2nd Semester

Course Code	Course Title	Type of Course	L – P	Credit
PHY-211T	Physics-II	C	4 – 0	4
CHM-211T	Chemistry-II	C	4 – 0	4
MTH-211T	Mathematics-II	C	4 – 0	4
CSE-201T	C Programming	CF	4 – 0	4
CIV-201T	Elements of Civil Engineering	CF	3 – 0	3
ECE-201T	Basic Electronics & Communication Engineering	CF	3 – 0	3
PHY-212P	Physics-II Lab	C	0 – 2	1
CHM-212P	Chemistry-II Lab	C	0 – 2	1
CSE-202P	C Programming Lab	CF	0 -2	1
	Total Credits		**22– 6**	**25**

Physics – II
PHY-211T

L – P
4 – 0

Unit-I

Quantum Mechanics: Why Quantum Physics, De-Broglie Hypothesis, Davison Germer experiment, Young's Double slit experiment, Uncertainty principle and Wave Packet, Wave function and its properties, Expectation value, Operators, Normalisation, Schrodinger wave Equation, Time Dependent and Time Independent, Continuity equation in QM, Schrodinger equation for free Particle, Particle in a Box, Step potential Tunnelling effect and its example (Tunnel diode or alpha decay).

Unit-II

Elementary Solid State Physics: Crystal lattice, Crystal structure, Unit cells, Miller Indices, Bravais lattice, Photographic crystal X-ray diffraction techniques, Laue's method, Classification of solids, formation of energy bands in metals, semiconductors and insulators, intrinsic and extrinsic semiconductors, Fermi energy.

Unit-III

Diffraction: Optical diffraction techniques- Fresnel diffraction, Fresnel Diffraction from a Slit. Fraunhoffer Diffraction, Fraunhoffer diffraction from a circular aperture, Fraunhoffer diffraction from a rectangular aperture, Polarization of light, Plane, Circular, Elliptical Polarization.

Unit-IV

Special theory of Relativity: Frames of reference, Michelson-Morley experiment, Absolute Space and Absolute Time, Need for Relativity, Basic postulates of special theory of relativity, Length contraction, Time dilatation, Relativistic Momentum, Mass-energy relation, Superconductivity: Meisner Effect, Type I and Type II Superconductors, BCS theory (Qualitative only), applications of superconductors.

Unit-V

Lasers*:* Introduction, Principle of laser, Stimulated and spontaneous emission, Population inversion, Einstein coefficients, optical pumping, Resonant Cavity and its modes, He-Ne Laser, Ruby Laser, Semiconductor Lasers, Applications of Lasers.

Text Books :

1. Optics by Ghatak
2. Optics by N. Subrahmanyam and BrijLal

Reference Books :

1. Fundamentals of Optics by Jenkins and White
2. Applied Solid State Physics by Rajnikant

Chemistry-II
CHM-211T

L – P
4 – 0

Unit-I

Nano-Technology: Nanoscale and Its Significance, Properties at Nanoscale: Optical, Electrical, Thermal, Mechanical and Magnetic, General Methods of Preparation of Nanomaterial's viz Top Down (Ball Milling, Nanolithography) and Bottom up Methods (Sol-Gel, Solution Based Method), Carbon Nanotubes (Properties and Applications)

Unit-II

Corrosion: Introduction, effects of corrosion, Factors effecting the rate of corrosion (Nature of the metal and Nature of the environment), Electrochemical Theory of Corrosion, Dry Corrosion and Wet Corrosion, Types of Corrosion (Pitting Corrosion, Crevice Corrosion, Galvanic Corrosion and Stress corrosion), Testing and Measurement of Corrosion, Corrosion Protection and Inhibition, Cathodic Protection, Anodic Protection, Protective Coatings.

