

Programme Code: IS									
Course Code: IS 11 305				Course Title: Calibration and Standards					
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: This subject is introduced with a view that the student will be exposed to calibration of various transducers & electronics instrument. Also they will get exposure about various standards available in industry.

Objectives: - Students will be able to

- Calibrate different types of transducers.
- Understand the procedure calibration for different electronics instruments, transducers & transmitters
- Know the Standards available in industry

Section I (Marks=40)			
Ch. No.	Contents	Hrs.	Marks
1.	Introduction 1.1 Need of calibration 1.2 Calibration standards 1.3 ISO9000: Requirement of Calibration 1.4 General steps of calibration	04	06
2.	Calibration of Temperature measuring & controlling instruments 2.1 Procedure of calibration as per ASTM method 2.2 Calibration of Water bath, oil bath, dry bath 2.3 Calibration of PT-100 & Thermocouple 2.4 Calibration of Pyrometer 2.5 Calibration of Temperature indicator & controller 2.6 Smart temperature transmitter Calibration	10	12
3.	Calibration of Pressure measuring & controlling instruments 3.1 Pneumatic Calibrators: Dead Weight Tester, Manometers 3.2 Portable Pressure Calibrator 3.3 Procedure of calibration as per BIS standard 3.4 Calibration of Elastic transducers: Diaphragms, Bellows, Bourdon Tube 3.5 Calibration of electrical pressure transducers 3.6 Calibration & setting of P/I & I/P converters 3.7 Calibration of Smart pressure transmitter 3.8 Calibration of Load Cell	12	14
4.	Calibration of level measuring & controlling Instruments 4.1 Calibration of Air purge level indicator 4.2 Calibration of level recorder 4.3 Calibration of Smart level transmitter	06	08
Section II (Marks=40)			
Ch. No.	Contents	Hrs.	Marks
5.	Calibration of flow measuring & controlling instrument 5.1 Procedure of calibration as per IS methods 5.2 Flow meter calibration method 5.3 Rotameter & Orifice plate erection & calibration 5.4 Smart flow transmitter calibration	10	12
6.	Calibration of control valve 6.1 Calibration of Air to open & Air to close Control Valve 6.2 Calibration of control valve	06	08
7.	Calibration of Electronic Test & Measuring Instruments 7.1 Calibration of CRO 7.2 Calibration of Function generator 7.3 Calibration of Digital Milimeters	06	08
8.	Standards 8.1 Signal Standards 8.2 Bus/data transfer Standard 8.3 Communication Standards	10	12

List of Practicals (Any eight):

1. Calibration of PT – 100 & Thermocouple
2. Calibration of pyrometer
3. Calibration of smart temperature transmitter
4. Rotameter & orifice plate calibration
5. Flow meter calibration
6. Smart flow transmitter calibration
7. Calibration of Air purge level indicator
8. Calibration of smart level transmitter
9. Calibration of elastic pressure transducer
10. Calibration of pressure transmitter
11. Calibration of Pneumatic Control Valve
12. Calibration of electronics test & measuring instruments

Reference Books:

Sr. No.	Name of Book	Name of Author	Edition	Publication
1.	Calibration: A technical Guide	Mike cable	-	ISA
2.	Instrumentation reference book	B.E. Noltingk	-	Butterworth International
3.	Instrumentation for Engineering Measurement	Dally, Riley, McConnell	-	John Wiley & Sons
4.	Instrumentation Devices & Systems	Rangan, Mani, Sharma	-	-

Programme Code: IS									
Course Code: IS 11 308				Course Title: Electronic Measuring Instruments					
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 need for more precise measurement in the areas of industry has increased the use of electronic instruments. Electronic measurements have become **crucial** machines able to perform complex task in large variety of environments, moreover such systems are found in every area of Science & Technology.

Measurement systems are realization of technical concepts able to gather, modify, store, retrieve and present information. This course is introduced with the view that the students will be familiar with various electronics instruments and measuring techniques.

OBJECTIVES: After studying this course, students will be able to

- Know the constructions of the instruments.
- Understand the principles of different measuring instruments.
- Know the calibration procedure of the instrument.
- Explain the function of measuring instrument using block diagram/Circuit diagram.
- Select the appropriate equipment for measurement.

