UNIVERSITY OF KALYANI

PART-I SEMESTER-I & II

syllabus

Common for

Bachelor of Technology

on

Electronics and Instrumentation Engineering

&

Information Technology

Department of Engineering and Technological Studies

Part-I, Semester- I & II Curriculum Structure

Common For

Bachelor of Technology on Electronics and Instrumentation Engineering & Information Technology

A. Definition of Credit

1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
1 Hr. Practical (P) per week	0.5 credit

B. Range of credits

A range of credits from 150 to 160 for a student to be eligible to get B.Tech Degree in Engineering. A student will be eligible to get B.Tech Degree *with Honours*, if he/she completes an additional 20 credits. The guidelines to acquire the additional credit points are given in Annexure-I.

C. Guidelines regarding Mandatory Induction Program for the new students

The guidelines for Mandatory Induction Program are given in Annexure-II .

PART –I, 1ST SEMESTER (EIE & IT)

NO. OF THEORETICAL SUBJECT	: 03	CREDITS ON THEORETICAL SUBJECTS	: 12
NO. OF SESSIONAL SUBJECT	: 04	CREDITS ON SESSIONAL	: 5.5
		TOTAL SEMESTER CREDITS	: 17.5

Sl. No.	Subject Code	Subject Name	Contacts (Periods/Week)				Credits
			L	T	P	Total	
A. THEORETICAL SUBJECTS							
1.	PH101	Physics	3	1		4	4
2.	MA101	Mathematics –I	3	1		4	4
3.	EE101	Basic Electrical Engineering	3	1		4	4
		Total of Theoretical Subjects				12	12
B. SESSIONAL SUBJECTS							
5.	PH191	Physics Lab			3	3	1.5
6.	EE191	Basic Electrical Engineering Lab			2	2	1
7.	ME191	Engineering Graphics & Design Lab	1		4	5	3
8.	NS191	NSS	0	0	1	1	0
		Total of Sessional Subjects				11	5.5
		Total of Semester				23	17.5

Subject : PHYSICS
Paper Code : PH101 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L + 1T *Credits: 4*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 48*

Sl No.	Details of the lesson	Contact Hours
1.	**Electronic materials** Free electron theory, Density of states and energy band diagrams, Kronig-Penny model (to introduce origin of band gap), Energy bands in solids, E-k diagram, Direct and indirect bandgaps, Types of electronic materials: metals, semiconductors, and insulators, Density of states, Occupation probability, Fermi level, Effective mass, Phonons.	8*L* + 2*T*
2.	**Semiconductors** Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p-n junction, Metal-semiconductor junction (Ohmic and Schottky), Semiconductor materials of interest for optoelectronic devices.	10*L*+ 2*T*
3.	**Light-semiconductor interaction** Optical transitions in bulk semiconductors: absorption, spontaneous emission, and stimulated emission; Joint density of states, Density of states for photons, Transition rates (Fermi's golden rule), Optical loss and gain; Photovoltaic effect, Exciton, Drude model.	6*L*+ 1*T*
4.	**Measurements** Four-point probe and van der Pauw measurements for carrier density, resistivity, and hall mobility; Hot-point probe measurement, capacitance-voltage measurements, parameter extraction from diode I-V characteristics, DLTS, band gap by UV-Vis spectroscopy, absorption/transmission.	6*L*+ 1*T*
5.	**Engineered semiconductor materials** Density of states in 2D, 1d and 0D (qualitatively). Practical examples of low-dimensional systems such as quantum wells, wires, and dots: design, fabrication, and characterization techniques. Heterojunctions and associated band-diagrams	6*L*+ 2*T*

Recommended Books:

1.	J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
2.	B. E. A. Saleh and M. C. Teich, Fundamentals of Photonics, John Wiley & Sons, Inc., (2007).
3.	S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
4.	A. Yariv and P. Yeh, Photonics: Optical Electronics in Modern Communications, Oxford University Press, New York (2007).
5.	P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).

