

MATHEMATICS-II					
Course Code	FE 210		Credits	4	
Scheme of Instruction Hours/ Week	L	T	P	TOTAL	
	3	1	0	39 hrs/sem	
Scheme of Examination TOTAL = 150 marks	IA	TW	TM	P	O
	25	25	100	0	0

Course Outcomes:

The student will be able to:

CO1	Evaluate double & triple integrals & learn its various Engineering applications.
CO2	Explain analytic properties of vector valued functions & the associated results used in engineering.
CO3	Solve first order differential equation & higher order linear differential equations
CO4	Explain the multiple integrals, vector calculus, solve ordinary differential equations.

UNIT -1	
Applications of definite integrals to evaluate length of curves, surface areas. Multiple Integration: Double integrals (Cartesian & Polar), change of order of integration in double integrals. Change of variables (Cartesian to Polar).	10hrs
UNIT -2	
Applications of double integrals: Areas , volumes of solid of revolutions, Center of Mass and Gravity (constant and variable densities); Triple integrals (Cartesian, Spherical, Cylindrical), Simple applications involving cubes, sphere and rectangular parallelepipeds	10hrs
UNIT -3	
Vector Differentiation: Vector differentiation, Scalar and Vector fields, Directional Derivatives, Divergence and Curl of Vector fields, Gradient of a Scalar field. Vector Integration: Vector integration, line integrals and work done by a force, surface integrals, Integral Theorems: Green's theorem with proof, Gauss Divergence theorem and Stokes theorem only application.	10hrs
UNIT -4	
Higher order linear Differential Equation with constant coefficients and with right hand side of the form e^{ax} , $\sin ax$, $\cos ax$, $e^{ax} f(x)$, $x^n f(x)$, $e^{ax} x^n f(x)$. Linear equations with variable coefficients such as Cauchy's Equation and Lagrange's Equation, D-operator and Inverse D- operators, method of Variation of Parameters.	9 hrs

TEXTBOOKS	
1	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2	Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
3	Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
4	G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
REFERENCES	
1	D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
2	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
3	Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

CHEMISTRY					
Course Code	FE120/FE 220		Credits	4	
Scheme of Instruction	L	T	P	TOTAL	
Hours/ Week	3	0	0	39 hrs/sem	
Scheme of Examination	IA	TW	TM	P	O
TOTAL = 125 marks	25	0	100	0	0

Course Outcomes:

The student will be able to:

CO1	Explain the basic concept of electrochemical system involving different types of energy systems and components involved therein
CO2	Describe the classification and grading of Hydrocarbon fuels and non-conventional energy systems like solar and Biogas
CO3	Differentiate various types of corrosion and gain knowledge on control measures associated with corrosion
CO4	Identify polymeric materials, methods and properties associated with these materials.

UNIT -1	
Electrochemical Energy Systems: Single electrode potential: concept, sign convention, Determination of standard electrode potential, Nernst equation and related numerical. Electrochemical cells: Galvanic and Concentration cells- Construction, Representation and related numerical on EMF. Electrodes: Reference Electrodes –Calomel and Silver/Silver chloride electrodes; Ion Selective electrodes, glass electrode; Construction, representation, pH determination using the electrodes. Batteries: Basic concepts, Characteristics, classification. Construction, working and applications of Zn-Air Battery and Li-ion polymer battery.	10hrs
UNIT -2	
Corrosion: Definition and Mechanism of corrosion- Direct chemical corrosion & Electrochemical corrosion. Types of Corrosion: Galvanic corrosion, differential aeration corrosion(with reference to waterline and Pitting corrosion). Factors Influencing corrosion: Nature of metal and Environment; Corrosion Control Measures: Proper design, Purity and alloying, Cathodic protection, Modifying environment, Metal Coatings: Anodized coatings(Aluminium), Electroless (Copper) and Electroplating coatings (Chromium Plating). .	10hrs
UNIT -3	
Stereochemistry and Organic Reactions: chirality, optical activity, enantiomers and diastereomers, Projection formulae and geometrical isomerism, Organic Chemical Reactions: Beckmann Rearrangement and Reimer-Tiemann Reaction (mechanism and applications) Fuels: Definition, Classification with reference to combustible fuels; Crude oil-Mining and purification, grading of Gasoline and Diesel. Instrumental techniques and applications Principles, Instrumentation and Applications of : UV-Vis spectrometry, FTIR and Gas Chromatography	10hrs

UNIT -4	
Polymers: Definition, Classification-based on source of availability, structure, number of monomers and their arrangement, type of polymerization and response to heat, Basic concepts- monomers, Degree of polymerization, Functionality. Methods of Polymerization- Bulk and Suspension. Structure-Property relationships in Polymers- chemical, Electrical(conducting polymer e.g. polyacetylene), optical, Mechanical and Crystallinity in Polymers (Tg and Tm).Degradation of Polymers- Oxidation, weathering, Environmental stress cracking and thermal.	9 hrs

