Computer Science and Engineering

B. Tech Course

July, 2018

PART I: COURSE STRUCTURE

FIRST YEAR
FIRST SEMESTER

A. Theory

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
1	CHEM1001	Chemistry I	3	1	0	4	4
2	MATH1101	Mathematics I	3	1	0	4	4
3	ELEC1001	Basic Electrical Engineering	3	1	0	4	4
		Total Theory	**9**	**3**	**0**	**12**	**12**
B. Laboratory							
1	CHEM1051	Chemistry I Lab	0	0	3	3	1.5
2	ELEC1051	Basic Electrical Engineering Lab	0	0	2	2	1
3	MECH1052	Engineering Graphics & Design Lab	1	0	4	5	3
		Total Practical	**1**	**0**	**9**	**10**	**5.5**
	Total of Semester without Honours		**10**	**3**	**9**	**22**	**17.5**
C. Honours							
1	HMTS1011	Communication for Professionals	3	0	0	3	3
2.	HMTS1061	Professional Communication Lab	0	0	2	2	1
		Total Honours	**3**	**0**	**2**	**5**	**4**
	Total of Semester with Honours		**13**	**3**	**11**	**27**	**21.5**

SECOND SEMESTER

A. Theory

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
1.	PHYS1001	Physics I	3	1	0	4	4
2.	MATH1201	Mathematics II	3	1	0	4	4
3.	CSEN1001	Programming for Problem Solving	3	0	0	3	3
4.	HMTS1201	Business English	2	0	0	2	2
		Total Theory	**11**	**2**	**0**	**13**	**13**
B. Laboratory							
1.	PHYS1051	Physics I Lab	0	0	3	3	1.5
2.	CSEN1051	Programming for Problem Solving lab	0	0	4	4	2
3.	MECH1051	Workshop / Manufacturing Practice	1	0	4	5	3
4.	HMTS1251	Language Lab	0	0	2	2	1
		Total Practical	**1**	**0**	**13**	**14**	**7.5**
	Total of Semester without Honours		**12**	**2**	**13**	**27**	**20.5**
C. Honours							
1	ECEN1011	Basic Electronics	3	0	0	3	3
2.	ECEN1061	Basic Electronics Lab	0	0	2	2	1
		Total Honours	**3**	**0**	**2**	**5**	**4**
	Total of Semester with Honours		**15**	**2**	**15**	**32**	**24.5**

A. Theory

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
1.	CSEN2101	Data structure & Algorithms	4	0	0	4	4
2.	AEIE2105	Computer Organization & Microprocessor	3	0	0	3	3
3.	ECEN2104	Digital Logic	3	0	0	3	3
4.	MATH2101	Mathematics-III Algebraic Structures	4	0	0	4	4
5.	HMTS2001	Human Values and Professional Ethics	3	0	0	3	3
		Total Theory	**17**	**0**	**0**	**17**	**17**
B. Laboratory							
1.	CSEN2151	Data structure & Algorithms lab	0	0	3	3	1.5
2.	CSEN2152	Software Tools Lab	0	0	3	3	1.5
3.	AEIE2155	Microprocessor & Microcontroller Lab	0	0	2	2	1
		Total Practical	**0**	**0**	**8**	**8**	**4**
	Total of Semester without Honours		**17**	**0**	**8**	**25**	**21**
C. Honours							
1	MATH2111	Probability and Statistical Methods	4	0	0	4	4
		Total Honours	**4**	**0**	**0**	**4**	**4**
	Total of Semester with Honours		**20**	**0**	**10**	**30**	**25**

FOURTH SEMESTER

A. Theory

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
1.	CSEN2201	Discrete Mathematics	3	1	0	4	4
2.	CSEN2202	Computer Architecture	3	0	0	3	3
3.	CSEN2203	Operating Systems	3	0	0	3	3
4.	CSEN2204	Design & Analysis of Algorithms	4	0	0	4	4
5.	ECEN2001	Analog Circuits	3	0	0	3	3
6.	EVSC2016	Environmental Sciences (MANDATORY)	2	-	-	2	-
		Total Theory	**18**	**1**	**0**	**19**	**17**
B. Laboratory							
1.	CSEN2252	Computer Architecture lab	0	0	2	2	1
2.	CSEN2253	Operating Systems lab	0	0	3	3	1.5
3.	CSEN2254	Design & Analysis of Algorithms lab	0	0	3	3	1.5
4.	ECEN2051	Analog Circuits Lab	0	0	2	2	1
		Total Practical	**0**	**0**	**10**	**10**	**5**
	Total of Semester		**18**	**1**	**10**	**29**	**22**

THIRD YEAR

FIFTH SEMESTER

A. Theory

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
1.	CSEN3101	Database Management Systems	4	0	0	4	4
2.	CSEN3102	Formal Language & Automata Theory	4	0	0	4	4
3.	CSEN3103	Object Oriented Programming	4	0	0	4	4
4.	ECEN3106	Electronic Design Automation	2	0	0	2	2
5.	CSEN3131-CSEN3140	Professional Elective - I	3	0	0	3	3
	CSEN3131 CSEN3132 CSEN3133 CSEN3134 CSEN3135	Computer Graphics & Multimedia Artificial Intelligence Web Technologies Graph Algorithms Big Data					
		Total Theory	**17**	**0**	**0**	**17**	**17**

