

CURRICULUM
FOR
SECOND SEMESTER
DIPLOMA IN
INSTRUMENTATION AND
CONTROL ENGINEERING

SUBJECT STUDY SCHEME (2nd Sem: INSTRUMENTATION & CONTROL ENGINEERING)

Course Code	Subjects	Time in Hours				Credits		
		Theory	Tutorial	Practical	Total	Theory	Practical	Total
BS201	Applied Mathematics-II	3	1	-----	4	4	-----	4
ES202	Introduction to Computers and Information Technology	---	---	4	4	---	2	2
HS203	Soft Skills and Personality Development	3	---	---	3	3	---	3
HS204	Soft Skills and Personality Development Lab	---	---	2	2	---	1	1
ES205	Basics of Electrical and Electronics	4	1	---	5	5	---	5
ES206	Basic of Electrical and Electronics Lab	---	---	2	2	--	1	1
ICPC201	Fundamental of Instrumentation Engineering	3		-----	3	3	-----	3
ICPC202	Fundamental of Instrumentation Engineering Lab	-----	-----	2	2	-----	1	1
ICPC203	Instrumentation Workshop	-----	-----	4	4	-----	2	2
	Total	13	2	14	29*	15	7	22

* Note: The remaining one hour in a week shall be utilized for sports and other activities like debates, seminar etc.

PROGRAM: THREE YEAR DIPLOMA IN ENGINEERING & TECHNOLOGY	
Course Code: BS201	Course Title: Applied Mathematics-II
Semester: 2nd	Credit: 4
Periods Per Week: 4 (L: 03, T: 01, P: 0)	

(* Common to Architecture Assistantship, Automobile, Civil, Civil(PHE), QSCM, Computer , Electrical , E&C, Medical Electronics, Food Technology, I&C, Leather Technology, Mechanical, Textile Technology, Wood Technology and IT)

COURSE OBJECTIVE:

This course is designed to develop an understanding of basic mathematical and statistical tools which include matrices, determinants, integral calculus and coordinate geometry and the applications of such tools in the field of engineering and technology

COURSE CONTENT

1. Integral Calculus

- 1.1 Integration as inverse operation of differentiation
- 1.2 Simple integration by substitution, by parts and by partial fractions (for Linear factors only)
- 1.3 Evaluation of definite integrals (simple problems)-

$$\text{Evaluation of } \int_0^{\pi/2} \sin^n x \cdot dx, \int_0^{\pi/2} \cos^n x \cdot dx, \int_0^{\pi/2} \sin^m x \cdot \cos^n x \cdot dx$$

Using formulae without proof (m and n being positive integers only)

2. Coordinate Geometry

- 2.1 Equation of straight line in various standard forms (without proof), intersection of two straight lines, angle between two lines. Parallel and perpendicular lines, perpendicular distance formula.
- 2.2 General equation of a circle and its characteristics. To find the equation of a circle, given: Centre and radius, three points lying on it and coordinates of end points of a diameter.
- 2.3 Definition of conics (Parabola, Ellipse, Hyperbola) their standard equations without proof. Basic problems on conics when their foci, directrices or vertices are given.

3 Matrices and Determinants

- 3.1 Definition of matrix and its types.
- 3.2 Addition, subtraction and multiplication of matrices.
- 3.3 Expansion of Determinants.

4 Statistics

- 4.1 Measures of Central Tendency: Mean, Median, Mode
- 4.2 Measures of Dispersion: Mean deviation, Standard deviation
- 4.3 Basic Concepts of Probability.

COURSE OUTCOME

After the completion of the course the student will be able to:

- evaluate both indefinite and definite integrals by various methods
- identify various points in a 2-D space along with formulation of equations and graphs for different types of lines, circles, ellipses, parabolas etc.
- find the sum, difference and product of two or more matrices,
- evaluate determinants and their relations to matrices
- find the mean, median, mode and other measures of central tendency.
- solve basic problems on probability.