TEXTBOOKS	
1	Shashi Chawla; A Text Book of Engineering Chemistry; Dhanpat Rai Publishing Co.; 2011.
2	S. S. Dara; Engineering Chemistry; Chand & Co.;2011.
REFERENCES	
1	Jain and Jain; Engineering Chemistry; Dhanpat Rai Publishing Co.;2013.
2	M.G. Fontana; Corrosion Engineering; McGraw HillPublication. 2010
3	M.M. Uppal; Engineering Chemistry; KhannaPublication. 2009

COMPUTER PROGRAMMING

Course Code	FE 230		Credits	4	
Scheme of Instruction Hours/ Week	L	T	P	TOTAL	
	3	0	0	39 hrs/sem	
Scheme of Examination TOTAL = 125 marks	IA	TW	TM	P	O
	25	0	100	0	0

Course Outcomes:

The student will be able to:

CO1	Demonstrate the use of algorithms and flowcharts to plan the solution of a computing problem
CO2	Explain the use of formatted and unformatted input and output statements in C programs
CO3	Analyse the syntax and semantics of any given data types, data structures and programs in C language.
CO4	Design and implement programs using standard C language infrastructure regardless of the hardware or software platform

UNIT -1	
Programming Basics: Notions of algorithms, flowcharts and programming, iteration and recursion. Features of block-structured languages, Functions and procedures, Parameter passing, Top-down style and stepwise-refinement with concrete examples Fundamental algorithms: Exchanging values of two variables, counting, summation of a set of numbers , generation of prime numbers , reversal ,series.	10hrs
UNIT -2	
Overview of Programming language C, constants variables and data types, operators and expressions, data input output, decision making and looping: If, If-else, while, do- while, for, switch. Function declarations and prototypes, pass by value, and pass by reference. Iterative function and recursive functions	10hrs
UNIT -3	
Arrays: One dimension array, array initialization, Searching, Insertion, deletion of an element from an array; finding the largest/smallest element in an array, two dimension array, addition/multiplication of two matrices, transpose of a square matrix; passing array to function , character array and string. Pointers: Address operators, pointer type declaration, pointer assignment, pointer initialization, pointer arithmetic, functions and pointers, arrays and pointers, pointer arrays.	10hrs
UNIT -4	
Structure & Unions: Defining a structure, declaring structure variables, Accessing structure members, structure initialization, copying & comparing structure variables, operation on individual members, Array of structures, structure & functions, Unions, Size of Structure. Files management in C: Defining & opening a file, closing a file, I/O operations on files, Error handling during I/O files, Random Access to files. Introduction to Dynamic Memory Allocation	9 hrs

TEXTBOOKS	
1	Herbert Schildt ; C: The Complete Reference, 4th Edition; Tata McGraw Hill;2000
2	Stephen Prata ; C Primer Plus 5th Edition; SAMS Publishing;2005.
REFERENCES	
1	Brian W. Kernighan and Dennis M. Ritchi; C Programming Language 2nd Edition; Pearson Education;2006.
2	Samuel P. Harbison and Guy L. Steele; C: A Reference Manual , 5th Edition; Prentice Hall;2003.
3	King K.N; C Programming: A Modern Approach, 2nd Edition; W. W. Norton and Company;2008.

INTRODUCTION TO CIVIL ENGINEERING					
Course Code	FE 240		Credits	4	
Scheme of Instruction Hours/ Week	L	T	P	TOTAL	
	3	0	0	39 hrs/sem	
Scheme of Examination TOTAL = 125 marks	IA	TW	TM	P	O
	25	0	100	0	0

Course Outcomes:

The student will be able to:

CO1	Explain the history and basic disciplines of Civil Engineering and building materials.
CO2	Identify various processes involved in building constructions and structures.
CO3	Apply the IoT and Computational methods in Civil Engineering.
CO4	Implement safety measures for buildings