Unit-III

Polymers: Advantages of Polymers over other Engineering Materials, Functionality, Degree of Polymerization, Concept of Molecular Weight, Polymerization (Addition, Condensation and Copolymerization), Polymerization Techniques (Bulk, Solution, Suspension and Emulsion polymerizations), Preparation, Properties and Engineering application of some Important Polymers, Polythene (LDPE and HDPE), Polyvinyl Chloride, Polystyrene, Teflon, Phenol Formaldehyde, urea-formaldehyde resin, Introduction to polymer iccomposites.

Unit-IV

Lubricants: Introduction, Function of Lubricants, Mechanism of Lubrication, Classification of Lubricants (Liquid ,Semisolid , Solid), Properties of Lubricants (Flash Point and Fire Point, Viscosity , Aniline Point Acid value).

Unit-V

Instrumental Techniques-II: Nuclear Magnetic Resonance: Principle, shielding mechanism, chemical shift, number of Signals, application of nuclear magnetic resonance to simple organic molecules, Introduction to Thermal Analysis: Principle, Working and Application (TGA,DTA), X-ray Spectroscopy: Principle and Applications.

Books Recommended:

1. A Text Book of Engineering by S.S Dara S Chand & Co limited New Delhi
2. Advanced Practical Physical Chemistry by Yadav, Goyal publication
3. Spectroscopic methods by Williams and Fleming
4. Applied Chemistry : Theory And Practice by O. P. Vermani
5. Laboratory Manual on Engineering Chemistry by S.K. Bhasin and Sudha Rani, DhanpatRai Publishing Company, New Delhi
6. Applied chemistry by V. M. Balsaraf &Et. I. K. Al, International Publishing House Pvt. Ltd.
7. Electrochemistry and Corrosion Science by N.Perez
8. Analytical chemistry: An Introduction byDouglas A. Skoog, Donald M. West, F. James Holler
9. Polymer Science by V.R.Goowriker, N.V Viswanathan and jayadevSreedhar by Wiley Easter Limited New Delhi
10. Nanotechnology Fundamentals And Applications by ManasiKarkare & Rajni Bahuguna
11. Nanotechnology Importance And Application by Fulekar
12. Physical Chemistry by Puri Sharma and Patharua.
13. Solid State Chemistry and its Applications by Anthony R. West, Wiley Publisher

Mathematics-II

MTH-211T

L – P

4 – 0

UNIT-I

Non-linear differential equation of first order, Simultaneous differential equation, Simultaneous differential equation of the form $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$, Applications of ordinary differential equations, Differential Equation: Partial differential equations of first order, langrage linear equation Standard form, Charpit`s Method to solve non-linear partial differential equation.

UNIT-II

Partial differential equations of second and higher, Homogeneous Partial Differential equations with constant coefficients, vibration of stretched flexible string, heat flow equation, Wave equation, solutions by the method of separation of variables.

UNIT-III

Fourier Series, Integral Calculus: Differential under the sign of integration. Double and triple integrals, change of variables, Beta and Gamma functions.

UNIT-IV

Matrices: Review of algebra of matrices, Orthogonal and unitary matrices, partitioning of Matrices, Trace of Matrices, Triangular matrices, Rank of a matrix, elementary transformations, Inverse by Elementary Transformation.

UNIT-V

Normal Form of a Matrix, solution of simultaneous equation by elementary operation, Caley-Hamilton theorem, Eigen values, and Eigen vectors of a matrix, Quadratic Form.

Books Recommended:

1. Advanced Engineering Mathematics by E.Kreyszig
2. Differential equations and its applications, H.T. Piaggio, Prentice-Hall
3. Applied Mathematics for Engineers by P.N. Wartikar
4. Advanced Engineering Mathematics,2/e by Greenberg, Pearson education, 2004
5. Ordinary and partial Differential equation, M.D. Raisingania, S.Chand and Co
6. Linear Algebra, Hoffmann & Kunze, Prentice-Hall
7. Mathematical Analysis by S.C. Malik & Savita Arora New Age international Limited
8. Integral Calculus by Shanty Narayan.