Section I (Marks=40)			
Ch. No.	Contents	Hrs.	Marks
1.	Introduction to Measurement System 1.1 Introduction to Measurement or Instrumentation system. 1.2 Static & Dynamic Characteristics of Instruments. 1.3 Types of instrument errors. 1.4 Sources of errors. 1.5 Standards –International, Primary, Secondary, Working standards. 1.6 Electrical standards- Absolute Ampere, Resistance and voltage standards. 1.7 Calibration- Necessity and Significance.	06	08
2.	AC & DC Bridges: 2.1 DC Bridges:-Wheatstone & Kelvin double Bridges. 2.2 AC Bridges :-Maxwell, Hay, Schering, Wein Bridges. 2.3 Types of Bridge null detectors. 2.3 Basic concept of Wagner's earth (ground) connection. Diagram, bridge balance conditions, equations, working and applications of above bridges.	06	08
3.	Electronic Instruments: 3.1 Concept of Analog and digital instruments. 3.2 Concept of indicating instruments. 3.3 Concept of Recording and integrating type instruments: PMMC, Electrodynamometer and Moving-Iron meter. 3.4 DC Ammeters. 3.5 DC Voltmeters. 3.6 True RMS Voltmeter. 3.7 Ohmmeter-Series & Shunt type. 3.8 Multi-meter : Analog & Digital 3.9 Dual slope Integrating type D.V. M. 3.10 Uses of current and potential transformers. 3.11 Output Power meter. 3.12 Phase meter. 3.13 Digital IC tester Block Diagram, construction, operation/working principle, calibration, applications of above instruments.	16	18
4.	Q Meter: 4.1 Basic Q meter circuit. 4.2 Measurement methods of Q meter: direct, series and parallel connections. Circuit diagram, working, and applications.	04	06

Section II (Marks=40)			
Ch. No.	Contents	Hrs.	Marks
5.	Cathode Ray Oscilloscope : 5.1 Basic concept. 5.2 Block Diagram of CRO. 5.3 Cathode Ray Tube-Features. 5.4 Working Principle of CRO. 5.5 Vertical deflection system. 5.6 Horizontal deflection system. 5.7 Trigger sweep and Delay Line. 5.8 Front panel controls of an analogue CRO . 5.9 Types :Dual Trace & Dual Beam CROs. 5.10 Sampling CRO: Block diagram, working, applications. 5.11 Digital storage oscilloscope: Block diagram, working, applications. 5.12 Specifications of single beam dual trace CRO . 5.13 Voltage, Time period, Frequency, and Phase angle measurements. 5.14 Use of Lissajous patterns for phase and frequency measurements. 5.15 Testing of Electronic Components using CRO. 5.16 Probes for CRO: Current, RF Demodulator Probes. 5.16 Placing CRO in operation.	16	18
6.	Signal Generators: 6.1 Sine wave Generator. 6.2 Sweep frequency Generator. 6.3 Pulse and square wave Generator. 6.4 Function Generator. 6.5 Universal counter: Measurement of frequency, Time, Period, Ratio. Block diagram, Principle, working, applications of above signal generators.	06	08
7.	Signal Analysis: 7.1 Wave analyzer. 7.2 Harmonic distortion analyzer.. 7.3 Spectrum analyzer Basic concept, block diagram, principle, working, applications of above instruments.	04	06
8.	8.1 ADC and DAC techniques, types, and their specifications, 8.2 V to F converter, 8.3 Sample and hold circuit, 8.4 Analog multiplexer, 8.5 Data loggers.	06	08

List of Practicals (Any eight):

1. Measurement of AC/DC current, AC/DC voltage and Resistance using digital multimeter :
Constructional details of analog multimeter
2. Measurement of AC/DC current, AC/DC voltage and Resistance using :Analog Multimeter:
Constructional details of analog multimeter
3. Testing of digital ICs using IC Tester
4. Measurement of frequency, duty cycle, time ratio using Digital Frequency Counter.
5. Study of front panel controls of dual trace CRO
6. Measurement of voltage, phase angle, frequency-using CRO.
7. **Measure phase angle and frequency using Lissajaceous pattern on CRO.**
8. **Study of DSO - measurement of response time. of relay using DSO.**
9. Measurement of Q using Q- meter.
10. Measurement of harmonic distortion using Distortion meter.
11. Measurement of frequency, period, time using universal counter.
12. Observation of sine, square & triangular waveforms on function Generator.
13. Measurement of inductance/capacitance using **AC Bridges.**
14. Measurement of **low resistance using Kelvin Double Bridge.**
15. **Study and application of ADC 0809**
16. **Study and application of DAC 0808**