RECOMMENDED BOOKS:

1. R.D Sharma, Applied Mathematics-II.
2. H.K Das, Applied Mathematics.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, New Delhi, 40th Edition, 2007.
4. S.S. Sabharwal, Sunita Jain, Eagle Parkashan, Applied Mathematics, Vol. I & II, Jalandhar.
5. Comprehensive Mathematics, Vol. I & II by Laxmi Publications, Delhi.
6. Reena Garg & Chandrika Prasad, Advanced Engineering Mathematics, Khanna Publishing House, New Delhi
7. Applied Mathematics-II, Eagle Publications.

UNIT WISE TIME AND MARKS DISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	16	35
2	10	20
3	12	25
4	10	20
Total	48	100

PROGRAM THREE YEAR DIPLOMA IN ENGINEERING AND TECHNOLOGY	
Course Code: ES202	Course Title: Introduction to Computers and Information Technology
Semester: 2nd	Credit: 2
Periods Per Week: 4 (L: 0 T: 0 P: 4)	

(* Common to Architecture Assistantship, Automobile, Civil, Civil(PHE), QSCM, Computer , Electrical , E&C, Medical Electronics, Food Technology, Garment Technology, I&C, Leather Technology, Mechanical, Textile Design, Textile Technology, Travel and Tourism, MLT, Wood Technology and IT)

COURSE OBJECTIVE

Information technology has great influence on all aspects of our life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS Office/Open Office using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

COURSE CONTENT

1. Basics of Information Technology

- 1.1. Its concept and scope, applications of IT, ethics and future with information technology.
- 1.2. Impact of computer and IT in society.
- 1.3. Computer application in office, book publishing, data analysis, accounting, investment, inventory control, graphics, air and railway ticket reservation, robotics, military, banks, Insurance financial transactions and many more.

2. Basic Components of Computer System

- 2.1. Block diagram of a computer System and Processing of Data.
- 2.2. Demonstration of computer system viz., Hardware, Software
- 2.3. Concept of Memory and its various types, Primary and secondary memories (RAM, ROM, Storage Devices etc).

3. Internet and its Applications

- 3.1. Introduction to Internet, its basic working.
- 3.2. Concept of Email, Social Media, Cloud Computing.
- 3.3. Basic ideas about IP Address, DNS, URL, Server, Web Browser, LAN etc.

4. Use of Various Basic Data Processing Softwares

- 4.1. Word Processing (Microsoft Word & Google Docs.)**

- 4.1.1. File Management:
 - 4.1.1.1. Opening, creating and saving a document, locating files, copying contents in some different file(s).
- 4.1.2. Editing a document:
 - 4.1.2.1. Entering text, Cut, copy, paste using tool- bars
- 4.1.3. Formatting a document:
 - 4.1.3.1. Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
 - 4.1.3.2. Aligning of text in a document, justification of document, Inserting bullets and numbering
 - 4.1.3.3. Formatting paragraph, inserting page breaks and column breaks, line spacing
 - 4.1.3.4. Use of headers, footers: Inserting footnote, end note, use of comments
 - 4.1.3.5. Inserting date, time, special symbols, importing graphic images, drawing tools
- 4.1.4. Tables and Borders:
 - 4.1.4.1. Creating a table,
 - 4.1.4.2. Formatting cells,
 - 4.1.4.3. Use of different border styles, shading in tables,
 - 4.1.4.4. Merging of cells, partition of cells, inserting and deleting a row in a table
- 4.1.5. Print preview, zoom, page set up, printing options
- 4.1.6. Using Find, Replace options

4.2. Microsoft-Excel and Google Sheets

- 4.2.1. Introduction to Spreadsheet Application-Workbook and Worksheets
- 4.2.2. Working with data and formulas:
 - 4.2.2.1. Addition, subtraction, division, multiplication, percentage and autosum.
 - 4.2.2.2. Format data, create chart, printing chart, save worksheet, creating and formatting of charts and graphs

4.3. Presentation (Microsoft-PowerPoint and Google Slides)

- 4.3.1. Introduction to PowerPoint - How to start PowerPoint - Working environment: concept of toolbars, slide layout, templates etc. - Opening a new/existing presentation - Different views for viewing slides in a presentation: normal, slide sorter etc.
- 4.3.2. Addition, deletion and saving of slides.
- 4.3.3. Insertion of multimedia elements - Adding text boxes, importing pictures, movies and sound, tables and charts etc.
- 4.3.4. Formatting slides - Text formatting, changing slide layout, changing slide color scheme - Changing background, Applying design template.
- 4.3.5. Viewing the presentation using slide navigator

COURSE OUTCOME

After the completion of the course the student will be able to:

- Identify the different hardware components and functional units of a Computer system.
- Explain basic concepts and working of internet.
- Create and format word documents by using different word processing software.
- Prepare the spread sheets and the presentation of data in different ways.
- Prepare power point presentations.

