MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME : DIPLOMA IN INSTRUMENTATION/ DIPLOMA IN INSTRUMENTATION & CONTROL

COURSE CODE : IS/IC

DURATION OF COURSE : 6 SEMESTERS **WITH EFFECT FROM 2012-13**

SEMESTER : FIFTH **DURATION : 16 WEEKS**

PATTERN : FULL TIME - SEMESTER **SCHEME : G**

SR. NO.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME								SW (17500)
							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
				TH	TU	PR		Max	Min	Max	Min	Max	Min	Max	Min	
1	Computer Hardware & Networking β	CHN	17533	02	--	02	02	50	20	--	--	--	--	25@	10	50
2	Microcontroller β	MIC	17534	03	--	02	03	100	40	50#	20			25@	10	
3	Control Systems	CSY	17538	03		02	03	100	40	50#	20			25@	10	
4	Analytical Instrumentation	AIN	17539	03	--	02	03	100	40	--	--	--	--	25@	10	
5	Process Instrumentation	PIN	17540	03		02	03	100	40	50#	20	--	--	25@	10	
6	Behavioural Science $	BSC	17075	01	--	02	--	--	--	--	--	25#	10	25@	10	
7	EDP & Project β	EDP	17066	01	--	02	--	--	--	--	--	--	--	25@	10	
8	Professional Practices-III	PPT	17068	--	--	03	--	--	--	--	--	--	--	50@	20	
			TOTAL	**16**	**--**	**17**	**--**	**450**	**--**	**150**	**--**	**25**	**--**	**225**	**--**	**50**

Student Contact Hours Per Week: **33 Hrs.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks **: 900**

@- Internal Assessment, # - External Assessment, [ ] No Theory Examination, $ - Common to all branches, #* - Online Theory Examination,

β - Common to ET / EJ / EN / EX / IE / DE / EV / IU / ED / EI /EL /MU

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work.

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

Course Name : Electronics Engineering Group

Course Code : ET/EN/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI

Semester : Fifth for ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU and Sixth for IU/ED/EI

Subject Title : Computer Hardware and Networking

Subject Code : 17533

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50	--	--	25@	75

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

Today is the age of information technology. Hence everyone is required to work on computers and internet. This subject is introduced to focus on basic working of the computer motherboard, peripherals and networking components.

Theoretical and Practical approach while studying this subject will help in understanding for troubleshooting, diagnosing computer and its peripheral related problems. Students will aware of basic concept of networking, its applications, topologies, communication media, network directing devices, protocol used, OSI reference model and TCP/IP model.

This subject will give exposure to students on computer hardware, peripherals, specifications, installation, faults and troubleshooting. Students will also be able to plan, analyze, design, install, configure, test, implement and maintain networking systems

Study of this subject will enable students to select appropriate hardware, list specifications, will identify simple to complex problems and their solutions. The subject is practical oriented and will develop the debugging skills in the students

General Objectives.

Students will able to.

- Understand principle, construction, working of computer peripherals
- Select cost effective, good quality reliable peripherals and equipment
- Identify the problem as hardware or software related.
- Identify and repair the simple faults in computer systems.
- Plan, analyze, design, install, configure, test, implement and maintain networking systems

Learning Structure

Applications

- Selection of appropriate hardware based on application
- Repair and maintenance of PC's
- Plan, analyze, design, install, configure, test, implement and maintain networking systems

Procedure

Learning architectural details	• Write everything down • Do the easy stuff first • Check for operator error • Check the software • Check external signals • Run diagnostic programs	Repairing the different components of PC by using different methods	Follow step by step procedure to install TCP/IP Protocols and TCP/IP configuratio n	Testing and troubleshooting of network connectivity	Network configuration, installation and maintenance Network utilities

Principle

Logic of components	Rules of troubleshooting	Rules of repairing	Principle of TCP/IP reference model	Principle of OSI reference model

Concept

Motherboard, drive formatting, latency, landing zone, HDD, FDD, Active, Passive, modular motherboard	Error codes, memory package, styles and structures, memory signals, memory manager, disk manager, EZ-Drive, DMI, SCSI, Video adapter etc.	Types of Topology LAN, WAN, MAN	Types of Network devices	Types of Transmission media

Facts

AT, ATX, motherboard, AGP, PCI Port etc.	Problems of system boards, display problems	Tools for repairing the faults, types of tests	Computer Network and Benefits	Classification of Network	Network Features

Theory:

Chapter	Topic and Contents	Hours	Marks
01	**Topic 1] Motherboard And Peripherals** **Specific Objectives:** ➢ **Identify different components and their function on motherboard** ➢ **Identify and compare storage devices** ➢ **Write specifications, select appropriate monitor and compare LCD and CRT monitors** ➢ **Understand principle, construction and working of peripherals** **Contents:** • Different types of PC configurations and their comparison, • Chipset basic, Architecture of Intel 945 G • Overview and features of ISA, PCI-X, PCI-Xpress • Overview features and types of DDR RAMs, Concept of cache memory : Internal cache, External cache (L1, L2, L3 cache), BIOS Basics • CD/DVD ROM drive : Construction, recording, comparison • LCD monitor: functional block diagram of LCD monitor, working principle, Types-Passive matrix and Active matrix. Important characteristics - Resolution, Refresh rate, Response time. Comparison of CRT display and LCD display • Construction, working & Installation of Keyboard, mouse, scanner and printer. Keyboard: Membrane and mechanical only. Mouse: Optical only, Scanner: Flatbed only, Printer: Dot matrix, Inkjet, and Laser only	10	14
02	**Topic 2] Power Supply and Interfaces** **Specific Objectives:** ➢ **Select, identify, measure and troubleshoot power related problems** ➢ **Differentiate online and offline UPS.** ➢ **Identify, select and use different interfaces** **Contents:** 2.1 • Block diagram and working of SMPS, Signal description and pin diagram of ATX power supply. • UPS : Block diagram working, Types, Rating 2.2 • USB features and operation, RS232: Voltages & 9 pin Signal description.	04	06
03	**Topic 3] Diagnostic, Testing And Maintenance** **Specific Objectives:** ➢ **Identify importance of preventive maintenance** ➢ **Realize the need of practices of preventive maintenance of peripheral** **Contents:** • Maintenance : Preventive and passive maintenance • Preventive maintenance of peripherals of PCs: Mouse, keyboard, hard disk, CDROM drive, laser printer, scanner.	04	08

	• PC problems and troubleshooting, POST.		
04	**Topic 4] Introduction to Networks** **Specific Objectives:** ➢ **Classify types of networks** ➢ **Plan and design network** ➢ **Install, configure and use networking devices** ➢ **Test and maintain networks** **Contents:** • Network classification: LAN, WAN, MAN. Peer to peer and client server networks • Network topology, Benefits of networks • Network cables- coaxial, UTP, STP, fiber optics their comparison and characteristics • Network standards- Ethernet, Ring, Token, wireless • Principle, operation and function of Hubs, Switches, Routers, Bridges, Repeaters, Gateways, firewalls	06	10
05	**Topic 5] Networking devices and Reference Models** **Specific Objectives:** ➢ **Understand layered approach** ➢ **Compare TCP-IP and OSI models** ➢ **Setup and configure network in laboratory environment** **Contents:** • OSI Reference Model - Interlayer Communication - Data Encapsulation, Functions of each layer. • TCP/IP Reference Model - Link, Internet, Transport, Application layer. • Comparison of the OSI and TCP/IP reference models • TCP/IP Protocols - IP, ICMP, ARP, TCP, FTP and UDP. • IP Addressing - IP Address Assignments, IP Address Classes, Subnet Masking. • TCP/IP Configuration- Installing the TCP/IP Protocol; Configuring TCP/IP - Configuring Basic TCP/IP Properties, Configuring Advanced TCP/IP Properties	08	12
	Total	**32**	**50**

Skills to be developed:
Intellectual Skills:

1. Identify and select appropriate peripherals
2. Plan schedule for preventive maintenance of computer systems and network
3. Test and troubleshoot the problems in computer systems
4. Plan, analyze, design, configure networking systems
5. Select different hardware and software diagnostic tools of networking.

Motor Skills:

1. Handling of computer system and peripherals
2. Assembly of computer systems

3. Install and testing of network components
4. Crimping of cables.

Practical: **List of experiments**

1. **Computer System:** Show different types cabinets and motherboards to students. Identify CPU types, motherboard architecture, form factor, chipsets used, RAM slots, different types of buses, on board peripherals, different connectors like sata/pata, ATX/AT, FDD, and other connections terminated at front or rear panels. CMOS battery, BIOS type, jumper settings. List the standard specifications of latest PC.
2. **Keyboard:** Identify different types of keyboards, types of keys, number of keys, different type of keyboard connectors, there details, Keyboard installation, wireless keyboard, typical keyboard errors and troubleshooting procedures of it, Guidelines for preventive maintenance of keyboards
   Mouse: Identify different types of mouse, dissemble mouse, and show different parts / mechanisms of mouse, principle of operation, connectors of mouse, wireless mouse, typical mouse faults and trouble shoot procedure of it. Guidelines for preventive maintenance of mouse
3. **Hard Disk:** Identify different types of hard disk, classify them into PATA and SATA, Open hard disk show different parts of hard disk, identify pins and connectors of HDD, How to make HDD primary/secondary i.e. jumper settings of IDE disk, SCSI hard disk and its controller card. Explain terms related to Hard Disk : Track, Sector, cylinder, cluster, Head parking, MBR, Zone recording.
4. **Formatting and Partitioning of Hard disk:** Low level and high level formatting of hard disk, partitioning of hard disk into different logical drives using fdisk or similar third party utilities. Install multiple Operating systems on same hard disk. Identify different errors, Standard procedures to troubleshoot hard disk
5. **Display Adapter:** Identify display adapters and its types. Identification of appropriate drivers of connected display device. Installation of display drivers, setting resolutions, factory settings, different controls on front panel of monitor. Types of monitors, there comparison, typical faults of monitor, Troubleshooting procedure of monitors
6. **Scanner:** Identify different types of scanners, principle of operation, typical specifications, installing scanner, scanning of images, typical faults of scanner and trouble shoot procedure of it. Preventive maintenance of scanner.
7. **Modem:** Identify different types of modem, installation of modem, modem operations, different types of indicators on front panel of external modem and there meanings, modem connectors, Typical faults and maintenance of modem
8. **Power Supply:** ATX power supply, pin details, voltage measurement, typical faults and troubleshooting procedure of SMPS, Preventive maintenance.
9. **Printer:** Identify printers, typical components of each printer, printer specifications, printer installation of local and network printers. Typical faults of printer and trouble shoot procedure of it. Guide lines for preventive maintenance of printer.
10. **Network Cables:** Identify different types of network cables, comparison , prepare straight and cross cable by crimping and test the same with network tester.
11. **Setup of client server network in a Lab:** Connect one computer lab in client server configuration using hub/ switch, UTP cables, RJ-45 connectors. Install network cards, Test them, set IP addresses in class-c network, test connectivity of clients to server using software utilities, demonstrate client server based application