Reference Books:

Sr. No.	Name of Book	Name of Author	Edition	Publication
1.	Electronic Instrumentation	H. S. Kalsi	Second Edition	Tata McGraw Hill
2.	Modern Electronics Instrumentation & Measurement Techniques	Albert D. Helfrick & William D. Cooper.	Eastern Economy Edition (EEE)	Prentice Hall India
3.	A Course in Electrical and Electronics Measurement and Instrumentation	A. K. Sawhney	Seventh Edition	Dhanpat Rai & Co
4.	Electronic Instruments Handbook	Coomb	Second Edition	Tata McGraw Hill
5.	Elements of Electronic Instrumentation & Measurement	Carr	Second Edition	Prentice Hall

Programme Code: IS									
Course Code: IS 11 404				Course Title: Biomedical Instrumentation					
Compulsory / Optional: Optional									
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:-

As the world's population grows, the need for health care increases. In recent years progress in medical care has been increasing.

Bio-medical instrumentation helps measurements of biological variables. Nowadays varieties of instruments are used in the diagnosis and treatments of diseases in the health care. This course is introduced with the view that the students will know the basic theory of different biomedical instruments/equipments.

Objectives: - Students will be able

- To draw the block diagram of the medical equipment.
- To explain the construction and operation of medical equipment.
- To understand the output waveforms of the equipment.(ECG)
- To know the biomedical transducers/ electrodes, used in the medical field.
- To understand the patient safety.
- To understand the various physiology systems.

Section I (Marks=40)			
Ch. No.	Contents	Hrs.	Marks
1.	Introduction 1.1 Specifications of biomedical instrumentation system Range, sensitivity, linearity, hysteresis, frequency response, accuracy, signal to noise ratio, stability, isolation. 1.2 Man- Instrument system : components, block diagram, working 1.3 Problems encountered in measuring a living system.	06	08
2.	Bioelectric signals and /electrodes 2.1 Bioelectric signals:- a) Origion of bioelectric signals b) Resting and action potential. c) Introduction to typical bio-electric Potential/signal e.g. ECG, EEG, ERG, EOG, EGG. 2.2 Electrodes:- a) Electrode theory b) Types of electrodes: ECG, EMG, EEG c) ECG electrodes- construction, working, specifications.	08	10
3.	Various physiological system 3.1 Cardiovascular system: Cardiovascular circulation, heart internal structure, heart sounds 3.2 Respiratory system:- physiology, mechanics of breathing, lung volume and capacities. 3.3 Nervous system:- anatomy, neuronal communication, organization of brain, neuronal firing measurements.	12	13
4.	Biomedical Recorders 4.1 ECG system :- Block diagram, description, leads - unipolar, bipolar, placement of electrodes, effects of artifacts on ECG recording. 4.2 EMG;- block diagram, description.	06	09

Section II (Marks=40)			
Ch. No.	Contents	Hrs.	Marks
5.	Measurements 5.1 Measurement of heart rate, heart sound. 5.2 Principle of B. P. measurement. Direct and indirect methods, block diagram, working. 5.3 Measurement of respiration rate: spirometer, thermistor method , CO2 method of respiration rate measurement. 5.4 Measurement of blood flow : Plethysmography. 5.5 Audiometry: basic concept, audiometer: block diagram ,working	14	20
6.	Life support equipments and imaging 6.1 Defibrillators:- Types, Dc defibrillator: diagram, working, response. 6.2 Pacemakers:- Pacemaker systems, internal & external pacemaker, block diagram, working, pacing methods. 6.3 Imaging: 1 X-ray machines: Block diagram ,working 2 CT scan: Basic concept of CT scan, applications 3 MRI: basic concepts ,applications 4 Ultrasonography: Basic concept ,applications	12	14
7.	Electrical safety 7.1 Electric shock hazard: Basic concept, Microshocks / macroshocks, Effect of electric current on human body 7.2 Various types of leakage currents and methods to reduce it: various types of insulations	06	06

List of Practicals (Any eight):

1. Plotting of ECG.
2. To observe the response of human ear with audiometer
3. Study of various electrodes used in measurement of various physiological parameters.
4. Measurement of blood pressure using indirect measurement.
5. Observe the functioning of DC defibrillator system.
6. Observe working of external pacemaker.
7. Measurement respiration rate using respiration rate meter.
8. Measurement of cardiac monitor.
9. Measurement of heart rate by using heart rate meter.
10. Study of CT scanner and Study of MRI.