C Programming
CSE-201T

L – P
4 – 0

Unit-I

Computer components, characteristics & classification of computers, hardware & software, peripheral devices, system software, application software, utility program, compiler, interpreter, Assemblers, Evolution of programming languages, Algorithms, Dataflow Diagram,introduction to compiler/ Assembler/Interpreter.

Unit-II

Structure of C program, Identifiers, Keywords, Data Types, Constant and Variables, Operators: Precedence and Associativity, Expressions, Statements, Input and Output functions, storage classes, type casting, Macros.

Unit-III

Control structures: Branching & looping, One Dimensional Array, Multidimensional Array and their applications, string manipulation.

Unit-IV

Library and User defined functions, Formal and Actual parameters, function prototypes, Parameter passing (Call-by-value,), Recursion, Structures, unions.

Unit-V

Pointer variable, Pointer Arithmetic, passing parameters by reference, pointer to pointer, pointers to functions, dynamic memory allocation, pointer to structure & pointer to union, Pointers to Multidimensional Arrays, Declaration of file pointer, opening and closing files, working with text files.

Books Recommended:

1. Programming in ANSI C by E. Balaguruswami, TMH
2. Programming in C by Byron Gottfried, TMH
3. Computer fundamentals and programming in C by Pradip Dey & Manas Ghosh, OXFORD University Press
4. The 'C' programming language by Ritchi, Kernighan & D.M. Ritchie, PHI
5. C The Complete Reference by H. Sohildt, TMH
6. Let us C by Y. Kanetkar, BPB Publications
7. Computer Science - A Structured Programming Approach using C by B.A. Forouzan &R.F. Gillberg, Cengage Learning.

Elements of Civil Engineering
CIV-201T

L - P
3 - 0

UNIT-I

Introduction to Civil Engineering: Overview of Civil Engineering; Civil Engineering land marks, Impact (social, economic, environmental) of Civil Engineering on society, introduction to various branches of civil Engineering, Future directions: Job opportunities in Civil Engineering.

UNIT-II

Stress & Strain: Forces & stresses, Body Forces, surface forces, Internal forces, components of stress in rectangular co-ordinates, Uni-axial tensile test, Elasticity, An-elasticity, Work-hardening, anisotropy, homogeneity and continuity, generalized Hooke's law, Lame's constants, Modulus of rigidity, Bulk modulus, relation between the elastic constants, Principle of superposition, Uniqueness theorem, Thermal effects, Center of Gravity (symmetrical & un-symmetrical sections), moment of inertia of symmetrical & unsymmetrical sections, parallel axis theorem, perpendicular axis theorem, radius of gyration.

UNIT-III

Bending moment & Shearing Force: Notation & sign convention for flexural loads, shear force & bending moment, diagrams of determinate structures, (Cantilever, simply supported beams & varying load beams) supported to point loads, UDL and VDL, computing of reactions using equation of equilibrium.

UNIT-IV

Trusses: Planner Truss structures, idealization of planar structures, sign convention & member force representation, analysis of trusses by methods of Joints, graphical and sections.

UNIT-V

Torsion of shafts: Geometry of deformation of a twisted circular shaft, Stress and deformation in twisted circular solid and hollow shafts, Strain energy due to torsion, Power transmitted by circular shafts.

BOOKS RECOMMENDED:

1. Engineering Mechanics by I.H. Shames Prentice Hall, New Delhi.
2. Vector Mechanics for Engineers by F.P. Beer, and Johnston, McGraw Hill Edition.
3. Engineering Mechanics by D.S. Kumar, S.K. Kataria & Sons, New Delhi.
4. Engineering Mechanics by J. L. Meriam and L. G. Kraige, John Wiley.
5. Strength of Materials by Khurmi.
6. Strength of Materials by Ramamurtha.