Subject : MATHEMATICS-I
Paper Code : MA101 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L + 1T *Credits: 4*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 48*

Sl. No.	Details of the lesson	Contact hours
1.	***Calculus:*** Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.	5*L* + 2*T*
2.	***Sequences and series:*** Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions;	3*L* + 1*T*
3.	***Calculus:*** Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.	6*L* + 1*T*
4.	***Multivariable Calculus (Differentiation):*** Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.	6*L* + 2*T*
5.	***Matrices:*** Determinants, Matrices, vectors: addition and scalar multiplication, matrix multiplication; Inverse and rank of a matrix, rank-nullity theorem; Eigenvalues, eigenvectors, symmetric, skew-symmetric, and orthogonal Matrices, eigenbases; Diagonalization. System of linear equations, Cramer's Rule; Gauss elimination and Gauss-Jordan elimination.	10*L* + 4*T*
6.	***Vector spaces :*** Vector Space, linear dependence of vectors, basis, dimension; Linear transformations (maps), range and kernel of a linear map, Inverse of a linear transformation, composition of linear maps, Matrix associated with a linear map. Inner product spaces, Cayley-Hamilton Theorem, and Orthogonal transformation, Gram-Schmidt orthogonalization.	6*L* + 2*T*

Recommended Books:

1.	*G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry", 9*th Edition, Pearson, Reprint, 2002.
2.	Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
3.	D. Poole, "Linear Algebra: A Modern Introduction", 2nd Edition, Brooks/Cole, 2005.
4.	T. Veerarajan, "Engineering Mathematics for first year", Tata McGraw-Hill, New Delhi, *2008.*
5.	B.V. Ramana, "Higher Engineering Mathematics", Tata McGraw Hill New Delhi, 11th Reprint, 2010.
6.	N.P. Bali and Manish Goyal, "A text book of Engineering Mathematics", Laxmi Publications, Reprint, 2010.
7.	B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 35th Edition, 2000.

8.	V. Krishnamurthy, V.P. Mainra and J.L. Arora, "An introduction to Linear Algebra", Affiliated East–West press, Reprint 2005.

Subject : BASIC ELECTRICAL ENGINEERING
Paper Code : EE101 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L + 1T *Credits: 4*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 48*

Sl No.	Details of the lesson	Contact Hours
1.	***DC Circuits:*** Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems, Maximum Power Transfer Theorem, Miller Theorem & Millman's Theorem. Time-domain analysis of first-order RL and RC circuits.	8*L*+3*T*
2.	***AC Circuits:*** Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance. Three-phase balanced circuits, voltage and current relations in star and delta connections.	8*L*+3*T*
3.	***Transformers:*** Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.	6*L*+2*T*
4.	***Electrical Machines:*** Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, Significance of torque-slip characteristic. Loss components and efficiency, starting and speed control of induction motor. Single-phase induction motor. Construction, working, torque-speed characteristic and speed control of separately excited dc motor. Construction and working of synchronous generators.	8*L*+2*T*
5.	***Electrical Installations:*** Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.	6*L*+2*T*

Recommended Books

1.	B. L. Thereja, A. K. Thereja; A Textbook of Electrical Technology - Volume I & II, S Chand; Twenty Third edition (1 January 1959)
2.	D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3.	L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4.	E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5.	V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

Subject : PHYSICS LABORATORY.
Code : PH191 Subject Category: Sessional
Full Marks : 100
Contact Hours per week = 3P *Credits: 1.5*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl No.	Details of the lesson
1.	To Study the characteristics of different PN junction Diode-Ge and Si
2.	To analyze the suitability of a given Zener diode as a power regulator
3.	To find out the intensity response of a solar cell/Photo diode/LED
4.	To determine the band gap of a semiconductor
5.	To determine the resistivity of a semiconductor by four probe method
6.	To study voltage regulation and ripple factor for a half-wave and a full-wave rectifier without and with different filters
7.	To study the Hall effect for the determination of charge current densities
8.	Distinguish between Diamagnetic material, Paramagnetic and ferromagnetic material.
9.	To compare various capacitance and verify the law of addition of capacitance.