Reference Books:-

Sr. No.	Name of Book	Name of Author	Edition	Publication
1.	Introduction to Biomedical Equipment	Carr and Brown		Tata McGraw hill
2.	Biomedical instrumentation and measurements	Cromwell, Weibell, Pfeiffer	7th	Prentice Hall India
3.	Handbook Of Biomedical Instrumentation	R.S. Khandpur	--	Tata McGraw hill
4.	Medical instrumentation : Application & Design	John G. Webster	3rd	John Wiley and Sons Inc.

Note:-

Students visit shall be arranged to hospitals for observing the functioning of various biomedical equipments.

Programme Code: IS									
Course Code: IS 11 407				Course Title: PLC and SCADA					
Compulsory / Optional: Optional									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
2	--	4	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 days PLC& SCADA systems are used in most of the industries for automation. PLC& SCADA systems are used for controlling various the plant operations. So the knowledge of PLC& SCADA system is essential to the instrumentation diploma holder. This course is introduced with the view that the students of instrumentation must be familiar with PLC& SCADA systems and their application in industries.

Objectives: - Students will be able

- To understand the concepts of PLC& SCADA system.
- To understand the operation of PLC& SCADA system
- To know the application of PLC& SCADA system.
- To know the specification of PLC& SCADA system.
- To know the programming of PLC.
- To state the elements of PLC& SCADA system.
- To draw the ladder diagrams for given problem.

Section I (40 marks)			
Ch. No.	Contents	Hours	Marks
1.0	Introduction to PLC 1.1 Need of automation 1.2 Advantages of automation 1.3 Introduction of PLC 1.4 Advantages & Disadvantages 1.5 Block diagram and functions of elements of PLC 1.6 Status indicators: Fault, Run, Power, Fault 1.7 Programming devices types 1.8 Operation of PLC 1.9 Types of PLC: fixed and modular PLC 1.10 Types of Programming Language (Introductory approach) 1.11 Specifications of PLC	02	06
2.0	PLC Instructions 2.1 Basic concept of ladder 2.2 Rules of ladder 2.3 Classification of PLC instructions 2.3.1 Bit type instructions: XIC,XIO,OTE,OTL,OUT,OSR 2.3.2 Logical instructions : OR,AND,NOT,XOR 2.3.3 Comparison instructions: EQU,NEQ,LES,LEQ,GRT,GERQ,LIM 2.3.4 Timer :TON,TOFF,RTU 2.3.5 Counter: CTU,CTD,HSC 2.3.6 Maths : ADD,SUB,MUL,DIV 2.3.7 Advanced maths : SCP 2.3.8 Data transfer :MOV,COP,MVM 2.4 Data files	06	14
3.0	Modules and I/O Devices 3.1 Basic concept of module 3.2 Types of modules 3.3 Input modules and output modules : DC module, Analog input Output module , special, modules :basic concepts, block diagram 3.4 Digital and Analog I/O devices : Limit switch, proximity switch, ,potentiometer, RTD, relay, selector switch, thumbwheel: Basic concepts 3.5 Wiring diagram for connection of I/O devices ,concept of sourcing & sinking	02	06
4.0	Commissioning & Troubleshooting of PLC 4.1 Mounting 4.2 Commissioning 4.3 Troubleshooting: basic concept, troubleshooting flowchart	02	04
5.0	Application Examples 5.1 Batch process Control 5.2 Diesel generator set control 5.3 Drum/Bottle Filling System 5.4 Traffic light control 5.5 Basic concept of VFD, Activating VFD through PLC System diagram, logic, I/O listing, ladder diagram	04	10