RECOMMENDED BOOKS:

1. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd- Jungpura, New Delhi
2. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
3. Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
4. Basics of Information Technology, by Ishan Publications, Ambala
5. Information Technology for Management by Henery Lucas, 7th edition, Tata McGraw Hill Education Pvt Ltd, New Delhi

UNIT WISE TIME AND MARKSDISTRIBUTION

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	06	10
2	13	20
3	13	20
4	32	50
Total	64	100

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
Course Code: HS 205	Course Title: Soft Skills and Personality Development
Semester: 2ND	Credits: 3
Periods per week: (L: 3 T: 0 P: 0)	

COURSE OBJECTIVE: Soft skills, unlike hard skills that are technical, tangible, measurable, quantifiable and assessable, are practical, imperceptible and subtle qualitative traits that determine the efficacy of human communication at professional and personal levels. While hard skills acquisition can be correlated with one's intelligence quotient (IQ), soft skills developments are intricately linked with one's emotional quotient (EQ) and spiritual quotient (SQ). Hard skills can aid an individual secure a position, yet soft skills help the person retain it, achieve excellence and fulfil self-actualization needs. Using academic as well as popular books, the course offers soft skills by integrating them at personal, professional, interpersonal and management levels.

COURSE CONTENT

Unit 1

Personal Skills

Self-Assessment; Identifying Strength & Limitations; Habits, Will-Power and Drives; Developing Self-Esteem and Building Self-Confidence, Significance of Self-Discipline
Understanding Perceptions, Attitudes and Personality Types.
Mind-Set: Growth and Fixed; Values and Beliefs
Motivation and Achieving Excellence; Self-Actualization Need Goal Setting, Life and Career Planning; Constructive Thinking

Unit 2

Professional Skills

Communicating Clearly: Understanding and Overcoming barriers; Cross gender/Cross Cultural communication, Strategic communication.
Active Listening
Persuasive Speaking and Presentation Skills
Conducting Meetings, Writing Minutes, Sending Memos and Notices
Etiquette: Effective E-mail Communication; Telephone Etiquette
Body Language in Group Discussion and Interview

Unit 3

Interpersonal Skills

Enhancing Empathy, Showing Sympathy and Dealing with Antipathy; Gaining Trust and Developing Emotional Bonding
Ethics and Etiquettes (Social and Official Settings); Respecting Privacy; Civic Sense and Care for the Environment
Negotiating, Decision-Making, Conflict-Resolution, Five Styles

Emotional Literacy; Assertiveness versus Aggressiveness; Learning to Say "No."; Learning to Appreciate and Give Praise; Presenting Bad News
Humour, Jokes and Anecdotes in Effective Communication

Unit 4

Management Skills

Managing Time and Beating Procrastination
Managing People: Leading and Working with Team (Co-ordination and Co-operation);
Developing Accountability, Commitment and Responsibility; Behaving Conscientiously
Managing Stress and Maintaining Positive Outlook
Managing Health, Boosting Memory, Enhancing Study Skills
Managing Money and Love; Balancing Personal and Professional Life

Course Outcome

After the completion of the course, the student will be able to:

- Develop Self Confidence
- Learn attitudes and personality types
- Learn communication skills and etiquettes of communication
- know about interpersonal skills and management skills

REFERENCES

1. Personality Development and Soft Skills, Barun k. Mitra, Oxford Press
2. Business Communication, Shalini Kalia, Shailja Agarwal, Wiley India
3. Cornerstone Developing Soft Skills, Sheffield, Pearson
4. Managing Soft Skills for Personality Development -edited by B.N Ghosh, McGraw Hill India
5. Soft Skills An Integrated Approach to Maximize Personality, Gajendra S. Chauchan, Sangeeta Sharma, Wiley In