Subject : BASIC ELECTRICAL ENGINEERING LABORATORY.
Code : EE191 Subject Category: Sessional
Full Marks : 100
Contact Hours per week = 2P *Credits: 1*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 24*

Sl No.	**Details of the lesson**
1.	Mesh and nodal analysis
2.	Verification of super position theorem
3.	Verification of Thevevnins's theorem
4.	Study of R-L series and R-C series circuit
5.	R-L-C series resonance circuit
6.	R-L-C parallel resonance circuit
7.	Relationship between phase and line currents and voltages
8.	Open Circuit and Short Circuit test on single phase transformer

Subject : ENGINEERING GRAPHICS & DESIGN
Code : ME191 Subject Category: Sessional
Full Marks : 100
Contact Hours per week =1L+4P *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 60*

Sl No.	Details of the lesson
1.	***Introduction to Engineering Drawing*** covering, Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales;
2.	***Orthographic Projections*** covering, Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes - Auxiliary Planes;
3.	***Projections of Regular Solids*** covering, those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.
4.	***Sections and Sectional Views of Right Angular Solids*** covering, Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings (foundation to slab only)
5.	***Isometric Projections*** **covering,** Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;
6.	***Overview of Computer Graphics*** covering, listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line (where applicable), The Status Bar, Different methods of zoom as used in CAD, Select and erase objects.; Isometric Views of lines, Planes, Simple and compound Solids];
7.	***Customisation & CAD Drawing*** consisting of set up of the drawing page and the printer, including scale settings, Setting up of units and drawing limits; ISO and ANSI standards for coordinate dimensioning and tolerancing; Orthographic constraints, Snap to objects manually and automatically; Producing drawings by using various coordinate input entry methods to draw straight lines, Applying various ways of drawing circles;
8.	***Annotations, layering & other functions*** covering applying dimensions to objects, applying annotations to drawings; Setting up and use of Layers, layers to create drawings, Create, edit and use customized layers; Changing line lengths through modifying existing lines (extend/lengthen); Printing documents to paper using the print command; orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Part editing and two dimensional documentation of models. Planar projection theory, including sketching of perspective, isometric, multi-view, auxiliary, and section views. Spatial visualization

	exercises. Dimensioning guidelines, tolerancing techniques; dimensioning and scale multi-views of dwelling;
9.	***Demonstration of a simple team design project*** *that illustrates* Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; meshed topologies for engineering analysis and tool-path generation for component manufacture; geometric dimensioning and tolerancing; Use of solid-modeling software for creating associative models at the component and assembly levels; floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc. Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Recommended Books

1.	Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2.	Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3.	*Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech* Publishers
4.	CAD Software Theory and User Manuals

PART –I, 2ND SEMESTER (EIE & IT)

NO. OF THEORETICAL SUBJECT	: 04	CREDITS ON THEORETICAL SUBJECTS	: 13
NO. OF SESSIONAL SUBJECT	: 04	CREDITS ON SESSIONAL	: 7.5
		TOTAL SEMESTER CREDITS	: 20.5

A. THEORETICAL SUBJECTS							
Sl. No.	Subject Code	Subject Name	Contacts (Periods/Week)				Credits
			L	T	P	Total	
1.	CH201	Chemistry-I	3	1		4	4
2.	MA201	Maths –II	3	1		4	4
3.	IT201	Programming for Problem Solving	3			3	3
4.	HU201	English	2			2	2
		Total of Theoretical Subjects				13	13
B. SESSIONAL SUBJECTS							
1.	CH291	Chemistry Lab			3	3	1.5
2.	ME291	Workshop/Manufacturing Practices	1		4	5	3
3.	IT291	Programming for Problem Solving Lab			4	4	2
4.	HU291	Linguistic Lab			2	2	1
		Total of Sessional Subjects				14	7.5
		Total of Semester				27	20.5

Subject : CHEMISTRY –I
Paper Code : CH101 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L+1T *Credits: 4*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 48*