Learning Resources:
Books:

Sr. No.	Author	Title	Publisher
01	Mark Minasi	The Complete PC Upgrade & Maintenance Guide	Willey Publication
02	Scott Mueller	Upgrading & Repairing PCs	Pearson Education
03	Bigelow	Bigelow's Troubleshooting, Maintaining & Repairing PCs	Tata McGraw Hill
04	William Stalling	Local and metropolitan Area Networks 6/e	Pearson
05	Douglas E Comer & M S Narayanan	Computer Networks and Internet	Pearson

Websites:

ccna.com
ccna.com/ccna-training
learningnetwork.cisco.com
www.mcse-training.com
www.microsoft.com/learning/en/us/certification/mcse.aspx
www.intel.com/products/processor
www.intel.com/products/desktop/motherboard
www.seagate.com
www.scsisource.com
www.w3schools.com/tcpip
www.protocols.com

Course Name : Electronics Engineering Group

Course Code : ET/EN/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI

Semester : Fifth for ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU and Sixth for IU/ED/EI

Subject Title : Microcontroller

Subject Code : 17534

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50#	--	25@	175

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

This subject comes under technology area. The subject is an extension of concepts covered in digital technique. 8051 microcontroller architecture, peripheral interfacing to it, assembly language programming is covered in this subject.

Microcontroller is heart of all domestic, industrial, consumer goods and other high end products. Automation in every field of life is being used and microcontroller is inbuilt element of these systems and devices.

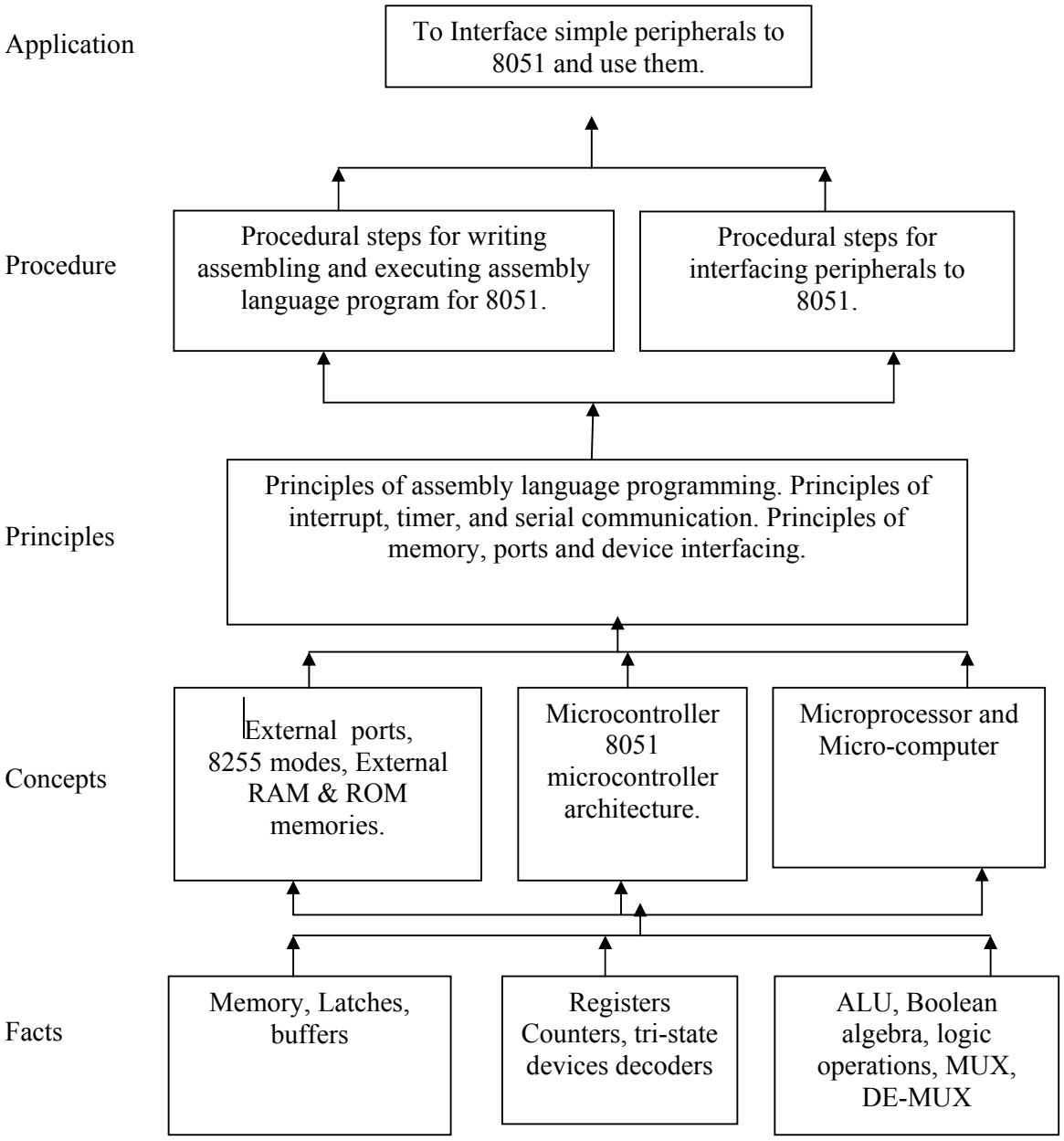
The student will gain the knowledge of peripheral interfacing and programming them. Microcontroller is in built element of embedded system. The subject will help the students to study concepts of embedded system. It will also help to understand design of simple microcontroller systems.

General Objectives.

Students will able to:

- Understand concepts of microcomputer, microprocessor and microcontroller.
- Interface peripherals to microcontroller.
- Develop logic for assembly language programming.
- Understand the principles of working of present day microcontroller systems in various fields.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
Topic 1: Introduction to Microcomputers and Microcontrollers **Specific Objectives:** ➢ Distinguish microcomputer, microprocessor, and microcontroller **Contents:** 1.1 Introduction to single board microcomputer. (Marks 04) • Block Diagram of Microcomputer. • Elements of Microcomputer. (Buses, Microprocessor, memory, I/O devices). • Different types of buses: address, Data, and control bus 1.2 Introduction to Microcontroller (Marks 06) • General block diagram of microprocessor and microcontroller • Comparison of Microprocessors and Microcontrollers. • Types of architectures - Harvard and Von-neuman. • Selection factors of microcontroller(Architecture type, speed, Word size, instruction set, memory, and I/O capability)	04	10
Topic 2: 8051 Microcontroller ➢ Identify Hardware features and internal registers with their functions ➢ Identify physical difference between external and internal memory and between different ports ➢ Compare different members of 8051 family. **Contents :** 2.1 8051 architecture (Marks 10) • Features, Architecture, Pin description. 2.2 Special Features of 8051 (Marks 06) • Boolean Processor, Power saving options- idle and power down mode, Derivatives of 8051.	08	16
Topic 3: 8051 Instruction set and programming ➢ Comprehend addressing modes and instruction set. ➢ Develop and realize assembly language programs. 3.1 Addressing modes and instruction set. (Marks 10) • Assembler directive- ORG, DB, EQU, END, CODE, DATA 3.3 Assembly language programming (Marks 10) 3.4 Software development cycle- Editor, Assembler, cross compiler, linker, locater, compiler (Marks 04)	12	24

Topic 4: MCS 51 Interrupt and timers ➢ Realize Concept of Interrupts, timer, and related SFRs ➢ Use timers and Interrupts through programs ➢ Compare interrupts and polling method. **Contents:** 4.1 8051 Timer/counter (Marks 12) • Timer / Counter logic and modes • Simple programs on timer to generate time delay using polling and interrupt method. 4.2 8051 Interrupts (Marks 10) • Interrupts and polling. • SFR - IE, IP • Simple programs based on interrupts and polling method	10	22
Topic 5: Serial Communication and parallel ports: ➢ Comprehend Serial and parallel communication **Contents:** 5.1 Serial port of 8051 • Serial Communication-SCON, SBUF • Modes of serial communication • Simple programs for serial communication. • I/O port structure & its Programming.	06	12
Topic 6: Memory and I/O interfacing ➢ Interface I/O devices and memory devices ➢ Expand memory and I/O **Contents:** 6.1 Memory Interfacing: (Marks 06) • Interfacing External RAM and ROM 6.2 I/O Interfacing: (Marks 10) • 8255-Block diagram, operating modes • Port expansion with 8255 • Interfacing of LED, keys, Relays, Seven segment display, Stepper motor.	08	16
Total	**48**	**100**

Practical's:
Skills to be developed:

Intellectual skill

1. Understand hardware and instruction set.
2. Develop assembly programs.

Motors skills

1. Handle trainer kits, computer.
2. Interface peripherals.

List of practicals:

1. Know 8051 kit and simulation software in your lab.
2. Develop program for arithmetic operation such as addition, subtraction multiplication, division.
3. Develop program for block exchange and block transfer with external memory.