B. Laboratory

Sl.	Code	Subject	L	T	P	Total	Credit
1.	CSEN3151	Database Management Systems lab	0	0	3	3	1.5
2.	CSEN3153	Object Oriented Programming lab	0	0	3	3	1.5
3.	ECEN3156	Electronic Design Automation lab	0	0	2	2	1
		Total Practical	**0**	**0**	**8**	**8**	**4**
	Total of Semester without Honours		**17**	**0**	**8**	**25**	**21**

C. Honours

1	MATH3111	Operations Research and Optimization techniques	4	0	0	4	4
		Total Honours	**4**	**0**	**0**	**4**	**4**
	Total of Semester with Honours		**21**	**0**	**8**	**29**	**25**

THIRD YEAR

SIXTH SEMESTER

A. Theory

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
			L	T	P	Total	
1.	CSEN3201	Complier Design	4	0	0	4	4
2.	CSEN3202	Computer Networks	4	0	0	4	4
3.	HMTS3201	ECONOMICS FOR ENGINEERS	3	0	0	3	3
4.	CSEN3231-CSEN3240	Professional Elective-II	3	0	0	3	3
	CSEN3231 CSEN3232 CSEN3233 CSEN3234 CSEN3235	Advanced Operating System Advanced Java Programming Data Mining & Knowledge Discovery Computational Geometry Cloud Computing					
5.		Open Elective-I	3	0	0	3	3
	AEIE3221 ECEN3221 ECEN3222 MATH3221 MATH3223	Introduction to Sensors Analog and Digital Communication Designing with Processors and Controllers Computational Mathematics Scientific Computing					
6.	INCO3016	Constitution of India/ Essence of Indian Traditional Knowledge	2	-	-	2	-
		Total Theory	**19**	**0**	**0**	**19**	**17**

B. Laboratory

Sl.	Code	Subject	L	T	P	Total	Credit Points
1.	CSEN3251	Complier Design lab	0	0	3	3	1.5
2.	CSEN3252	Computer Networks lab	0	0	3	3	1.5
		Total Practical	**0**	**0**	**6**	**6**	**3**

C. Sessional

Sl.	Code	Subject	L	T	P	Total	Credit Points
1	CSEN3293	Term Paper and Seminar	0	0	4	4	2
		Total Seminar	**0**	**0**	**4**	**4**	**2**
		Total of Semester	**19**	**0**	**10**	**29**	**22**

FOURTH YEAR

SEVENTH SEMESTER

A. Theory

Sl.	Code	Subject	L	T	P	Total	Credit Points
			Contacts Periods/ Week				**Credit Points**
1.	HMTS4101	Principles of Management	3	0	0	3	3
2.	CSEN4131-CSEN4140	Professional Elective-III	3	0	0	3	3
	CSEN4131 CSEN4132 CSEN4133 CSEN4134 CSEN4135	Soft Computing Cryptography & Network Security Image Processing Approximation Algorithms Information Retrieval					
3.		Open Elective-II	3	0	0	3	3
	AEIE4121 AEIE4122 CHEN4121 CHEN4122 ECEN4121 ECEN4122 PHYS4121	Instrumentation and Telemetry Linear Control Systems and Applications Industrial Total Quality Management Industrial Pollution Control Software Defined Radio Error Control Coding Quantum Physics					
4.		Open Elective-III	3	0	0	3	3
	AEIE4127 MATH4122 BIOT4123 CHEN4123 ECEN4126 ECEN4127	Introduction to Embedded System Advanced Linear Algebra Biosensor Statistical Methods in Design of Experiments Ad Hoc Networks and Security Challenges Introduction to VLSI Design					
		Total Theory	**12**	**0**	**0**	**12**	**12**

B. Sessional

			L	T	P	Total	Credit Points
1	CSEN4191	Industrial Training / Internship	-	-	-	-	2
2.	CSEN4195	Project-I	0	0	8	8	4
		Total Sessional	**0**	**0**	**8**	**8**	**6**
		Total of Semester without Honours	**12**	**0**	**8**	**20**	**18**

C. Honours

			L	T	P	Total	Credit Points
1	CSEN4111	Machine Learning	4	0	0	4	4
		Total Honours	**4**	**0**	**0**	**4**	**4**
		Total of Semester with Honours	**16**	**0**	**8**	**24**	**22**