Sl. No.	Details of the lesson	Contact hours
1.	***Atomic and molecular structure*** Schrodinger equation. Particle in a box solution and their applications for conjugated molecules and nanoparticles. Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.	*6L+2T*
2.	***Spectroscopic techniques and applications*** Principles of spectroscopy and selection rules. Electronic spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging, surface characterisation techniques. Diffraction and scattering.	*5L+2T*
3.	***Intermolecular forces and potential energy surfaces*** Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena. Potential energy surfaces of H3, H2F and HCN and trajectories on these surfaces.	*3L+1T*
4.	***Use of free energy in chemical equilibria*** Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion. Use of free energy considerations in metallurgy through Ellingham diagrams.	*6L+2T*
5.	***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, coordination numbers and geometries, hard soft acids and bases, molecular geometries	*8L+2T*
6.	***Some Important Chemical Processes*** Basic chemical processes in (1) petrochemical and polymer, (2) basic inorganic (sodium hydroxide, sulfuric and nitric acids, fertilizers, chlorine), (3) speciality chemicals (agricultural, dyes and pigments), (4) consumer chemicals (detergents, soaps, cosmetics, perfumes etc.) and (5) pharmaceuticals (some examples)	*5L+2T*
7.	***Chemistry in the world*** Chemical evolution: how elements were formed; brief idea of chemical environment in ancient and modern world; chemistry and life	*3L+1T*

Recommended Books:

1. B. H. Mahan, "University chemistry",
2. M. J. Sienko and R. A. Plane, "Chemistry: Principles and Applications",
3. C. N. Banwell, "Fundamentals of Molecular Spectroscopy",
4. B. L. Tembe, Kamaluddin and M. S. Krishnan, "Engineering Chemistry (NPTEL Web-book)",
5. P. W. Atkins, "Physical Chemistry"
6. P. L. Luisi, "The Emergence of Life: From Chemical Origins to Synthetic Biology", Cambridge University Press, 2002
7. G. T. Austin, "Shreve's Chemical Process Industries", 5th Ed., Tata McGraw Hill

Subject : MATHEMATICS –II
Paper Code : MA201 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L+1T *Credits: 4*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 48*

Sl. No.	Details of the lesson	Contact hours
1.	***Multivariable Calculus (Integration):*** Multiple Integration: Double integrals (Cartesian), change of order of integration in double integrals, Change of variables (Cartesian to polar), Applications: areas and volumes, Center of mass and Gravity (constant and variable densities); Triple integrals (Cartesian), orthogonal curvilinear coordinates, Simple applications involving cubes, sphere and rectangular parallelepipeds; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.	10*L+3T*
2.	***First order ordinary differential equations:*** Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.	5*L+2T*
3.	***Ordinary differential equations of higher orders:*** Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation; Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.	7*L+3T*
4.	***Complex Variable – Differentiation:*** Differentiation, Cauchy-Riemann equations, analytic functions, harmonic functions, finding harmonic conjugate; elementary analytic functions (exponential, trigonometric, logarithm) and their properties; Conformal mappings, Mobius transformations and their properties.	7*L+2T*
5.	***Complex Variable – Integration:*** Complex integrals, Cauchy-Goursat theorem (without proof), Cauchy Integral formula (without proof), Liouville's theorem and Maximum-Modulus theorem (without proof); Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals using the Bromwich contour.	7*L+2T*

Recommended Books:

1.	G.B. Thomas and R.L. Finney, "Calculus and Analytic geometry", 9th Ed., Pearson, 2002.
2.	Erwin Kreyszig, "Advanced Engineering Mathematics", 9th Edition, John Wiley & Sons, 2006.
3.	W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, 9th Edn., Wiley India, 2009.
4.	S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
5.	E. A. Coddington, An Introduction to Ordinary Differential Equations, Prentice Hall India, 1995.
6.	E. L. Ince, Ordinary Differential Equations, Dover Publications, 1958.
7.	J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Ed., Mc-GrawHill, 2004.
8.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 2008
9.	B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Subject : PROGRAMMING FOR PROBLEM SOLVING
Paper Code : IT101 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 3L +0T *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl. No.	Details of the lesson	Contact hours
1.	**Introduction** Overview of basic components of computer system (primary memory, secondary memory, processor etc.) and basic computer organization, Basic idea of Operating System, Translator; Number System.	2*L*
2.	**Introduction to Programming** Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. From algorithms to programs; Programming environments; source code, object and executable code; Variables (with data types), variables and memory locations; Syntax and Logical Errors in compilation, Debugging.	2*L*
3.	**C Fundamentals** The C character set, identifiers and keywords, data types & sizes, variable names, declaration statements, storage classes. C program structure, header files, built in libraries.	2*L*
4.	**Operators & Expressions** Arithmetic operator, relational and logical operators, Bit-Level Operators, type conversion, expression evaluation, precedence and associativity, Input and Output- standard input and output, formatted input and output.	2*L*
5.	**Flow of control** Statement and blocks, if-else, switch-case, loops- while, for, do while; break, continue, exit, return, go to and labels	3*L*
6.	**Functions and Program Structures** Basics of functions, function prototypes, function call, function definition, library functions, user defined functions, system defined functions, functions returning values, parameter passing: pass by value. Command Line Argument; variable argument list; Storage class: auto, external, static and register, scope rules. Recursion, Tail recursion	5*L*
7.	**Arrays and Pointers** One dimensional arrays, two dimensional arrays, Character Arrays, pointers. Passing arrays to functions, passing pointers to functions, idea of call by reference Functions returning structures, functions returning pointers	4*L*
9.	**Structures, Union, Enumerator**	3*L*
10.	**Advanced arrays and Pointers** Memory allocation– static and dynamic; Multidimensional arrays, pointer to pointer, array of pointers, pointer to array, pointer to a function, Array of structures, pointer to structures; Near Pointer, Far Pointer, Huge Pointer; Character Arrays and Strings; Arrays of structures, Pointer to structures; Structure containing pointer, self-referential structures	5L
11.	**Preprocessor Directives** Types of Preprocessors, Macro substitution directives, File inclusion directives, Compiler control directives	2L
12.	**Files & Error Handling:** Concepts of File Management, FILE Type; Bit fields, formatted and unformatted files; Error Handling	6*L*

Recommended Books

1.	B.W. Kernighan and P. J. Plauger, "The Elements of Programming Style", McGraw-Hill, New York
2.	E. Yourdon, "Techniques of Program Structures and Design", Prentice Hall
3.	F.S. Scheid, "Theory and Problems of Computers and Programming", McGraw-Hill
4.	Gottfried, "Programming with C", Tata McGraw-Hill
5.	B.W. Kernighan and D.M. Ritchie, "The C Programming Language", Prentice Hall India
6.	V. Rajaraman, "Fundamentals of Computers", Prentice Hall India
7.	E. Balaguruswamy, "Programming in ANSI C", Tata McGraw-Hill
8.	Y. Kanetkar, "Let us C", BPB
9.	Y. Kanetkar, "Pointers in C", BPB
10.	M.M. Oka, "Computer Fundamentals", EPH

Subject : ENGLISH
Paper Code : HU201 Subject Category: Theoretical
Full Marks : 100 [End Semester Examination: 70 Marks + Internal Assessment: 30 Marks]
Contact Hours per week = 2L *Credits: 2*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 24*

Sl. No.	Details of the lesson	Contact hours
1.	***Vocabulary Building*** The concept of Word Formation, Root words from foreign languages and their use in English, Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives. Synonyms, antonyms, and standard abbreviations.	*5L*
2.	***Basic Writing Skills*** Sentence Structures, Use of phrases and clauses in sentences, Importance of proper punctuation, Creating coherence, Organizing principles of paragraphs in documents, Techniques for writing precisely	*5L*
3.	***Identifying Common Errors in Writing*** Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés	*5L*
4.	***Nature and Style of sensible Writing*** Describing, Defining, Classifying, Providing examples or evidence, Writing introduction and conclusion	*5L*
5.	***Writing Practices*** Comprehension, Précis Writing, Essay Writing	*4L*

Recommended Books:

1.	Michael Swan, "Practical English Usage". OUP. 1995.
2.	F.T. Wood, "Remedial English Grammar". Macmillan.2007
3.	William Zinsser, "On Writing Well". Harper Resource Book. 2001
4.	Liz Hamp-Lyons and Ben Heasly, "Study Writing". Cambridge University Press. 2006.
5.	Sanjay Kumar and Pushp Lata, "Communication Skills". Oxford University Press. 2011.
6.	"Exercises in Spoken English. Parts. I-III". CIEFL, Hyderabad. Oxford University Press

Subject : CHEMISTRY LABORATORY.
Code : CH291 Subject Category: Sessional
Full Marks : 100
Contact Hours per week = 3S *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 36*

Sl No.	Details of the lesson
1.	Determination of viscosity coefficient by Ostwald viscometer
2.	Determination of surface tension by stalagmometer
3.	Determination of pH by pH meter and by colour-matching
4.	Determination of part of phase boundary of phenol-water system
5.	Determination of equilibrium constant of $KI + I_2 = KI_3$
6.	Determination of UV-Vis spectrum of a chromophore

Subject : WORKSHOP/MANUFACTURING PRACTICES LABORATORY.
Code : WS291 Subject Category: Sessional
Full Marks : 100
Contact Hours per week = 1L + 4S *Credits: 3*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 60*

Sl No.	Details of the lesson
1.	Machine shop
2.	Fitting shop
3.	Carpentry
4.	Welding shop
5.	Casting
6.	Smithy
7.	Plastic moulding & Glass Cutting

Subject : PROGRAMMING FOR PROBLEM SOLVING LABORATORY
Paper Code : IT191 Subject Category: Sessional
Full Marks : 100
Contact Hours per week = 4P *Credits: 2*
Duration of the semester: 12 weeks *Assumed total contact hours in a semester: 48*

Sl. No.	Details of the lesson
1.	Problem solving using computers: Familiarization with programming environment
2.	Variable types and type conversions: Simple computational problems using arithmetic expressions
	Experiments using bit level operator and other operators
3.	Branching and logical expressions
4.	Loops: Iterative problems
5.	1D and 2D Array declaration and manipulation
6.	Functions, call by value, call by reference
7.	Pointers, structures, dynamic memory
8.	Experiments on Preprocessor Directives
9.	Library function implementation, experiments with command line argument and variable argument list
10.	Experiments on file handling and error handling

Subject : LINGUISTIC LABORATORY.	
Code : HU291	Subject Category: Sessional
Full Marks : 100	
Contact Hours per week = 2P(2S)	*Credits: 1*
Duration of the semester: 12 weeks	*Assumed total contact hours in a semester: 24*

Sl No.	**Details of the lesson**
1.	Listening Comprehension
2.	Pronunciation, Intonation, Stress and Rhythm
3.	Common Everyday Situations: Conversations and Dialogues
4.	Communication at Workplace
5.	Interviews
6.	Group Discussions
7.	Formal Presentations

Annexure I

Guidelines for Acquiring Additional Credit Points for B.Tech Degree with Honours

The Curriculum for Bachelor of Technology programme on Electronics and Instrumentation Engineering and Information Technology consists of a maximum of 160 credits in the entire 4 year programme. As per the AICTE guidelines an additional 20 credits is to be acquired to obtain the degree of Bachelor of Technology *with Honours*. These additional 20 credits will have to be acquired through University of Kalyani approved programmes including MOOCs. The students will have to complete additional 20 credits within 4 years of time distributed over four years as per the rules of the B.Tech degree. All 20 credits can not be earned in one year.

The list of University of Kalyani approved programmes will be announced at the beginning of every academic year.

Annexure II

Guidelines for Mandatory Induction Program

The Mandatory Induction Program is designed by referring to the AICTE Model Curriculum for Undergraduate Degree Courses in Engineering & Technology (January 2018) - Volume I (Page No.31-38). All new students enrolled for B.Tech programme has to undertake a mandatory non-credit course on induction programme. Duration for the mandatory induction programme is three weeks. A brief description of all the activities during the mandatory induction programme is presented below.

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Department/Branch & Innovations