4. To develop program for finding smallest/largest number and arranging numbers in ascending/descending order.
5. Generate square wave and rectangular wave on port pin with a program.
6. Interface LED and key with 8051 and making LED on/off with a key press.
7. Interface 7-segment display and design up/down counter on it with a program.
8. Display of key depression in decimal format on 7- segment display using lookup table through program.
9. Interface 8 bit DAC to generate different patterns and interface 8 bit ADC and develop program to convert analog data and store it.
10. Develop program for level controller/Traffic Controller.

Learning resources:

1. **Books**

Sr. No.	Title	Author	Publisher
01	8051 Microcontroller architecture programming & application.	K. J. Ayala	EEE/ prentice hall of India
02	The 8051 microcontroller & embedded system.	Mohmad-ali-mazidi, Janice-Gelispe-mazidi , Roline D. Mckinlay	Pearson / Prentice hall
03	Microcontroller principal & application	Ajit pal	Prentice Hall of India
04	Microcontroller theory & application.	Ajay Deshmukh	Tata McGraw- Hill
05	Microcontroller Architecture, programming, interfacing, & system design	Rajkamal	Pearson
06	8051 Microcontroller Mcs-51 family and its variant.	Satish shaha	Oxford

2. **C.D's / PPT's** : www.osvn.com

3. **Websites:**
   www.youtubecom
   www.keil.com
   www.faqs.org/microcontroller

Course Name : Diploma in Instrumentation / Diploma in Instrumentation & Control / Diploma in Industrial Electronics

Course Code : IC/IS/IE

Semester : Fifth

Subject Title : Control System

Subject Code : 17538

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50#	--	25@	175

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

Modern civilization is an indication of human Endeavour to control nature's forces and to harness them for the benefit to mankind. The laws of nature are such that everything in this universe is controlled. Control is the process of causing a system variable to take some desired value, known as reference value.

A control system consists of several elements or components connected and operated in such a way as to achieve a desired control in a specific domain of operation of the system. This can be as simple as making the temperature in a room stay at 21°C or as complex as manufacturing an integrated circuit or guiding a spacecraft to Jupiter. In general, all the elements necessary to accomplish the control objective are described by the term control system.

This subject is beneficial for process control variation in any process control industry which equips the students for maintenance and quality analysis.

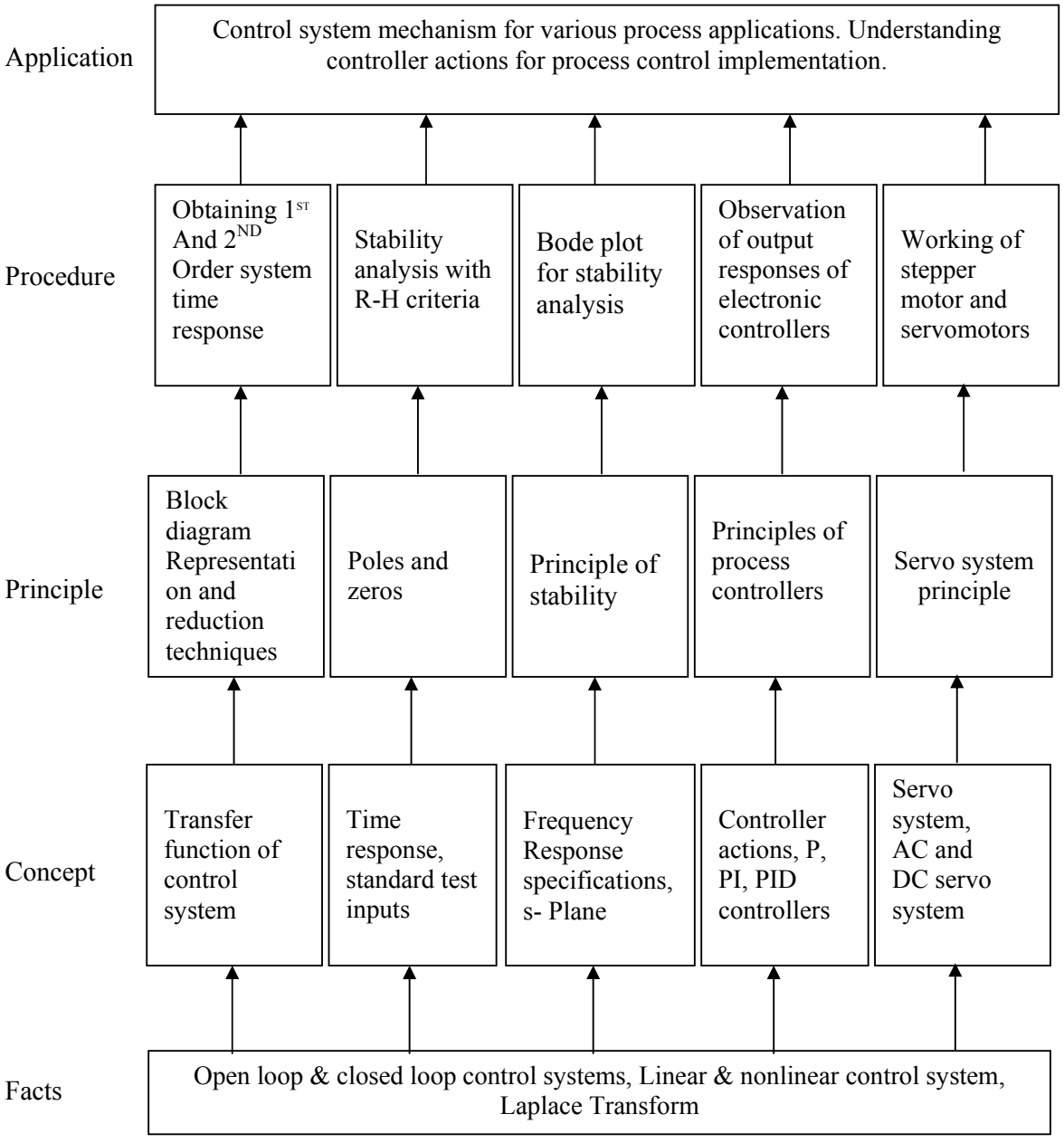
General Objectives:

The student will be able to:

1. Learn the classifications of control system.
2. Understand Steady state, time response, and frequency response analysis.
3. Learn Stability analysis with RH criteria and Bode plot.
4. Understand Servo system and its application.

5. Learn the Process control system and controllers.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
Topic 1: Introduction to the control system Specific Objectives: ➢ Develop transfer functions ➢ Differentiate between 1st& 2nd order of system ➢ Develop and solve block diagram of control system Contents: 1.1 [8 Marks] • **Control system:** Definition and practical examples • **Classifications:** Open loop & closed loop systems – definition, block diagram, practical example and Comparison; Linear and non linear system; Time variant and time invariant systems. • **Laplace Transform:** Laplace Transform for standard functions • **Transfer function:** Definition, Derivation of transfer functions for closed loop & open loop control system, Differential equations & Transfer functions of R-C and R-L-C electrical circuits. 1.2 [8 Marks] • **Order of a system:** Definition 0, 1, 2 order system, standard equations, simple numericals • **Block diagram reduction technique:** Need, reduction rules, numerical problems.	08	16
Topic 2: Time -response analysis Specific Objectives: ➢ Differentiate between transient and steady state responses ➢ Appreciate the importance of standard inputs and apply them in analysis of control system ➢ Represent poles and zeros in s-plane ➢ Analyze 1st& 2nd order control system for step input Contents: 2.1 [12 Marks] • **Time domain analysis**: Transient and steady state response • **Standard test inputs:** Step, ramp, parabolic & impulse: Need of them, significance, and corresponding Laplace representation • **Poles& zeros:** Definition, S-plane representation • **First order control system:** Analysis for unit step input, Concept of time constant • **Second order control system:** Analysis for unit step input, Concept, definition & effect of damping 2.2 [12 Marks] • **Time response specifications** (no derivations) Tp, Ts, Tr, Td, Mp, e_{ss}; numerical Problems • **Steady state analysis**: Type 0,1,2 systems, Steady state error & error constants, numerical Problems	12	24
Topic 3: Stability Specific Objectives: ➢ Appreciate the importance of stability	08	16