Section II (40 marks)			
Ch. No.	Contents	Hours	Marks
6.0	Introduction to SCADA 6.1 Introduction. 6.2 History of SCADA 6.3 Definition 6.4 Elements of SCADA 6.5 Benefits of SCADA 6.6 Types of SCADA: Single master single remote, single master multiple control, multiple master multiple control 6.7 Block diagram of SCADA	03	08
7.0	Remote Control Unit 7.1 Introduction 7.2 Block diagram 7.3 Elements of RTU systems 7.3.1 Communication subsystems 7.3.2 Logic subsystem 7.3.3 Termination subsystem 7.3.4 Power supply subsystem 7.4 Advanced RTU applications.	02	04
8.0	SCADA software:RSVIEW32 8.1 Features of RSview32 8.2 Various of editors of RSVIEW32 8.3 Concept of tag, types of tags, addressing tags 8.4 Configuration of SCADA(RSVIEW32) 8.5 Alarm generation, trend- types	03	08
9.0	Communication protocols 9.1 Network topologies- types Define protocol 9.2 RS232- features, advantages & disadvantages 9.3 RS488 features, advantages & disadvantages 9.4 HART protocol- definition,working,features 9.5 Field bus - definition,features advantages & disadvantages 9.6 Ethernet- types, features, advantages & disadvantages	04	10
10.0	Applications 10.1 simple program using SCADA, 10.2 Use of SCADA for elevator control 10.3 Water distribution system Mimic diagram ,program, device addressing, animation, alarm generation	04	10

LIST OF PRACTICALS : (Any Twelve Practicals)

1. Development of basic logic functions using ladder logic.
2. Develop ladder diagram for Traffic control system and test it through PLC.
3. Develop the ladder program for counting the objects and test it with the PLC
4. Develop the ladder program and test it : batch process, drum/bottle filling system, DG set
5. Develop Simple programs on Comparison and maths instructions and test it
6. Temperature measurement using PLC
7. Interfacing of I/O devices to PLC
8. Configuration of RSVIEW 32 In Touch software
9. Creation of analog, digital tags and addressing of these tags
10. Testing of I/O devices with SCADA system.
11. Creation and configuration of alarms.
12. Observation of trends of variables.
13. Develop ladder logic and graphics for SCADA applications (boiler control, packing systems and materials handling system).
14. Interfacing SCADA with ladder logic.
15. Observation of real time & historical data from any process with SCADA
16. Activating VFD through PLC
17. Modification of ladder diagram program of any node

Note : 1 Practicals shall be performed on Allen -Bradley and Siemens PLC and RSView 32 and In Touch (Wonderware) SCADA software.
 2 Industrial visit shall be arranged to observe actual applications of PLC and SCADA systems

Reference Books:-

Sr. No.	Name of Book	Name of Author	Edition	Publication
1.	Programmable logic control	George Batten, Jr.	II Edition	Mc Graw Hill
2.	Introduction to Programmable logic controllers	Gary Dunning	II Edition	Thosman Asia Pvt.Ltd.
3.	SCADA: supervisory control and data acquisition	Stuart A. Boyer	II Edition	ISA Publication
4.	Programmable Logic Controller	V. R. Jadhav	I Edition	Khanna Publications
5.	Instrument Engineers Handbook	Bela G. Liptak.,Kriszta Venczel	Revised Edition	Chilton Book Company

Programme Code: IS									
Course Code: MG 11 512				Course Title: Industrial Organization and Management					
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
04	--	--	04	80	20	--	--	--	100

*** This subject is considered for the award of class.**

Rationale:-

Management concepts are universal and it is a multidisciplinary subject. They are equally applicable to different types industries like Manufacturing, Service and Trade as well as different kind of business activities like industry, army, school, hospital, retail shops etc. Also, at the end of diploma course polytechnic students are expected to enter in to the Industrial Environment. This environment is altogether different and new to the students. A proper introduction and understanding of management fundamentals is therefore essential for all these students.

Contents of the this subject will enable the students to address various issues related to human resource, finance, materials, legislations etc. by use of basic principles of management. This will ensure that students will play their role effectively to enhance the quality of business output in total.

Objectives:-

The students will able to:

1. Familiarize them with environment related to business processes.
2. Know the management aspects of the organisation
3. Understand Role & Responsibilities of a Technician
5. Appreciate the importance of ethics, corporate social responsibility and quality

Section I		
Contents:	Hours	Marks
01 BUSINESS 1.1 Definition 1.2 Characteristics 1.3 Classification 1.4 Objectives 1.5 Types of Business organizations 1.6 Business environment 1.7 Globalization and its effects on Indian economy 1.7 Business Ethics and Social Responsibility 1.8 Major areas of Indian industry	6	10
02 ORGANIZATION.	8	12

2.1	Definition, Need.		
2.2	Essentials		
2.3	Types of organization Structures (line, functional, line & staff)		
2.4	Forms of organizations (Proprietorship, partnership, joint stock companies, Govt. Enterprises, co-operative enterprises)		
03	INDUSTRIAL ACTS.		
3.1	Factory Act	6	10
3.2	Industrial dispute act		
3.3	Pollution control act		
3.4	Indian Electricity act		
3.5	Industrial safety (Accident, causes and prevention)		
04	ADMINISTRATION.		
4.1	Definition	4	8
4.2	Difference between Administration & Management		
4.3	Types of administration (centralized, individual)		
4.4	Roles, Responsibilities & functions of administrator		
4.5	Problems associated with administration		