Basic Electronics and Communication Engineering
ECE-201T

L – P
3 – 0

UNIT-I

Electronic Components: Active and Passive (Resistors, Inductors and Capacitors) components, Introduction to Semiconductors: P and N type Semiconductors, Transport Mechanism of Charge Carriers, Charge Densities in a Semiconductor, Electric properties, Hall Effect, Generation, Recombination, Diffusion, Continuity Equation, Injected Minority Carrier Charge.

UNIT-II

PN Junction: Open Circuited PN Junction, Current Components in PN junction Diode, Basic Principle, Operation and Volt-Ampere Characteristics of PN Junction Diode, Temperature Dependence of V/I Characteristics, Piecewise linear Diode Characteristics, Diode Resistance, Diode Capacitances in detail, Charge Control Description of a Diode, Junction Diode Switching Times, BJT and its types.

UNIT-III

Digital Electronics: Introduction to digital Electronics, Gates (Basic & universal), Boolean algebra, laws & theorems, simplification of Boolean expression, Basics of Microprocessor 8085 and its pin diagram.

UNIT-IV

Communication Systems**:** Introduction to Communication System, elements of Communication System, Benefits of Communication, Communication Media, Modulation and Demodulation (brief idea).

UNIT-V

Transducers: Classification of Transducers, Basic Requirements of Transducers, Passive Transducers, Strain Gauge, Thermistor, LVDT, Active Transducers, Piezoelectric and Thermocouple.

TEXT BOOKS:

1. Electronic Devices & Circuits by J.B. Gupta
2. Integrated Electronics by Millman & Halkias
3. Communication system Analog and Digital by Sanjay Sharma

REFERENCE BOOKS:

1. Electronic Communication system by G. Kennedy
2. Electronic Communication Systems (Fundamentals through advanced) by W. Tomassi, Pearson Education.
3. Electronic Devices and Circuit Theory by Boylestead and Nashelsky.

Physics - II Lab
PHY-212P

L – P
0 – 2

List of Experiments:

1. Determination of refractive index of prism by spectrometer.
2. Determination the wavelength of sodium light by diffraction grating.
3. Determination of Wavelength of sodium light by Newton's ring.
4. Study of Zener diode voltage regulating characteristics.
5. To study double slit interference by He-Ne laser.
6. To plot the graph for the transistor characteristics.
7. To plot the graph for the semi-conductor diode.
8. To find the dead time of a G. M. Counter

Chemistry-II Lab
CHM-212P

L - P
0 - 2

List of Experiments:

1. Synthesis of the phenol formaldehyde resin
2. To titrate Fe(II) with $KMnO_4$ spectrophotometrically.
3. To determine the dissociation constant of methyl red by spectro photometric method
4. To determine the temporary and permanent hardness of the a sample of water by complex ometeric titration
5. To determine the Alkalinity of the given sample of water.
6. Determination of the ion exchange capacity of cation exchange resin.
7. Separation of a mixture of inorganic ions by paper chromatography.

Demonstration of experiments:

Determination of specific rotation of the sucrose by polraimetery

Spectrophotometer (concentration determination, wavelength maximum)

C Programming Lab

CSE-202P

L – P

0 – 3

List of Experiments:

1. Programs to understand the basic data types.
2. Program for looping and decision statements.
3. Programs to generate odd, even, fibnoccii, lucas and other common series using loops.
4. Programs using built-in math functions.
5. Programs on arrays.
6. Program to implement linear search.
7. Programson two dimension array.
8. Program to add and multiply two Matrices.
9. Program to find transpose of a Matrix
10. Program to read and display array using functions
11. Programs on string manipulations.
12. Write functions for finding sum, difference, product and remainder between two numbers and return the result
13. Programs on functions.
14. Write a function to find factorial using recursion
15. Programs on structures and unions.
16. Programs on pointers
17. Write a function to swap two numbers using call by reference?
18. Write a function to find minimum of an array using pointers.?
19. Write a function to reverse a string using pointers?
20. Programs on basic file operations