➢ Analyze different types of stability ➢ Apply Routh's stability criterion for stability analysis Contents: • **Stability :** Definition of stability, Analysis of Stable, unstable, critically stable & conditionally stable system, Relative stability, Root locations in S-plane for stable and unstable systems. • **Routh's stability criterion:** Different cases & conditions (statement method), Numerical Problems.		
Topic 4: Frequency Response Specific Objectives: ➢ List frequency response specifications ➢ Draw Bode plot ➢ Analyze stability from Bode plot Contents: 4.1. [4 Marks] • **Frequency response analysis:** Introduction, advantages & disadvantages; Frequency response specifications. 4.2. **Bode plot:** **[**6 Marks] • Need of Bode plot • Straight line Magnitude plot • Straight line Phase angle plot • Bode plot for gain K, poles & zeros at origin, 1ST order ~~poles~~ system (1/(as+c)) ~~& zeros~~ • Analyze stability from Bode plot using Gain margin and Phase margin~~.~~	08	10
Topic 5: Process Control and Control actions Specific Objectives: ➢ Differentiate between different types of Control actions such as P,I & D ➢ Describe composite controllers such as PI, PD, PID controllers Contents: • **Process control system**: Block diagram & explanation of each block. • **Control actions:** ▪ **Discontinuous modes:** ON-OFF controllers: equation, neutral zone ▪ **Continuous modes:** PROPORTIONAL controllers (offset, proportional band), INTEGRAL & DERIVATIVE controllers: o/p equations, corresponding Laplace Transforms, Response graph of P,I & D controllers ▪ **Composite controllers**: PI, PD, PID controllers- O/P Equations, Response, Comparison, Application, Electronic op-amp based circuits	06	16
Topic 6: Servo System Specific Objectives: ➢ Define servo systems ➢ Draw the constructional sketches of servo components. servomotor	06	18

Contents: 6.1. [4 Marks] • **Servo system:** Definition, block diagram • **AC & DC servo systems**: Concept and principle, Comparison, schematic diagram. 6.2. **Servo components:** [14 Marks] Draw, describe the working and state the applications of following • Potentiometer as error detector • Synchro as error detector • Stepper motor- PM & variable reluctance type, comparison of stepper motor with DC servo motor • DC servo motor- characteristic, difference from a normal DC motor • AC servo motor- characteristic, difference from a normal 2 phase induction motor,		
Total	**48**	**100**

Practical:
Skills to be developed:

Intellectual Skills:

- Reading and interpretation of the graph.
- Interpretation of the results from observations and calculations.
- Use of these results for analyzing the problems

Motor Skills:

- Proper handling of instruments.
- Measuring physical quantities accurately.
- Observe the phenomenon and to list the observations in proper tabular form.
- Adopt proper procedure while performing the experiment.

List of Practicals:

1. Measurement and control of error of angular position of DC Servo system.
2. Measurement and control of error of angular position of AC Servo system.
3. Characteristics of potentiometer as error detector.
4. Characteristics of Synchro as error detector.
5. Generate the pulses and measure the speed of stepper motor.
6. Step response of first order R-C circuit.
7. Step response of first order R-L-C circuit.
8. Type 0 system analysis for step, ramp & parabolic inputs.
9. Measurement & control of temperature (or any other parameter) with on-off controller.
10. Measurement & control of temperature (or any other parameter) with Proportional controller.
11. Measurement & control of temperature (or any other parameter) with PI controller.
12. Measurement & control of temperature (or any other parameter) with PID controller.

Learning Resources:

1. **Books:**

Sr. No.	Author	Title	Publisher
1	I.J. Nagrath & M. Gopal	Control System Engineering	McGraw-Hill
2	Anand Kumar	Control Systems	PHI
3	K.R.Varmah	Control Systems	McGraw-Hill
4	K. Ogata	Modern Control Engineering	PHI
5	C. D. Johnson	Process Control Instrumentation Technology	Prentice hall

2. **Websites:**

www.servosystems.com

en.wikipedia.org/wiki/Servomechanism

en.wikipedia.org/wiki/PID_controller

Course Name : Diploma in Instrumentation / Diploma in Instrumentation & Control

Course Code : IC/IS

Semester : Fifth

Subject Title : Analytical Instrumentation

Subject Code : 17539

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	--	--	25@	125

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

The area of analytical instrumentation involves a multidisciplinary approach covering instruments used in hospitals for routine clinical analysis, drug and pharmaceutical laboratories, oil refineries and above all for environmental pollution monitoring.

The fundamental knowledge of this subject will enable the student to select proper instrument for analytical application.

The aim of the subject is to understand the working principle and operation of analytical instruments and their special features.

General Objectives:

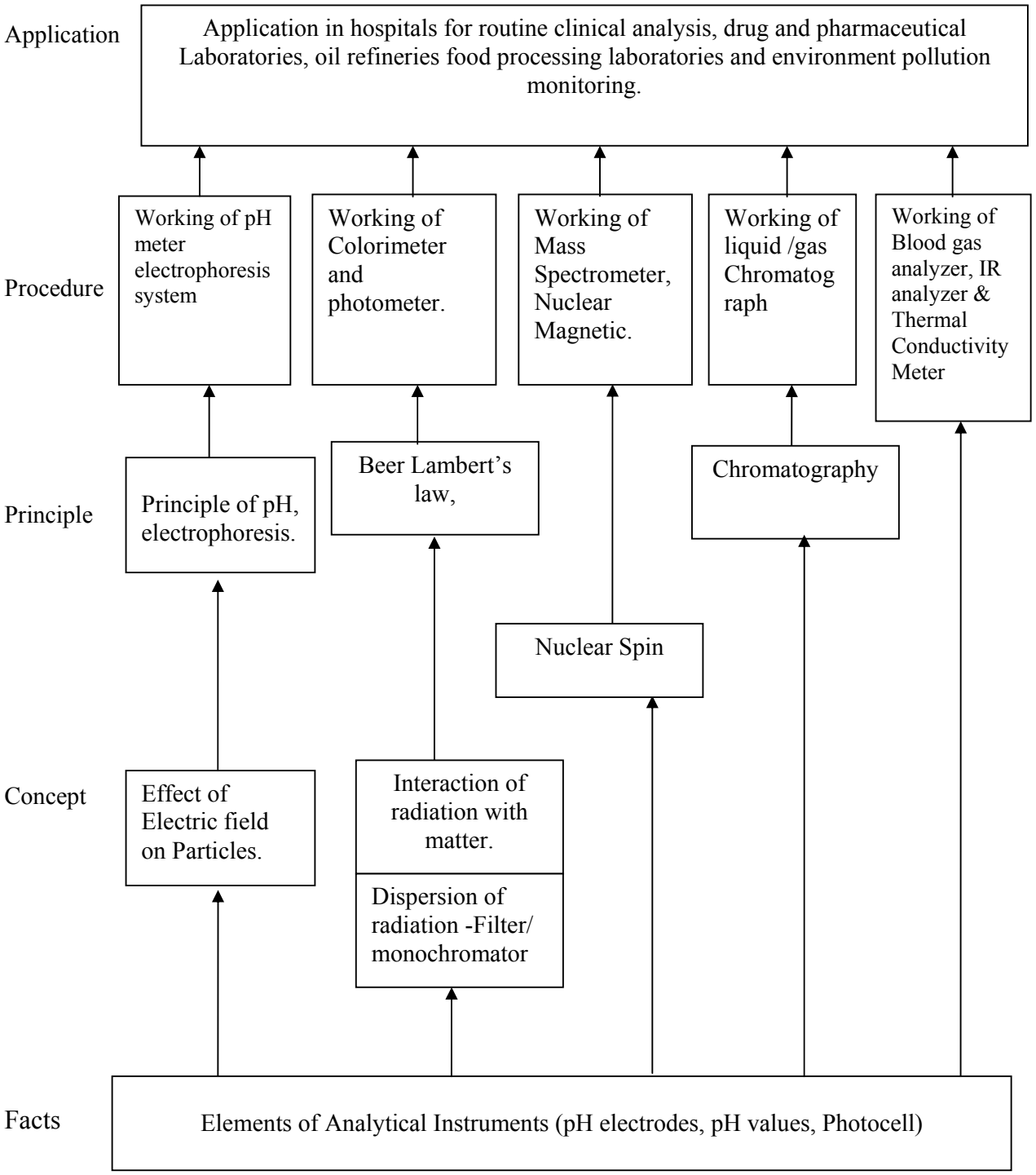
Students will able to;

1) Understand the principles of analytical instruments.

2) Operate the analytical instruments for analysis of different materials.

3) Employ knowledge of monitoring systems to control Environmental Pollution.

Learning Structure:



Contents: Theory

Chapter	Topics and Contents	Hours	Marks
01	**Introduction** ➢ **Draw block diagram of Analytical Instruments & explain functions of each block.** ➢ **List various laboratory instruments & working principle of each instrument.** **Contents** • Elements of Analytical Instrument - Block diagram, Explanation. • Laboratory Instruments - pH meter, Principle, Electrodes for pH measurement –Glass electrode and Calomel electrode-construction & working, null detector type pH meter. • Electrophoresis - Electrophoresis Apparatus - Paper Electrophoresis, Double beam densitometer-Block diagram, working.	06	16
02	**Colorimeters and Photometers** ➢ **State Beer Lambert's law** ➢ **Differentiate between photometer and spectrophotometer** ➢ **Draw construction of Flame photometer and explain its principle** **Contents** • Colorimeter - **(Marks 06)** Interaction of radiation with matter, Beer Lambert's Law, Principle of colorimetric method and its types - Single – Beam filter photometer, Double- Beam filter photometer, Multi-channel photometer • Spectrophotometer – **(Marks 10)** Using Prism, Using Grating Flame photometer – Principle, Constructional details of Flame photometer, Atomizer types – Discharge & Integral burner type, Applications	08	16
03	**Spectrometers** ➢ **Draw & explain the principle of Mass Spectrometer** ➢ **Explain use of Mass spectrometer in Chromatographic systems** ➢ **Explain the basic principle of NMR & its constructional details** ➢ **List applications of NMR** **Contents** • Mass Spectrometer - **(Marks 08)** Principle, Magnetic deflection (Nier 60 sector)type, Time of flight mass spectrometer, Components of mass spectrometer, Applications - (i) GCMS (ii) LCMS • NMR – **(Marks 08)** Principle of NMR, Nuclear spin, Nuclear energy levels, Resonance conditions, NMR absorption and Spectra Chemical shift, Constructional details of NMR spectrometer, Applications of NMR.	08	16
04	**Chromatography**	08	16

