

Course code	BSC-102				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work	30Marks				
Theory Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:

1. To analyse microscopic chemistry
2. Understand the concept of hardness of water and phenomenon of corrosion
3. Rationalise periodic properties
4. Distinguish the ranges of the electromagnetic spectrum

UNIT-I

Atomic and molecular structure: Schrodinger equation (Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations (derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

UNIT-III

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-III

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded).

UNIT-IV

Intermolecular forces: Ionic, dipolar and Van der Waals interactions.

Water Chemistry: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process).

Suggested Text Books:

- (i) University Chemistry, Bruce M. Mahan, Pearson Education.
- (ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

- (iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Education.
- (iv) Fundamentals of Molecular Spectroscopy, by C. N. Banwell
- (v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
- (vi) Physical Chemistry, by P. W. Atkins
- (vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

Course Outcomes:

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	EEE-104				
Category	Program Core course				
Course title	Electrical Measurement and Measuring instruments				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work/ Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- The course will focus on evaluating errors in measurement as well as identify and use different types of instruments for the measurement of voltage, current, power and energy.
- This course will widen the knowledge of measurement of electrical quantities resistance, inductance and capacitance with the help of bridges.
- The course will demonstrate the working of instrument transformers as well as calculate the errors in current and potential transformers.
- This course will Manifest the working of electronic instruments like voltmeter, multi-meter, frequency meter and CRO.
- Along with the above, the course will also give knowledge of transducers, their classifications and their applications for the measurement of physical quantities like motion, force, pressure, temperature, flow and liquid level.

UNIT I

Electrical Measurements: Measurement system, Characteristics of instruments, Methods of measurement, Errors in Measurement & Measurement standards, Review of indicating and integrating instruments: Voltmeter, Ammeter and Wattmeter.

UNIT II

Measurement of Resistance, Inductance and Capacitance: Measurement of low, medium and high resistances, insulation resistance measurement, AC bridges for inductance and capacitance measurement.

Instrument Transformers: Current and Potential transformer, ratio and phase angle errors, design considerations and testing.

UNIT III

Electronic Measurements: Electronic instruments: Voltmeter, Multimeter, Wattmeter & energy meter. Time, Frequency and phase angle measurements using CRO; Storage oscilloscope, Spectrum & Wave analyser, Digital counter, frequency meter, and Digital Voltmeter.

DISPLAY DEVICES: Nixie tubes, LED's LCD's, discharge devices.

UNIT IV

Instrumentation: Transducers & sensors, classification & selection of sensors, Measurement of force using strain gauges, Measurement of pressure using piezoelectric sensor, Measurement of temperature using Thermistors and Thermocouples, Measurement of displacement using LVDT, Measurement of position using Hall effect sensors. Concept of signal conditioning and data acquisition systems, concept of smart sensors and virtual instrumentation.

Text Book:

1. A K Sawhney, "Electrical & Electronic Measurement & Instrument", Dhanpat Rai & Sons, India
2. BC Nakra & K. Chaudhary, "Instrumentation, Measurement and Analysis," Tata McGraw Hill 2nd Edition
3. Purkait, "Electrical & Electronics Measurement & Instrumentation", TMH

Reference Books:

1. Forest K. Harris, "Electrical Measurement", Willey Eastern Pvt. Ltd. India
2. M. Stout, "Basic Electrical Measurement", Prentice Hall of India
3. WD Cooper, "Electronic Instrument & Measurement Technique", Prentice Hall International
4. EW Golding & F.C. Widdis, "Electrical Measurement & Measuring Instrument", AWWheeler & Co. Pvt. Ltd. India

Course code	EEE-104 (P)				
Category	Program Core course				
Course title	Electrical Measurement and Measuring instruments (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Experiments:

- 1) Study blocks wise construction of a analog oscilloscope & Function generator.
- 2) Study blocks wise construction of a Multimeter & frequency counter.
- 3) Study Measurement of different components & parameters like Q of a coil etc using LCRQ meter.
- 4) Study of distortion factor meter and determination of the % distortion of the given oscillator
- 5) Determine output characteristics of a LVDT and Measure displacement using LVDT
- 6) Study characteristics of temperature transducer like Thermocouple, Thermistor & RTD with implementation of a small project using signal conditioning circuits like instrumentation amplifier.
- 7) Measurement of Strain using Strain Gauge.
- 8) To study differential pressure transducer & signal conditioning of output signal.
- 9) Measurement of level using capacitive transducer.
- 10) Study of Distance measurement using ultrasonic transducer.