‘UNIT -1	
Basic Understanding: Broad disciplines of Civil Engineering; Importance of Civil Engineering, Possible scopes for a career and interdisciplinary career options. History of Civil engineering: Early constructions and developments over time; Ancient monuments & Modern marvels; Works of Eminent civil engineers Fundamentals of Building Materials: Properties and uses of Stones, bricks, mortars, sand, Construction Chemicals; Structural Steel, High Tensile Steel, Carbon Composites; Cement and different types and properties/Plastics in Construction; Recycling of Construction & Demolition wastes.	10 Hrs
UNIT -2	
Basics of Building Construction: Plain cement concrete, Reinforced & Pre-stressed Concrete constructions, Components of building, load bearing and framed structures, types of foundations, bearing capacity of soil, Brick masonry and Stone masonry works- types of masonry constructions. 3D printing Construction Equipment; Different types of constructions equipment’s- earthmoving, excavating and lifting equipment’s and uses. Automation & Robotics in Construction; Advent of Lean Construction.	10 Hrs
UNIT -3	
Types of Civil Engineering Structures: Buildings, Bridges, Tunnels, Railways, Port & Harbor, Airport, Dams, Water supply systems, Water tanks, typical uses and importance of each structure. Computational Methods: Typical software’s used in Civil Engineering- Building Information Modeling; brief introduction and uses, guidelines suggested by NBCon Development control rules and general building requirements. Names of IS codes for Civil engineering constructions. Basic of building drawings: drawing typical plan, section and elevation of simple buildings. Different symbols used in building drawing.	10 Hrs

UNIT -4	
<p>Fundamental of Fire Safety: Basic Chemistry and physics of fire, Recognition of possible fire sources and emergency, procedures in the event of a fire, types of detecting devices and extinguishing agents and systems, Firefighting installations, Visit to Fires safety laboratories. Fundamentals of industrial safety, Different types of safety systems and equipments, Laws related to safety (Factories ACT 1948 Explosive ACT, Electricity ACT)</p> <p>IoT in Civil Engineering: smart buildings, smart street, smart city concepts, Significance of IoT in Civil engineering & Construction Industry. Typical applications in monitoring and maintenance of Civil Infrastructures.</p>	12 Hrs

TEXTBOOKS	
1	<u>Elements of Civil Engineering by S S Bhavikatti, New Age International Private Limited, 2010.</u>
2	Basic Civil Engineering BY By Satheesh Gopi, Pearson Education India, 2012
3	Building Construction and Construction Material, G.S.Birdie and T.D.Ahuja Publisher : Dhanpat Rai Publishing Company, 2010
REFERENCES	
1	<u>Principles of Fire Safety Engineering: Understanding Fire and Fire Protection</u> by Akhil Kumar Das, Prentice Hall India Learning Private Limited (2014).
2	The National Building Code, BIS, (2017), RERA Act, (2017)
3	Building Construction and Construction Material, G.S.Birdie and T.D.Ahuja Publisher : Dhanpat Rai Publishing Company, 2012

ENGINEERING GRAPHICS					
Course Code	FE 270		Credits	2	
Scheme of Instruction Hours/ Week	L	T	P	TOTAL	
	1	0	2	39 hrs/sem	
Scheme of Examination TOTAL = 100 marks	IA	TW	TM	P	O
	0	100	0	0	0

Course Outcomes:

The student will be able to:

CO1	Demonstrate the imagination skills required in converting idea into drawing.
CO2	Explain projection systems in engineering drawing.
CO3	Analyze solids and their cut sections along with development of surfaces.
CO4	Explain Orthographic and Isometric projection of parts.

UNIT -1	
Introduction to Engineering Graphics , different types of lines used in engineering graphics. Dimensioning techniques. Orthographic Projection: Introduction, principle planes of projection, four quadrants, first angle projection, third angle projection, symbols of projection. Projections of points: Points situated in all four quadrants. .	8hrs
UNIT -2	
Projection of Straight lines(both the end points in first quadrant only) Line parallel to one or both the planes, Line contained by one or both the planes, Line perpendicular to one of the planes, Line inclined to one plane and parallel to the other plane, line inclined to both the planes, line contained by a plane perpendicular to both the reference planes, true lengths and true inclinations Projections of Planes: Circle, square, triangle, rectangle, pentagon, hexagon	12hrs
UNIT -3	
Projections of Solids: Cube, cylinder, cone, pyramid, prism Orthographic Projection& Sections: Using 1st angle projection. Only simple machine parts and castings	9hrs
UNIT -4	
Isometric projection: simple machine parts. Free hand sketching: Sketching orthographic views given a three dimensional view or a simple machine part. Sketching isometric view given the orthographic views of a simple machine part.	10 hrs

TEXTBOOKS	
1	N. D. Bhatt; Engineering Drawing; Charotar Publishing House Pvt. Ltd.;2015
2	K. R. Gopalkrishna; Engineering Drawing; Subash Publishing House;2012.
REFERENCES	
1	K. R. Mohan; Engineering Graphics; Dhanpat Rai Publishing Co.;2015.
2	P. J. Shah; Engineering Drawing; Vol. 1 & 2 – Praveen Shah Publishers;2003.
3	P. S. Gill; Engineering Drawing; S. K. Kataria& Sons; 2013.