Section II			
Contents:		Hours	Marks
05	MANAGEMENT.		
5.1	Concept, Definition	8	12
5.2	Scientific Management		
5.3	Levels of Management & their duties		
5.4	Principles of Management		
5.5	Functions of Management		
5.6	Management strategies- MBO, MBP, MBE (Management By Objective, Participation, Exception)		
06	FINANCIAL MANAGEMENT.		
6.1	Objectives	5	10
6.2	Types of Capitals		
6.3	Sources of Finance		
6.4	Break Even Analysis, Profit-loss Accounts, Balance Sheet		
6.5	Taxes (Sales Tax, Income Tax, VAT, and Excise.)		
07	HUMAN RESOURCE MANAGEMENT		
7.1	Functions of Personnel Management	4	6
7.2	Staffing- manpower planning, Recruitment, Selection,		
7.3	Training (Definition, Objectives, Types)		

08 MATERIALS MANAGEMENT. 8.1 Purchase Procedure 8.2 Inventory (Definition, Types) 8.3 Inventory Control (ABC analysis, EOQ concept)	4	6
09 TOTAL QUALITY MANAGEMENT 9.1 Concept, Definition 9.2 Principles of Total Quality(TQ) 9.3 Total Quality(TQ) management practice	3	6

Note: There will be home assignments(minimum five) based on the **Case Studies** discussed at the end of the topic. The faculty shall identify the **Case Studies** and make them available to students at the commencement of the session. This is aimed at developing the better insight into the subject. However no questions shall be asked on the **Case Studies**, while setting the theory question paper.

Reference Books:

1. Industrial Engineering and Management, Author – Dr. O.P.Khanna , Publisher – Dhanpat Rai & Sons New Delhi.
2. Industrial Engineering & Management, Author – Banga and Sharma, Publisher – Khanna Publication
3. Business Administration and Management, Author – Dr. S.C.Saksena, Publisher – Sahitya Bhavan Agra
4. The Process of Management, Author – W.H.Newman E. Kirby Warren Andrew R. McGill, Publisher – Prentice – Hall

Programme Code: IS									
Course Code: IS 11 313				Course Title: Project and Seminar Stage-II					
Compulsory / Optional: Compulsory									
Teaching Scheme and Credits				Examination Scheme					
TH	TU	PR	Total	TH	TS	PR	OR	TW	Total
--	--	4	4	--	--	--	50*	25	75
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.									

OBJECTIVES:

- To develop, fabricate/implement the project
- To test the project and evaluate its performance
- To give live demonstration of project
- To participate in different national/international project competitions
- To prepare technical paper and participate in various national/international conferences.

GENERAL GUIDELINES:

1. The Project groups of fifth semester will continue the project work in sixth semester and complete project in all respect (fabrication, assembly, development of control logic, implementation, testing, and validation).
2. The group should maintain a logbook of activities. It should have entries related to the work done, problems faced, solution evolved etc., duly signed by respective guide in every week.
3. The guides should regularly monitor the progress of the project work.
4. The project work along with project report should be submitted as part of term work in third year sixth semester on or before the term end date.
5. Project report must be submitted in the prescribed format only. No variation in the format will be accepted.

"Format of Project Report"***Major Contents:***

- i. Introduction
- ii. Literature survey
- iii. Detailed Theory:
 - 1) Planning and design
 - 2) Development and Implementation work

- 3) Methodology
- 4) Applications
- 5) 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 in group.)

6. The project group shall present the final project live and give presentation on it using overhead projector or power point presentation on LCD to the internal department committee for assessment of the project for award of TW marks. Assessment will be done by an internal department committee (consisting of respective guide and two 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 Department Committee					Grand Total
			Fabrication/ software/ actual work	Execution of project	Project Report Writing	Scope/ Utility/ Cost	Present-ation	
			5	5	5	5	5	25

7. The evaluation of project work at final oral examination should be done jointly by the internal and external examiners. The guide should be internal examiner for oral examination. The external examiner should be from the related area of the concerned project. He/She should have minimum of five years of experience at institute level or industry.