UNIT WISE TIME AND MARKS DISTRIBUTION

UNIT NO	TIME (HOURS)	MARKS
01	15	25
02	18	30
03	10	25
04	05	20
TOTAL	48	100

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
Course Code: HS 206	Course Title: Soft Skills and Personality Development Lab
Semester: 2ND	Credits: 1
Periods per week: 2(L: 0 T: 0 P: 2)	

COURSE OBJECTIVE: Soft skills, unlike hard skills that are technical, tangible, measurable, quantifiable and assessable, are practical, imperceptible and subtle qualitative traits that determine the efficacy of human communication at professional and personal levels. While hard skills acquisition can be correlated with one's intelligence quotient (IQ), soft skills development are intricately linked with one's emotional quotient (EQ) and spiritual quotient (SQ). Hard skills can aid an individual secure a position, yet soft skills help the person retain it, achieve excellence and fulfil self-actualization needs. Using academic as well as popular books, the course offers soft skills by integrating them at personal, professional, interpersonal and management levels.

LIST OF PRACTICALS

1. Thinking Skills Correcting Common Errors in day to day conversation making picture and improving diagram to English word
2. Field Diary and lab record
3. Ice Breaking Activity and Just A Minute Session
4. Speaking from observation and reading
5. Greetings -Apologies, request, social and professional Etiquette Telephone etiquettes
6. Indexing, Footnotes and bibliographic procedure
7. Vocabulary building
8. Report Making
9. Comprehensions

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN INSTRUMENTATION AND CONTROL ENGINEERING	
Course Code: ES205	Course Title : BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING
Semester: 2ND	Credits: 5
Periods per week: 5(L:4 T: 1P:0)	

*Common With Computer Engineering and IT

COURSE OBJECTIVE:

The course contents could be taught and implemented with an aim to develop different skills leading to the achievement of the competencies in measurement of basic electrical quantities/parameters and use of major electrical/electronic machines/instruments.

COURSE CONTENTS

1. Overview of DC Circuits

- 1.1. Ohms law and its verification.
- 1.2. Series and parallel combination of resistors with simple numerical problems.
- 1.3. Application of Kirchhoff's current law and Kirchhoff's voltage law to simple circuits.

2. Electro Magnetic Induction

- 2.1. Concept of electro-magnetic field produced by flow of electric current
- 2.2. Concept of magneto-motive force (MMF), flux, reluctance, permeability
- 2.3. Analogy between electric and magnetic circuit.
- 2.4. Faraday's laws of electro-magnetic induction, principles of self and Mutual induction.
- 2.5. Series and parallel combination of inductors.

3. Batteries

- 3.1. Basic idea of primary and secondary cells
- 3.2. Construction, working principle and applications of Lead-Acid Batteries
- 3.3. Brief idea of Lithium-ion batteries
- 3.4. Series and parallel connections of batteries
- 3.5. General idea of solar cells, solar panels and their applications

4. AC Fundamentals

- 4.1. Concept of alternating current and voltage.
- 4.2. Concepts of: cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value
- 4.3. Difference between ac and dc

5. Various Types of Power Plants

- 5.1. Working principle and block diagram explanation of thermal and hydro power stations and their comparative study

6. Semiconductor physics and diode

- 6.1. Classification of materials into insulators, conductors and semiconductors on the basis of energy band concept.
- 6.2. Concept of Intrinsic and Extrinsic Semi-conductors
- 6.3. PN junction Diode : working Mechanism and its related terms, V-I Characteristics , and its application as half wave and full wave rectifier
- 6.4. Working and application of special purpose diodes: LED(light Emitting diode), photo diode, Zener diode.
- 6.5. Filter circuits: Brief idea about shunt capacitor filter, series inductor filter, LC and Pie filter

7. Bipolar-transistors:

- 7.1. Concept of a bipolar transistor, PNP and NPN transistors, their symbols and mechanism of current flow; Current relations in a transistor; concept of leakage current.
 - 7.2. CB, CE, CC configurations of a transistor; Input and output characteristics in CB and CE configurations; Current amplification factors. Comparison of CB, CE and CC Configurations
 - 7.3. Transistor as an amplifier in CE Configuration.
8. **Unipolar Transistors**
- 8.1. Construction, operation and characteristics of MOSFET/JFET and its applications.
 - 8.2. Brief introduction of CMOS and its application.

