

Practicals should be performed on 8085 microprocessor

1. Interfacing of ADC 0809 /DAC 0808.
2. Traffic light control .
3. Interfacing of multiplexed seven segment display.
4. Interfacing of relay and thumb wheel switch.

Section-II (Any SIX)

Programs using 8051

1. To Add two 08 bit & 16 bit numbers.
2. To Subtract two 08 bit & 16 bit numbers.
3. To Multiply two 08 bit & 16 bit numbers.
4. To Divide two 08 bit & 16 bit numbers.
5. To arrange 08 bit numbers in a ascending order.
6. To arrange 08 bit numbers in descending orders.
7. To find one's complement of 16 bit number.
8. To find two' complement of 16 bit number.
9. To generate square wave.

Above mentioned some programs can be using simulation software.

Reference Books:-

Sr. No.	Name of Book	Name of Author	Edition	Publication
1.	Microprocessor & Interfacing	Douglas V. Hall	--	McGraw Hill Publication
2.	Microprocessor with applications in process control	S. I. Ashon	--	Tata McGraw Hill
3.	Microprocessors	B.Ram	7th Edition	Tata McGraw Hill
4.	Microprocessor & microcomputer system	Guti Guthikanda V. Rao	------	----
5	Microcontroller and Embedded system	M.A.Mazidi	12th edition	Pearson Education
6.	Intel 8051 microcontroller	James W. Stewart	--	-----
7.	The 8051 microcontroller	Kenneth J. Ayala	3RD Edition	DelMar
8.	Programming & customizing the 8051 microcontroller	Myke Predko	---	Tata McGraw Hill

Programme Code:IS									
Course Code: **Mg 11 517**	Course Title: **Entrepreneurship Development**								
Compulsory / Optional: **Optional**									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
3	**--**	**--**	**3**	**80**	**20**	**--**	**--**	**--**	**100**
Theory Paper assessment is External and Internal									

Rationale:

Basically entrepreneur is a person responsible for setting up a business or an enterprise. He is an important input of economic development of the country. Talented personalities are exploring new opportunities into business ventures such as BPO, contact manufacturing, trading, service sectors etc.

Entrepreneur puts up new projects that create wealth and opens up many employment opportunities.

This subject/course is introduced to encourage the Diploma-Engg. Holders to make a profitable carrier by self employment in limited and highly competitive market

Objectives:

The students will be able to

- Understand the basic concept of entrepreneurial process, scope and various support systems to entrepreneur.
- Marketing techniques.
- To prepare the business plan (project report).
- Develop awareness about enterprise management.

Section I		
Contents:	**Hours**	**Marks**
1.Introduction: 1.1 Definition of Entrepreneur 1.2 Characteristics of Entrepreneur 1.3 Functions of an Entrepreneur 1.4 Barriers to Entrepreneur 1.5 Distinction between Entrepreneur and Manager 1.6 Women Entrepreneur-problems and developing trends 1.7 Entrepreneurship-definition, need, EDP	**10**	**14**

2.Scope: 2.1 Trading, consultancy, franchises, service sectors, emerging areas 2.2 Small enterprise 2.2.1 Definition, characteristics, types. 2.2.2 Problems faced by SSI 2.2.3 Industrial sickness-causes and corrective measures	**08**	**14**
3.Support Systems: 3.1 Functions of supporting institutes. (MSME, SIDBI, DICS, SSIB, NSIC, MITCON, TCO's, MIDC.) 3.2 Govt. agencies and functions of financial institutes (IDBI, IFCI, ICICI, SFC, LIC, NABARD, KVIC, Banks.) 3.3 Industrial estates	**06**	**12**

Section II		
Contents:	**Hours**	**Marks**
4.Project/Business Plan: 4.1 Meaning of project 4.2 Project classification 4.3 Project identification- ideas, opportunities 4.4 Project selection (SWOT analysis) 4.5 Project report. Definition, importance, contents 4.6 Project appraisal (Definition, Techno-economical feasibility of report, cost benefit analysis.)	**12**	**16**
5.Marketing:	**08**	**14**

5.1 Concept of Marketing and selling. 5.2 Functions of marketing 5.3 Market Research 5.4 Product development process 5.5 Product life cycle.		
6.Modern Trends: 6.1 Management of SSI. 6.2 E-commerce. 6.3 Global trends and opportunities. 6.4 Steps in starting a SSI	**04**	**10**

Reference Books:

1. Entrepreneurship Development by S.S.Khanka, Publisher: S.Chand & Company: Fifth Edition.
2. Dynamics of Entrepreneurial Development and Management by Vasant Desai, Publisher: Himalaya Publishing House: Third Revised Edition
3. Entrepreneurship Development by Colombo plan staff college for Technical education. Publisher: Tata McGraw Hill, Education
4. Entrepreneurship Development Special Edition for MSBTE, Publisher: Tata McGraw Hill, Education
5. A Manual on How to Prepare a Project Report by J.B.Patel, D.G.Allampally, Publisher: EDI Study Material, Ahmadabad
6. Entrepreneurship Development by E. Gorden, K.Natrajan, Publisher: Himalaya Publishing, Mumbai
7. A Manual on Business Opportunity Identification & Selection by J.B.PatelS.S.Modi, Publisher: EDI Study Material, Ahmadabad
8. National Derectory of Entrepreneur Motivator & Resource Persons by S.B.Sareen, H. Anil Kumar, Publisher: EDI Study Material, Ahmadabad
9. New Initiatives in Entrepreneurship Education & Training by Gautam Jain, Debmuni Gupta, Publisher: EDI Study Material, Ahmadabad
10. A Handbook of New Enterpreneurs by P.C.Jain, Publisher: EDI Study Material, Ahmadabad
11. Evaluation of Enterpreneurship Development Programmes by D.N.Awasthi , Jose Sebeastian, Publisher: EDI Study Material, Ahmadabad
12. The Seven Business Crisis & How to Beat Them by V.G.Patel, Publisher: EDI Study Material, Ahmadabad
13. Entrepreneurship Development of Small Business Enterprises by Poornima M. Charantimath, Publisher: Pearson Education, New Delhi
14. Entrepreneurship: Theory and Practice by J.S. Saini, B.S.Rathore, Wheeler Publisher,New Delhi
15. Entrepreneurship Development, Publisher: TTTI, Bhopal / Chandigarh

Programme Code: **IS**									
Course Code: **IS 11 312**			Course Title: **Project and Seminar Stage-I**						
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
--	**--**	**4**	**4**	**--**	**--**	**--**	**25 (Seminar)**	**--**	**25**

Note:

1) PR/OR marks with (*) indicates an assessment by Internal and External examiners, while PR/OR marks without (*) indicates an assessment by Internal examiner only.
2) TW marks by Progressive Assessment**.**
3) Theory paper duration is 03 Hrs. and term test duration is 01 Hr.
4) Theory Paper assessment by Internal and External examiners.

O B J E C T I V ES:

- The basic objective of a project work should be to ignite the potential of students' creative ability by enabling them to develop something which has social relevance, aging, and it should provide a taste of real life problem that a diploma-holder may encounter as a professional.

- Project work is intended to provide opportunity for students to develop an understanding of correlation between different courses learnt in the entire diploma programme and to apply the knowledge gained in a way that enables them to develop & demonstrate higher order skills.

It will be appreciated if the polytechnics develop interaction with local industries and local developmental agencies viz. different *Panchayat* bodies, the *Municipal corporations,* etc. for choosing topics of projects and / or for case study. Students should devote themselves to make a project which preferably should be a working model of their thoughts based on their subject of choice.

G E N E R A L G U I D E L I N ES:

1. Project work is conceived as a group work through which the spirit of team building is expected to be developed. Students shall take a project in a group (group size is of 2-5 students) in the beginning of fifth semester in consultation with project guide and the project must be completed by end of semester.

2. Students will be required to carry out their Project Works in groups under the supervision of faculties of their core discipline who will work as Project Guides. The respective project guide should regularly monitor the progress of project work.

3. The project work must be carried out either in institute (in-house project) or in industry (in case of industry sponsored project).

4. The project pre-synopsis/proposal (3-4 pages) must be submitted in the institute at the beginning of fifth semester. While submitting a project pre-synopsis/proposal care is to be taken that project will be completed within the available time of two semesters (5^{th} and 6^{th} semesters).

5. Project title should be precise and clear.

6. Selection and approval of project topic:

    - Project topic should be related to real life or industrial applications.
    - Project topic must be designed and implemented by Instrumentation/Electronics concepts/techniques.
    - The investigation of practical problems in process/machine automation and their proposed solutions can be worked out.
    - Investigation of the latest development in a specific field of Instrumentation is also accepted.
    - Software development project related to Instrumentation is also accepted.
    - The Microprocessor / Microcontroller/ PLC/SCADA/DCS based application based project is preferable.
    - Interdisciplinary projects should be encouraged.

7. The project group in fifth semester is expected to complete following tasks
    - Selection of project topic
    - Literature survey
    - Planning and design of project
    - Identification/selection of required hardware components and software.
8. The project group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by project guide in every week.

9. At the end of 5th semester, seminar report must be prepared on project work done in fifth sem and must be submitted in the prescribed format only. No variation in the format will be accepted.

"Format of seminar report"

Major Contents:

i. Introduction
ii. Literature survey
iii. Theory: 1) Planning and design 2) Methodology 3) Applications
4) Advantages and Disadvantages.
iv. Future scope
v. Conclusion
vi References.

(No. of copies of seminar report to be prepared = S+2, where S is no. of students.)

10. Assessment of the project and seminar stage-I for award of Oral marks (25 marks) shall be based on seminar delivered. Assessment will be done by an internal department committee (consisting of respective guide and one faculty) as per following prescribed format.

ASSESSMENT SHEET

TITLE OF PROJECT TOPIC: _____

NAME OF PROJECT GUIDE:_____

Sr. No.	Enroll-ment No.	Name of Student	Assessment by Internal Examiner					Grand Total
			Topic Selection 5	Literat--ure Survey 5	Seminar Report Writing 5	Depth of Under--standing 5	Present--ation 5	25