	➢ **Classify types of chromatography in detail** ➢ **State the principle of Chromatography** ➢ **Draw & explain the block diagram of GC & LC & explain the functions of each block.** **Contents** • Principle of chromatography, Classification of Chromatography, • Gas Chromatography – Principle, Basic elements of GC • Liquid Chromatography – Principle, Basic elements of LC		
05	**Gas Analyzers** ➢ **Measure pH,pCO2,pO2 of the body fluids for equilibrium acid - base balance** ➢ **Draw & explain working of IR gas analyzer** ➢ **Draw & explain working of Thermal conductivity analyzer** **Contents** • Blood gas Analyzer - Catheter tip electrode for measurement of pO2 and pCO2, Block diagram of complete blood gas analyzer, working. • Infrared gas Analyzer - Principle, Block diagram and working • Thermal Conductivity Analyzer using Thermistor - Principle, Block diagram, working	08	16
06	**Environmental Pollution monitoring Instruments** ➢ **Know the types & concentration of gas pollutants** ➢ **Select and use various types of techniques used for measurement of different gas pollutants.** **Contents** • Representation of concentration of gases • Types and concentration of various gas pollutants • Measurement techniques for gas pollutants - Carbon monoxide measurement using Gas chromatography, SO2 measurement using Conductivity method, Nitrogen Oxides measurement using (i) Chemiluminescence (ii) CO Laser, Ozone measurement using Conductivitimeter.	10	20
	Total	**48**	**100**

Practical:

Intellectual Skills:

- Proper selection of measuring instruments
- Verify the principles, laws, using given instruments under different conditions.
- Interpret the results from observations and calculations.

Motor Skills:

- Proper handling of instruments.
- Apply proper procedure while performing the experiment.

List of Practical:

1. Determine pH of given solutions using pH meter.
2. Determining contents of given solution using Flame photometer.
3. Measurement of absorbance and transmittance of given solutions using Spectrophotometer.
4. Measurement of absorbance and transmittance of given solutions using Colorimeter.

5. Measurement of conductivity of a solution using conductivity meter.
6. Observe the dispersion of the particles using Electrophoresis.
7. Observe the working of Gas chromatography.
8. Visit to hospital laboratories / industrial laboratories to understand the working of various analytical equipments.

Learning Resources
Reference Books:

Sr. No.	Title	Author	Publisher
01	Handbook of Analytical Instrumentation	R.S.Khandpur	Tata McGraw Hill
02	Analytical Instrumentation	Bela G Liptak	Chilton Bbook Publication
03	Bioinstrumentation	L. Veerakumari	MJP Publishers

Assignments:

1. Describe working of Mass Spectrometer.
2. Classify chromatograph & explain GC in detail.
3. Draw & explain the working of Complete Blood gas Analyzer.
4. Describe the various components of NMR and its industrial & clinical applications.

List of equipments:

1. pH meter
2. Flame Photometer
3. Spectrophotometer
4. IR Conductivity meter
5. Thermal Conductivity meter

Course Name : Diploma in Instrumentation / Diploma in Instrumentation & Control

Course Code : IC/IS

Semester : Fifth

Subject Title : Process Instrumentation

Subject Code : 17540

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	--	02	03	100	50#	--	25@	175

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

In Industrial processes, parameters involved are required to be measured, transmitted, recorded & displayed for efficient functioning of process operations.

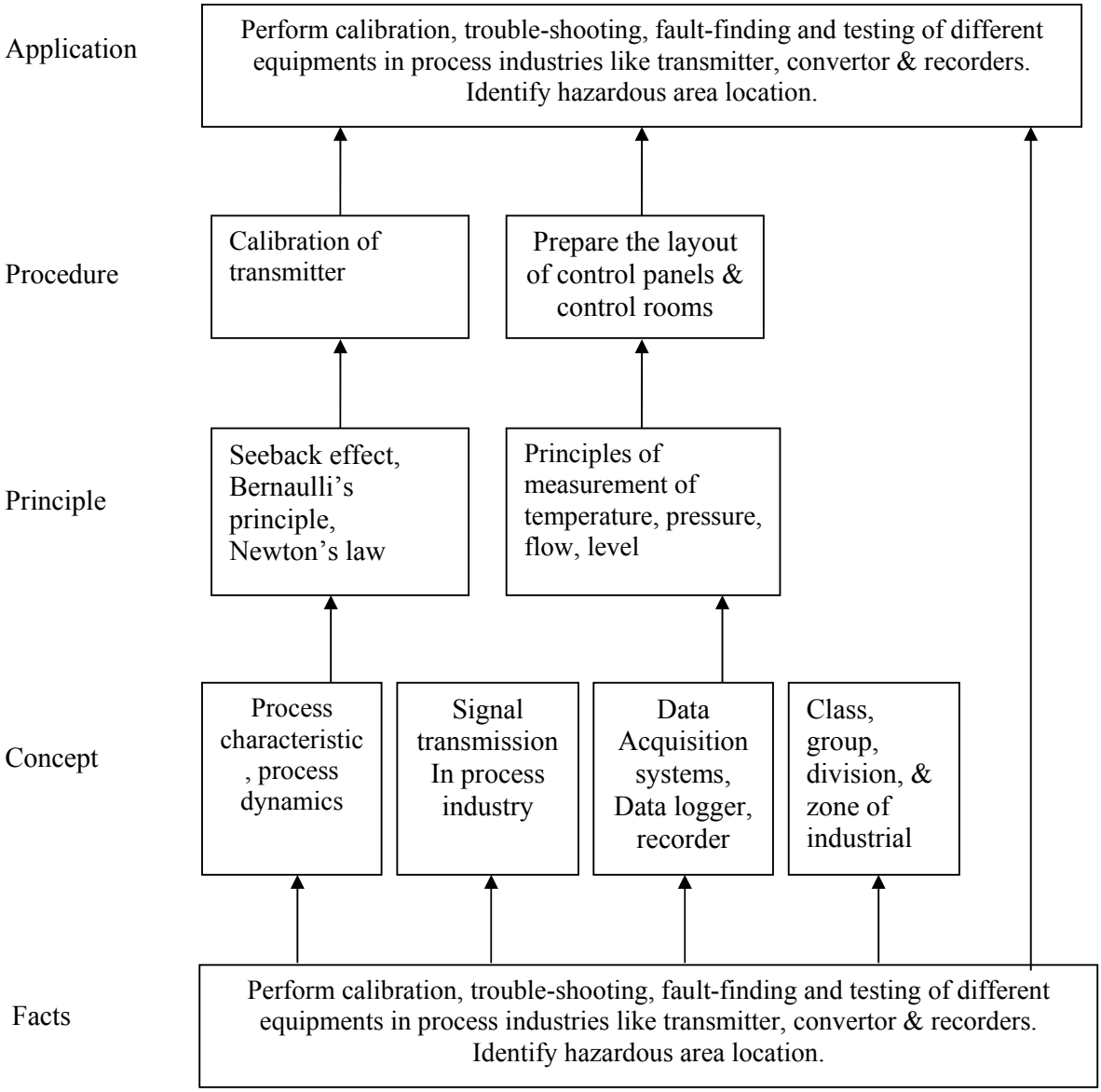
This subject gives a basic understanding about concept, facts, principles & working of various elements of Process Control systems used in industries. The students can use this knowledge to develop competency to work in various Industrial sectors such as project engineering, maintenance, service & calibration departments.

General Objectives:

The student will be able to:

1. Know about Instrumentation applied to small processes.
2. Use of process equipments such as transmitter, convertor, DAS and recorder used for process applications.
3. Perform calibration of transmitter
4. Prepare the layout of control panels & control rooms.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
Topic 1: Process Instrumentation System Specific Objectives: ➢ Identify process characteristics and process control system ➢ Classify process loops Contents: • **Process Control System:** Basic concept with example • **Process Instrumentation:** Concepts**,** Examples, Benefits • **Process Characteristics:** Definition & types • **Process Dynamic**: Definition & types	06	12
Topic 2: Signal Transmission & Transmitters ➢ Know methods of signal transmission in process industry ➢ Specify principle and working of different transmitters. Contents: • **Need of signal transmission system** • **Different types of signals transmission system:** ▪ **Pneumatic transmission system:** Standard signal 3-15 psi, Live zero, Flapper Nozzle Mechanism, Pneumatic transmitter: diagram & working. ▪ **Electronic transmission system:** Standard signal 4-20mA & 0-10V, Live zero, Electronics transmitter for temperature, flow (DP type) & pressure (force balance type): diagram & working. ▪ **SMART transmitters:** Block diagram, explanation, Salient features. ▪ **Digital transmission:** Foundation Field bus Architecture, HART communication technique ▪ **Calibration of transmitter**: Need, any one technique	16	24
Topic 3: Convertors ➢ Know methods of signal convertors ➢ Compare/ Specify convertors • **Need of convertors** • **Types of convertors**: Current to pressure convertor, Pressure to current convertor, Voltage to current/Current to voltage convertor- diagram and principle of working of each.	04	12