COURSE OUTCOME

After completion of the course the student will be able to

- explain the basic terminology used in electricity like charge, current, voltage , resistance etc.
- solve various electric circuits for current, voltage or resistance.
- state the laws of electromagnetic induction and describe the effect on a current-carrying conductor when placed in a magnetic field.
- explain the concept of batteries , their construction and their applications.
- Describe the various concepts associated with AC and will be also able to distinguish it with DC.
- apply the knowledge of diodes in rectifiers, power adapters and various electronic circuits.
- apply the knowledge of semiconductors in various technical gadgets like mobile phones, Computers, LED, photocells, solar lights etc.
- explain the working and applications of FET and MOSFET

RECOMMENDED BOOKS

1. Electrical Technology by B.L. Theraja, S. Chand and Company, New Delhi
2. Electrical and Electronics Engineering by S.K. Bhattacharya, Pearson Education, New Delhi
3. Basic Electrical Engineering by P.S. Dhogal, Tata McGraw-Hill Education Pvt Ltd, New Delhi
4. Basic Electrical and Electronics Engineering by Kumar K M, Vikas Publication House Pvt Ltd, New Delhi
5. Basic Electronics and Linear Circuits by N N Bhargawa and S C Gupta, Tata McGraw-Hill Education Pvt Ltd, New Delhi
6. Principles of Electrical and Electronics Engineering by V.K. Mehta, S. Chand and Co, New Delhi
7. Basic Electronics by J B Gupta, S K Kataria and Sons, New Delhi
8. Basic Electronics- Problems and solutions by Albert Molvino and David J Bates, Tata McGraw-Hill Education Pvt Ltd, New Delhi

UNIT WISE TIME AND MARKS DISTRIBUTION

No	Unit	Time Allotted (Hrs)	Marks Allotted (%)
1.	Overview of DC Circuits	08	12
2.	Electro Magnetic Induction	08	12
3.	Batteries	05	10
4.	AC Fundamentals	12	18
5.	Various Types of Power Plants	05	08
6.	Semiconductor Physics and Diode	13	20
7.	Bipolar Transistors	08	12
8	Unipolar Transistors	05	08
	Total	64	100

PROGRAM: THREE YEARS DIPLOMA PROGRAM IN INSTRUMENTION AND CONTROL ENGINEERING	
Course Code: ES206	Course Title: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB *
Semester: 2nd	Credits: 1
Periods Per Week : 2 (L: 0, T:0, P: 2)	

(*Common with Computer Engineering/IT)

COURSE OBJECTIVE:

This subject is a lab course to be supplemented by theory subject and aims to develop proficiency and understanding of practical outcomes of the subject taught in theory.

LIST OF PRACTICALS

1. Measurement of resistance of an ammeter and a voltmeter .
2. Verification of Ohms law.
3. Verification of Kirchhoff's Current and Voltage Laws in a dc circuit
4. Charging and testing of a lead - acid storage battery.
5. Plotting of V-I characteristics of a PN junction diode
6. Observation of the wave shapes for the following rectifier circuit
 - i. Half-wave rectifier
 - ii. Full-wave rectifier
7. Observation of wave shape of full wave rectifier with
 - i. Shunt capacitor filter
 - ii. Series inductor filter
8. Plotting of input and output characteristics of transistors in CE and CB configuration.
9. Plotting of V-I characteristics of MOSFET/JFET.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN INSTRUMENTATION & CONTROL ENGINEERING	
Course Code: ICPC 201	Course Title: FUNDAMENTAL OF INSTRUMENTATION ENGINEERING
Semester: 2ND	Credits: 3
Periods Per Week :3 (L: 3, T: 0, P: 0)	

COURSE OBJECTIVE:

The objective of the course is to impart the knowledge of basic principles involved in instrumentation systems. The student will learn the measurement concept, building blocks of instrumentation system, various types and characteristics of instruments, displaying variables besides instrument selection criteria. The student will also learn about errors in measurements. These concepts will help the student in forming a solid foundation for higher learning in the area of Instrumentation engineering.