Topic 4: Control Panels & Control Rooms ➢ Compare different types of control panels. ➢ Design of control panel & control room ➢ Identify enclosures for hazardous location/nonhazardous location • **Control panels:** Need; Types -Flat, Breakfront, Console; Ergonomic consideration**,** Documents needed to design the control panel • **Control room environment:** Ergonomic considerations**,** Control room layout. • **Enclosures**: IP classification, NEMA types	06	16
Topic 5: Data Acquisition System / Data loggers ➢ Know methods of DAS/Data logging/Recording ➢ Specify DAS/Data logger &Recorder • **DAS:** Need, Types(single channel, multichannel), Block diagram, working & Applications. • **Data logger:** Block diagram, working & Applications. • **Recorder**: Need, Types (Strip Chart, X-Y) Block diagram, working and Applications.	06	16
Topic 6: Instrumentation in Hazardous Area • Identify hazardous locations • Know working of alarm annunciator • Write specification of alarm annunciator **Hazardous area:** classification according to the materials, Protection methods- Explosion proofing, Increased safety & Intrinsic safety (Definition, Zener barrier methods). [12] • **Alarm annunciator**: Types, Operational sequence in different modes. [8]	10	20
Total	**48**	**100**

Practical:
Skills to be developed:

Intellectual Skills:

- Identify required equipment & Instruments.
- Specify different process Instrumentation equipment

Motor Skills:

- Installation procedure
- Calibration procedure

List of Practicals:

1) Identify the elements of process feedback loop like temperature/pressure/level/flow
2) Measurement and transmission of any one process variable using Electronics transmitter.
3) Calibration of any one transmitter(temperature, Pressure, DP)
4) Verification of various diagnostic features of SMART Transmitter.
5) Identify and interpret display devices on different control panels using trainer set up/ in industry.
6) Draw control room layout & list out ergonomic considerations.
7) Monitoring of various process parameters on DAS/Data Logger system.
8) Plot any one process parameter w.r.t time using recorder (strip chart or XY recorder).
9) Study of sequence of operations in alarm annunciator.
10) Conversion of standard signal using I/P or P/I convertor

List of Laboratory Equipment:

1. SMART Transmitter
2. DAS/Data logger
3. Control panel trainer set up
4. Strip chart/ XY recorder
5. Alarm annunciator
6. 4-20 mA transmitter
7. I/P or P/I convertor

List of Assignments:

Visit any one process industry and write a report on it

Learning Resources:

1. Books:

Sr. No.	Author	Title	Publisher
1	S.K.Singh	Industrial Instrumentation & Control	Mc Graw Hill
2	C.D.Johnson	Process Control Instrumentation Technology	Prentice Hall of India
3	Beta Liptak	Process Control	Chilton Book company
4	Andrew Williams	Process Control	Gulf Publication
5	MMS Anand	Electronics Instruments & Instrumentation Technology	Prentice Hall of India
6	Considine	Process/Industrial instruments & control Handbook	MC Graw Hill

2. Websites:

wikipedia.org/wiki/Instrumentation

http://www.pc-education.mcmaster.ca/Instrumentation/go_inst.htm

Course Name : All Branches of Diploma in Engineering & Technology

Course Code : EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/ CO/CM/IF/ EE/EP/CH/PS/CD/ED/EI/CV/FE/FG/IU/MH/MI/TX/TC/DC/AU

Semester : Fifth for EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ME/PG/PT/AE/CE/CS/CR/ CO/CM/IF/EE/EP/CH/PS/AU and Sixth for CD/MH/IU/CV/FE/FG/MI/ ED/EI/DC/TC/TX

Subject Title : Behavioural Science

Subject Code : 17075

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	--	--	--	25 #	25 @	50

Rationale:

With increased globalization and rapid changing business expectations, employers are looking for wide cluster of skills to cater to the changing demand. Personality traits and soft skills are playing a key role in a student's career in this changing scenario. Corporate houses look for soft skills that supplement hard skills.

Addition of behavioural science in curriculum is intended to enhance the efficiency of a person so that he can contribute to overall growth of organisation. It aims at developing insight into leadership, team building, motivation, interpersonal relationship, problem solving, decision making and aspects of personality in a technician's profile. Addition of the topic of organizational culture will further mould him/ her in the organisational role.

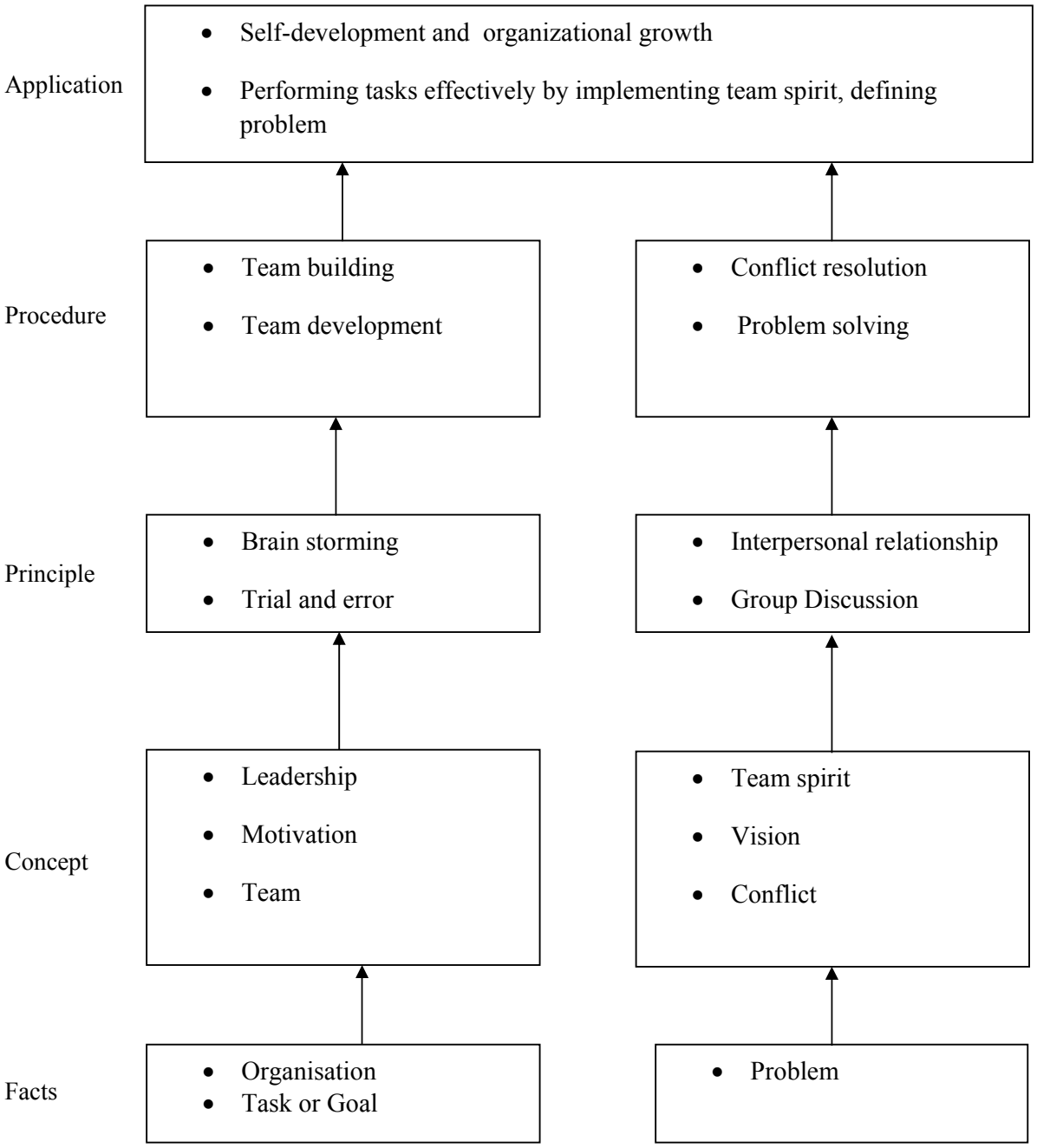
This subject of 'Behavioural Science' provides a broad base in which a technician can develop a successful career in the world of work.

General Objectives:

After studying this subject, the students will be able to:

1. Develop him/her as Team leader.
2. Use self-motivation and motivate others.
3. Build a team and develop team spirit among the team members.
4. Improve the interpersonal relationship skills.
5. Learn Problem solving and decision making skills.
6. Discuss a particular topic in a group and face the interview.

Learning Structure:



Theory:

Topic and Contents	Hours
Topic 1: LEADERSHIP Contents: 1.1 Introduction – Importance, examples of different types of leaders. 1.2 Meaning and Definition of Leadership. 1.3 Leadership qualities – Confidence, Vision, Communication Skills, influencing people etc. 1.4 Types of Leadership styles, their advantages and disadvantages – Autocratic, Democratic, Delegative, Bureaucratic and Laizze Fairie.	02
Topic 2: MOTIVATION Contents: 2.1 Meaning and Definition of motivation. 2.2 Types of motivation. 2.3 Maslow's Motivation theory. 2.4 Job characteristic model to enhance motivation.	03
Topic 3: TEAM BUILDING Contents: 3.1 Definition of Team. 3.2 Difference between Group and Team. 3.3 Need for formation of good team (vision, trust, cooperation, initiative, etc.) 3.4 Approach to Team building (Personality based, activity based, skill based, problem solving based, etc.)	02
Topic 4: CONFLICT RESOLUTION Contents: 4.1 Definition of Conflict. 4.2 Types of Conflict – Functional and Dysfunctional 4.3 Sources of Conflict – Ego, Authority, Frustration etc. 4.4 Positive and Negative effects of conflicts. 4.5 Methods of Conflict resolution – Compromising, withdrawal, forcing.	04
Topic 5: PROBLEM SOLVING AND DECISION MAKING Contents: 5.1 Steps in Problem Solving. 5.2 Methods used for solving problems – trial and error method, brain storming, lateral thinking method. 5.3 Techniques used for Decision making- Decision tree, Decision Matrix, Mind Mapping etc.	03
Topic 6: GROUP DISCUSSION AND INTERVIEW TECHNIQUES Contents: 6.1 GROUP DISCUSSION • Objectives of Group Discussion (ability to work in team, speaking and listening skills, leadership, creativity) • Does and Don'ts of Group Discussion. • How to conclude Group Discussion.	02

6.2 INTERVIEW TECHNIQUES • Types of Interviews. (patterned, stress, behavioural) • Dress Code, Body Language and Communication Skill. • Probable questions for Interview. • Telephonic or Video Interview.	
Total	**16**

Practical:
Skills to be developed:

Intellectual Skills:

- Develop ability to find his strengths.
- Select proper source of information.
- Follow the technique of time and stress management.
- Set the goal.

Motor Skills:

- Follow the presentation of body language.
- Work on internet and search for information.
- Prepare slides / transparencies for presentation.

List of Practicals / activities:

1. Form a group of 4 or 5 students and discuss the topic 'Qualities of an effective leader'. Each group will prepare its list with justification to the entire class and write an assignment under the guidance of subject teacher.
2. Form a pair of student and each one from pair will ask each other questionnaire on motivation, self-motivation, experiences that motivated him or other which him for success in the past and write an assignment under the guidance of subject teacher based on discussion.
3. Form a group of 4 or 5 students and assign them a group activity such as 'making a shape from match stick (50 to 100 match sticks) without guidance and without group discussion.
4. The group as in activity 3 will now perform the same activity. After group discussion and under guidance of subject teacher, each student from a group will write an assignment for both the activities and write their inferences with reference to group discussion, team development, team building, etc.
5. Form a group of 8 to 10 student and arrange a group activity such as;
    - Industrial visit.
    - Visit to any historical place/fort/museum, etc.
    - Housekeeping and cleaning of any laboratory/seminar hall for any function.

    After the execution of activity student will write an assignment under guidance of teacher keeping in mind individual role, purpose of activity, inter dependency of work or task, coordination of person and task involved and final performance.
6. Write an assignment on interpersonal relationship and conflict management with student's personal experience of solving conflicts.
7. Form a group of 20 students and ask them to prepare a list of 8 to 10 problems affecting the institute. Subject teacher should analyze one such problem on black board using 'Fish bone technique' with the participation of students. Students will write an assignment consisting;
    - Apparent problem statement.
    - Analysis of the causes.

- Definition of real problem.

8. The subject teacher starts the session with 'Statement of the problem' written on the black board. After ensuring that all the participants are at the same level of understanding the statement of problem, he initiates NGT (Normal Group Technique) to arrive at maximum possible number of creative solutions.
   Based on ranking matrix the group will arrive at feasible solutions and students will write an assignment consisting of;
   - Problem Statement.
   - Model of problem solving.
   - List of creative solution suggested by participants.
   - Write the most feasible solution based on given criteria.

9. Form a group of 4 to 5 students and give them a topic for GD for 10 to 15 minutes. Teacher should analyse GD on certain parameters and students will write an assignment on aspects of GD and prepare a format (suggested or designed by teacher) which gives details of GD carried out.
10. Arrange a guest lecture of H.R. Person from industry/expert in interview technique and conduct mock interview of each student. Student should write a report on this activity.
11. Arrange a visit to industry and gather information about organisation, product, turnover, work culture, vision/mission statement, quality policy, Corporate social responsibility etc. and write a report on it.

Note - Subject teacher shall guide the students in completing the assignments based on above practicals.

Learning Resources:
Books:

Sr. No.	Author	Name of Book	Publication
1	Subject Experts-MSBTE	Handbook and assignment book on Development of Life Skills-II	MSBTE
2	Dr. Kumkum Mukherjee	Principles of Management and Organizational Behaviour	Tata McGraw Hill Education Pvt Ltd.
3	Dr. T. Kalyana Chakravarti Dr. T. Latha Chakravarti	Soft Skills for Managers	Biztantra
4	Barun K. Mitra	Personality Development and soft skills	Oxford University Press
5	Priyadarshini Patnaik	Group discussion and interview skills	Foundation Books

Course Name : Electronics Engineering Group

Course Code : ET/EN/EJ/IE/IS/IC/DE/EV/MU/IU/ED/EI

Semester : Fifth for ET/EN/EX/EJ/IE/IS/IC/DE/EV/MU and Sixth for IU/ED/EI

Subject Title : Entrepreneurship Development and Project

Subject Code : 17066

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	--	--	--	--	25@	25

NOTE:

- Two practical hours are for project
- One theory and one tutorial hours are for Entrepreneurship Development (EDP). Twenty five marks are for term work report prepared under EDP.

Rationale:

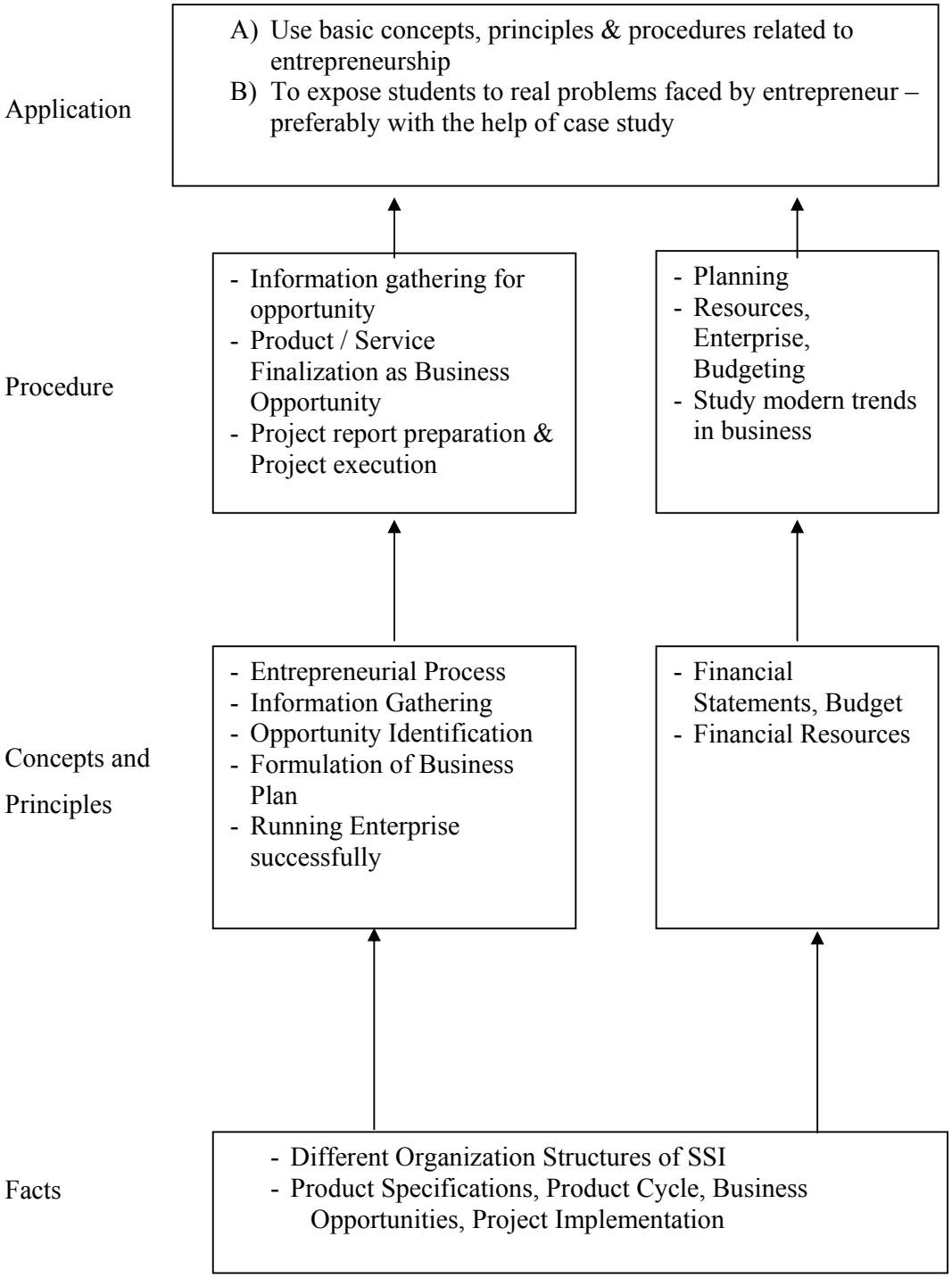
Globalization, liberalization & privatization along with revolution in Information Technology, have thrown up new opportunities that are transforming lives of the masses. Talented and enterprising personalities are exploring such opportunities & translating opportunities into business ventures such as- BPO, Contract Manufacturing, Trading, Service sectors etc. The student community also needs to explore the emerging opportunities. It is therefore necessary to inculcate the entrepreneurial values during their educational tenure. This will help the younger generation in changing their attitude and take the challenging growth oriented tasks instead of waiting for white-collar jobs. The educational institutions should also demonstrate their uniqueness in the creation of enterprising personalities in their colleges. This subject will help in developing the awareness and interest in entrepreneurship and create employment for others.

General Objectives:

The students will be able to

1) Appreciate the concept of Entrepreneurship
2) Identify entrepreneurship opportunity.
3) Develop entrepreneurial values and attitude.
4) Collect and use the information to prepare project report for business venture.
5) Develop awareness about enterprise management.

Learning Structure:



Content:

Part A) Industrial Project

Following activities related to project are required to be dealt with, during this semester.

1. Form project batches & allot project guide to each batch. (Max. 4 students per batch)
2. Each project batch should select topic / problem / work by consulting the guide & / or industry. Topic / Problem / work should be approved by Head of department.
3. Each project batch should prepare action plan of project activities & submit the same to respective Guide
4. At the end of semester, each project batch should submit the action plan and abstract of the project along with list of materials required if project involves fabrication or other facilities required in other kinds of project.
5. Action Plan should be part of the project report.