COURSE CONTENT**1. Basics of Instrumentation**

- 1.1. Definition of measurement and its significance
- 1.2. Methods of measurement: Direct methods, Indirect methods
- 1.3. Scope and necessity of instruments
- 1.4. Elements of a Generalized Measurement system
 - 1.4.1. Primary sensing element
 - 1.4.2. Variable conversion element
 - 1.4.3. Data presentation element
- 1.5. Instrumentation Systems
 - 1.5.1. Types of instrumentation systems
 - 1.5.2. Intelligent instrumentation system
 - 1.5.3. Dump instrumentation system
- 1.6. Classification of Instruments
 - 1.6.1. Absolute instruments
 - 1.6.2. Secondary instruments.
- 1.7. Functions of instruments
 - 1.7.1. Indicating function
 - 1.7.2. Recording function

2. Introduction of Transducers

- 2.1. Definition of sensors & transducers.
- 2.2. Difference between sensor & transducer.
- 2.3. Definition and classification of transducers, selection criteria, characteristics
- 2.4. Construction, working principle, selection criteria, disadvantage, limitation and application of
 - 2.4.1. Transducers based upon hall effect
 - 2.4.2. Techogenerator
- 2.5. Piezoelectric Transducer
- 2.6. Ultrasonic Transducer
- 2.7. Linear variable differential transformer

3. Performance Characteristics and Selection Criteria of Instruments

- 3.1. Performance characteristics
 - 3.1.1. Static characteristics of instruments-accuracy, precision, linearity, resolution, sensitivity, hysteresis, drift, dead time, loading effects.
 - 3.1.2. Dynamic characteristics-time constant, response time, natural frequency, damping coefficient.
- 3.2. Selection criteria of instruments.
- 3.3. Calibration.
- 3.4. Definition and importance of calibration.
- 3.5. Process of calibration.

4. Display and Recording Devices

- 4.1. Need of Recorders in Instrumentation system
- 4.2. Classification of Recorders
 - XY, Strip chart recorder, magnetic tape recorder
- 4.3. Digital display units
 - 4.3.1. Light Emitting Diode (LED)
 - 4.3.2. Liquid Crystal Display (LCD)
 - 4.3.3. Segmental displays
 - 4.3.4. Dot matrices
 - 4.3.5. Fluorescent Displays

5. Errors in Measurement

- 5.1. Limiting errors
- 5.2. Relative limiting error
- 5.3. Known error
- 5.4. Types of errors and their sources
 - 5.4.1. Gross error
 - 5.4.2. Systematic error
 - 5.4.3. Instrumental error
 - 5.4.4. Environmental error
 - 5.4.5. Observational error
 - 5.4.6. Random error

5.5. Normal distribution of errors

COURSE OUTCOME

After completion of the course the student will be able to:

- operate Recorders and Display units.
- calibrate various Industrial and Laboratory instruments.
- Illustrate basics of Sensors and Transducers.
- correct various errors in measurement.

RECOMMENDED BOOKS

1. RK Jain, "Mechanical and Industrial Measurement", Khanna Publishers, New Delhi Eleventh edition.
2. AK Sawhney, "Electrical and Electronic Measurement and Instrumentation", Dhanpat Rai and Co., New Delhi, Nineteenth Edition.
3. Joseph J. Carr, "Elements of Electronic Instrumentation and Measurement", Pearson Education, Third Edition.
4. K. Lal Kishore, "Electronic Instrumentation and Measurement", Pearson Education, Second Edition.
5. JB Gupta, "Electrical and Electronic Measurement and Instrumentation", S.K Kataria and Sons Publishers, New Delhi, 2013.
6. E.O. Doebelin, "Measurement Systems", Mc. Graw Hill Education Publisher, Sixth Edition.
7. Donald P. Eckrman, "Industrial Instrumentation" CBS Publication, First Edition.

UNIT WISE TIME AND MARKS DISTRIBUTION

Unit	Time (Hours)	Marks(%age)
1	6	10
2	12	30
3	8	15
4	12	25
5	10	20
Total	48	100

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN INSTRUMENTATION & CONTROL ENGINEERING	
Course Code: ICPC 202	Course Title: FUNDAMENTAL OF INSTRUMENTATION ENGINEERING LAB
Semester: 2ND	Credits: 1
Periods Per Week : 2 (L: 0, T: 0, P: 2)	

COURSE OBJECTIVE:

The objective of the course is to impart the knowledge of basic principles involved in instrumentation systems. The student will learn the measurement concept, building blocks of instrumentation system, various types and characteristics of instruments, displaying variables besides instrument selection criteria. The student will also learn about errors in measurements. These concepts will help the student in forming a solid foundation for higher learning in the area of Instrumentation engineering.

LIST OF PRACTICALS:

1. Familiarization and demonstration of Liquid Crystal Display.
2. Identification of various types of Instruments.
3. Demonstration and study of different types of recorder.
4. To assemble seven segment display using LEDs.
5. Detection and removal of Systematic error in an Instrument.
6. Identification of various types of Sensors and transducers.
7. Familiarization and use of Fluorescent display.
8. Study of piezoelectric transducer.
9. Measurement of displacement using LVDT.

PROGRAM: THREE YEARS DIPLOMA PROGRAMME IN INSTRUMENTATION & CONTROL ENGINEERING	
Course Code: ICPC 203	Course Title: INSTRUMENTATION WORKSHOP
Semester: 2ND	Credits: 2
Periods Per Week :4 (L: 0, T: 0, P: 4)	

COURSE OBJECTIVE: Instrumentation workshop practices are included in the curriculum in order to provide hands-on experience about use of different basic instruments used in domestic as well as industrial purpose. This subject aims at developing general manual and machining skills in the students. In addition, the development of a sense of safety at work place, team working and development of right attitude are the other objectives.

PRACTICAL EXERCISES

1. Study of electrical safety measures and protective devices
2. Study, demonstration and identification of common electrical materials with standard ratings and specifications such as wires, cables, switches, MCB & ELCB, fuses, cleats, clamps and allied items, tools and accessories.
3. Identification and familiarization with the following tools used in instrumentation workshop such as Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Screw Driver (Star Screw Driver), L- Keys, Soldering Iron, soldering wire, flux .
4. Identification and familiarization with various types of plugs, sockets, connectors suitable for general purpose audio video use. Connectors, Banana plugs, sockets and similar male and female connectors and terminal strips.
5. Familiarization and demonstration of various types of switches such as: normal/miniature toggle, slide, push button piano key, rotary, SPST, SPDT, DPST, DPDT.
6. Identification, familiarization and uses of various type of cell and batteries.
7. Identification, familiarization and uses of commonly used components; active and passive components; colour code and types of resistor and potentiometers, Diode, Transistor, LED, LDR etc.
8. Measure value of given resistor & compare it with theoretical value obtained using colour code.
9. Planning and performing of connection to single phase domestic electrical appliances using Phase, Neutral and Earth wires.
10. To perform the installation of electrical earthing for domestic purpose.
11. Prepare an extension board using fuse, switches, sockets, fan regulator, indicator

- etc. for single phase connections.
12. To perform connection of two LED bulbs as per staircase wiring.
 13. Measurement of current by using ammeter (both analog and digital type)
 14. Measurement of voltage by voltmeter (both analog and digital type)
 15. Connecting various components to perform single phase parallel and series circuit connections.
 16. To perform single phase Inverter Connections for domestic purpose
 17. Connection of 2HP, three phase motor with DOL starter.
 18. Solder components e.g. resistor, capacitor, diodes, transistors on a general-purpose PCB.
 19. De-soldering practice with de-soldering pump and with de-soldering wick.
 20. To measure inner & outer diameter using Vernier calipers.
 21. To measure thickness of the metallic sheet with micrometer.
 22. Repair a LED Bulb.
 23. Convert a simple LED bulb into automatic LED Bulb.
 24. To troubleshoot the circuit board of phone charger.
 25. To perform installation and connection of Solar P.V. Cells.
 26. Controlling the timing of turning ON/OFF a solar light with the help of LDR /Photocell and a timer.
 27. To perform dismantling and reassembling of auto electric iron.
 28. To perform dismantling and reassembling of desert cooler.
 29. Troubleshooting of electric device like heater or kettle.
 30. To perform the installation of a water overflow alarm and to troubleshoot it, in case of any problem.