Part B) Entrepreneurship Development

Theory:

Topic and Contents	Hours
Topic 1: Entrepreneurship, Creativity & Opportunities Contents: 1.1 Concept, Classification & Characteristics of Entrepreneur 1.2 Creativity and Risk taking. 1.3 Business types and Reforms 1.4 SWOT Analysis	03
Topics 2: Information and Support Systems for Development of Entrepreneurship: Contents: 2.1 **Information Sources:** Information related to project, procedures and formalities **2.2) Support Systems** 1) Business Planning & Requirements for setting up an SSI 2) Govt. & Institutional Agencies (Like MSFC, DIC, MSME, MCED, MSSIDC, MIDC LEAD BANKS) Statutory Requirements and Agencies.	03
Topics 3: Market Assessment and Product feasibility Contents: 3.1) Marketing -Concept and Importance Market Identification, 3.2) Customer need assessment, Market Survey Product feasibility analysis	02
Topics 4: Business Finance & Accounts 4.1) **Business Finance:** Costing basics, Sources of Finance, Break Even Analysis, 4.2) **Business Accounts:** Book Keeping**,** Financial Statements, Financial Ratios and its importance, Concept of Audit,	03
Topics 5: Project Report Preparation 5.1) Business plan: Steps involved from concept to commissioning 5.2) **Project Report** 1) Meaning and Importance 2) Components of project report/profile 5.3) **Project Feasibility Study:** 1) Meaning and definition 2) Technical, Market, Financial feasibility	03
Topics 6: Enterprise Management And Modern Trends 6.1) **Enterprise Management**: - 1) Essential roles of Entrepreneur in managing enterprise	02

2) Probable Causes Of Sickness 6.2) E-Commerce: Concept and process 6.3) Global Entrepreneur	
Total	**16**

Tutorial:

Sr. No	Assignments
1	Assess yourself-are you an entrepreneur?
2	An Interview with an Entrepreneur.
3	Feasibility study of a product.
4	Prepare a Project Report for starting a small scale business.

FONT SIZE OF PROJECT REPORT CONTENTS BE AS FOLLOWS:

1. MAIN TITLE: 16 BOLD TIMES NEW ROMAN/ ARIAL
2. SUB TITLES: 14 BOLD TIMES NEW ROMAN/ ARIAL
3. RUNNING MATTER: 12 TIMES NEW ROMAN / ARIAL

Format of the Project report should be designed by the department.

Learning Resources:

1) Reference Books:

Sr. No.	Name of Book	Author	Publisher
1	Entrepreneurship	Trehan	Dream Tech Press
2	Entrepreneurship 2/e	Rajeev Roy	Oxford University Press
3	Entrepreneurship and Small Business	Schaper	Wiley India Publication
4	Entrepreneurship Development	Colombo plan staff college for Technical education.	Tata Mc Graw Hill Publishing co. ltd. New Delhi.
5	Poornima M. Charantimath	Entrepreneurship Development of Small Business Enterprises	Pearson Education
6	Entrepreneurship Development	E. Gorden K.Natrajan	Himalaya Publishing. Mumbai

2) VIDEO CASSETTES

No.	SUBJECT	SOURCE
1	Five success Stories of First Generation Entrepreneurs	EDI STUDY MATERIAL Ahmedabad (Near Village Bhat , Via Ahmadabad Airport & Indira Bridge), P.O. Bhat 382428 , Gujrat,India P.H. (079) 3969163, 3969153 E-mail : ediindia@sancharnet.in/olpe@ediindia.org Website : http://www.ediindia.org
2	Assessing Entrepreneurial Competencies	
3	Business Opportunity Selection and Guidance	
4	Planning for completion & Growth	
5	Problem solving-An Entrepreneur skill	

Course Name : Diploma in Instrumentation / Diploma in Instrumentation & Control

Course Code : IC/IS

Semester : Fifth

Subject Title : Professional Practices-III

Subject Code : 17068

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	03	--	--	--	--	50@	50

Rationale:

Most of the diploma holders are employed in industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities, which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objectives:

To develop the following skills:

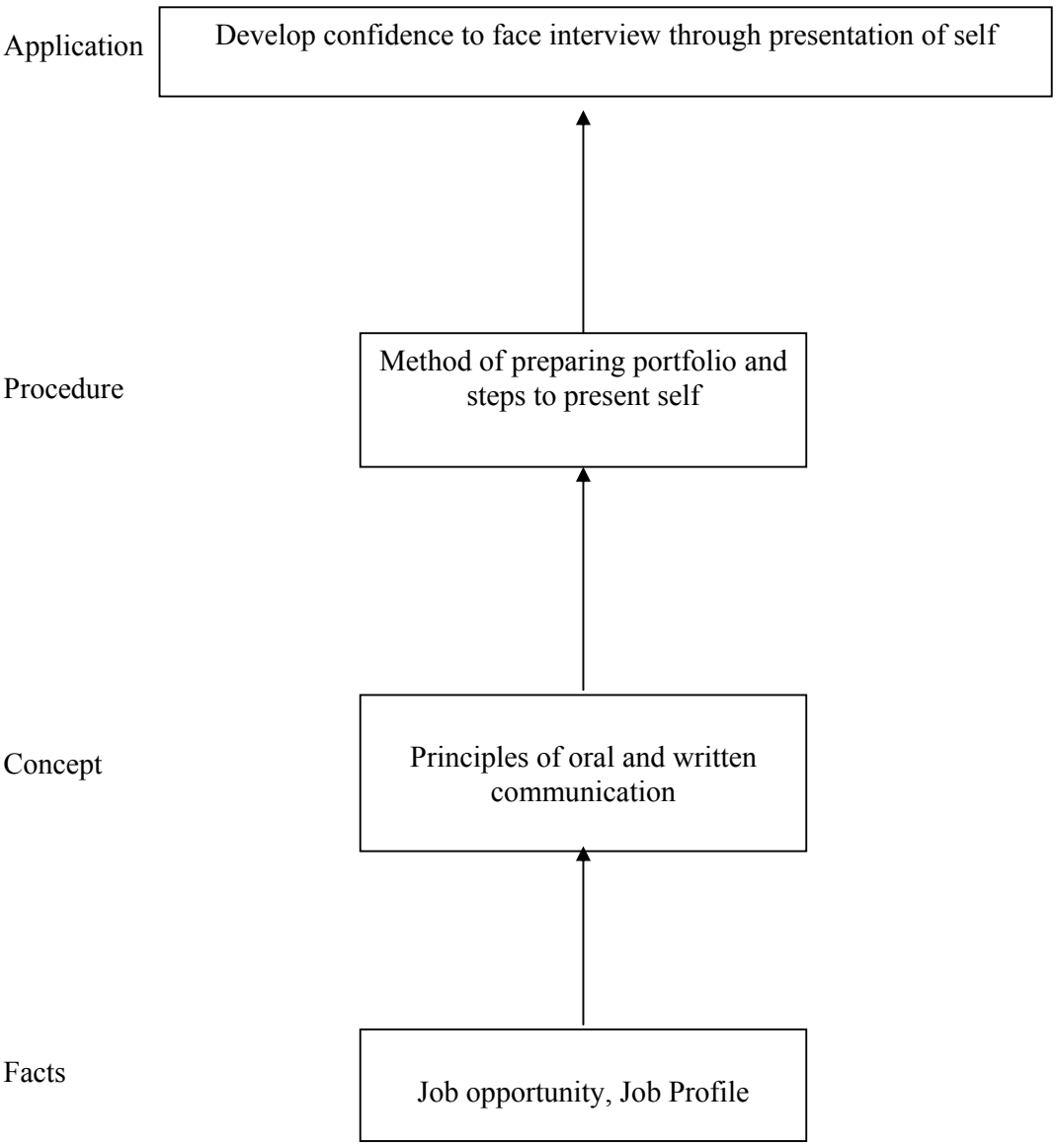
Intellectual Skills:

1. Analyze the information received from different sources.
2. Prepare report for given topic.

Motor Skills:

1. Present given topic in a seminar.
2. Interact with peers to share thoughts.
3. Prepare a report on industrial visit, expert lecture.

Learning Structure:



Activity	Name of the Activity	Hours
1	**Industrial Visits** Structured industrial visits be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The industrial visits may be arranged in the following areas / Industries. i) Chemical industry ii) Brushless Motors/ Servo Motor Manufacturing Unit iii) Petro -Chemical industry iv) PLC/DCS industry v) Any other relevant area	16
2	Lectures by Professional / Industrial Expert to be organized from the following areas. i) DC Brushless motors ii) D.C. , A.C. servomotors iii) Solenoids used in hydraulic and pneumatic systems iv) Motors used in NC and CNC machines v) Carrier guidance and interviewing techniques vi) Self- employment vii) Blue tooth technology. viii) Any topic related to social awareness	08
3	**Information search:** Students should prepare report as a part of term work of searching and collecting the information regarding their final project/industrial project	06
4	**Seminar** Student will deliver a seminar on technical topic. The topic will be on his project or new trends in technology or the subject of the Sixth semester	10
5	**Group Discussion** The students should discuss in a group of six to eight student and write a brief report on the same as a part of term work. The Faculty may suggest the topic for group discussion	08
	Total	**48**

Industrial Training (Optional)

- Students who have completed industrial training in summer vacation after 4th Semester will be granted exemption for activities related to topic 1 to 4.

- These students shall submit report of Industrial training signed and certified by authorities from Industry. Student will give seminar on industry training attended by him.

- Evaluation will be done on seminar and report submitted by student.