FOURTH YEAR

EIGHTH SEMESTER

Sl.	Code	Subject	Contacts Periods/ Week				Credit Points
A. Theory							
			L	T	P	Total	
1.	CSEN4231-CSEN4240	Professional Elective-IV	3	0	0	3	3
	CSEN4231	Distributed Algorithms					
	CSEN4232	Mobile Computing					
	CSEN4233	Pattern Recognition					
	CSEN4234	Computational Complexity					
	CSEN4235	Social Network Analysis					
	CSEN4236	Computer Vision					
2.	CSEN4241-CSEN4250	Professional Elective-V	3	0	0	3	3
	CSEN4241	Distributed Databases					
	CSEN4242	Natural Language Processing					
	CSEN4243	Parallel Algorithms					
	CSEN4244	Real Time & Embedded System					
	CSEN4245	Quantum Computing					
	CSEN4246	Robotics					
3.		Open Elective-IV	3	0	0	3	3
	AEIE4221	Process Instrumentation					
	AEIE4222	Medical Instrumentation					
	BIOT4221	Computational Biology					
	BIOT4222	Non-conventional Energy					
	CHEN4221	Nanotechnology					
	CHEN4222	Introduction to Solar and Wind Technology					
	ECEN4222	Optical Fiber Communication					
		Total Theory	**9**	**0**	**0**	**9**	**9**
B. Sessional							
1	CSEN4295	Project-II	0	0	16	16	8
2.	CSEN4297	Comprehensive Viva-voce	-	-	-	-	1
		Total Sessional	**0**	**0**	**16**	**16**	**9**
		Total of Semester	**9**	**0**	**16**	**25**	**18**

Open Electives to be offered by Computer Science and Engineering department for Non-departmental students:

Offered in Semester	Name of Subject	Subject Code
Open Elective I (Semester 6)	Fundamentals of RDBMS	CSEN3221
Open Elective II (Semester 7)	Fundamentals of Operating Systems	CSEN 4121
Open Elective III (Semester 7)	Intelligent Web and Big Data	CSEN4126
Open Elective IV (Semester 8)	Basics of Mobile Computing	CSEN4221

Honours Course for B. Tech Computer Science & Engineering Students:

Sl. No.	Semester	Paper Code	Course Title	Contact Hours / Week			Credit Points
				L	T	P	
	1st	HMTS1011	Communication for Professionals	3	0	0	3
		HMTS1061	Professional Communication Lab	0	0	2	1
	2nd	ECEN1011	Basic Electronics	3	0	0	3
		ECEN1061	Basic Electronics lab	0	0	2	1
	3rd	MATH2111	Probability and Statistical Methods	4	0	0	4
	5th	MATH3111	Operations Research and Optimization techniques	4	0	0	4
	7th	CSEN4111	Machine Learning	4	0	0	4
	Total						**20**

Credit Summary for B Tech Programme with effect from 2018-2019

Sl. No.	Course Type	AICTE Suggested	CSEN
1.	Humanities and Social Sciences including Management Courses	12	12
2.	Basic Science Courses	25	23
3.	Engineering Science Courses including Workshop, Drawing, Basics of Electrical / Mechanical / Computer, etc.	24	30
4.	Professional Core Courses	48	51
5.	Professional Elective Courses relevant to chosen Specialization / Branch	18	15
6.	Open Subjects – Electives from other Technical and/or Emerging Subjects	18	12
7.	Project Work, Seminar and Internship in industry or elsewhere	15	17
8.	Mandatory Courses (Non-credit) [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Traditional Knowledge]	0	0
	Total	**160**	**160**
9	Honours Courses	20	20
	Grand Total	**180**	**180**

Definition of Credit (as per AICTE):
- 1 Hour Lecture (L) per Week = 1 Credit
- 1 Hour Tutorial (T) per Week = 1 Credit
- 1 Hour Practical (P) per Week = 0.5 Credits
- 2 Hours Practical (Lab) per Week = 1 Credit

Range of Credits (as per AICTE):
- ✓ A total of 160 credits will be necessary for a student to be eligible to get B Tech degree.
- ✓ A student will be eligible to get B Tech degree with Honours if he/she completes an additional 20 credits. These could be acquired through various Honours Courses offered by the respective departments.
- ✓ A part or all of the above additional credits may also be acquired through MOOCs. Any student completing any course through MOOC will have to submit an appropriate certificate to earn the corresponding credit.
- ✓ For any additional information, the student may contact the concerned HODs.

PART II: DETAILED SYLLABUS

Syllabus of 1ˢᵗ semester:

Course Name : Chemistry-I					
Course Code: CHEM1001					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	**1**	**0**	**4**	**4**

Course outcome for the subject code CHEM1001

The subject code CHEM1001 corresponds to chemistry theory classes for the first year B. Tech students, which is offered as Engineering Chemistry and is common for all branches of engineering subjects. The course provides basic knowledge of theory based subjects like quantum mechanics, thermodynamics, reaction dynamics, electrochemistry, structure and reactivity of molecules. The course outcomes of the subject are

1. Knowledge of understanding the operating principles and reaction involved in batteries and fuel cells and their application in automobiles as well as other sectors to reduce environmental pollution.

2. An ability to design and conduct experiments, as well as to organize, analyzes, and interprets data.

3. An ability to analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.for engineering applications.

4. Have knowledge of synthesizing nano materials and their applications in industry, carbon nano tube technology is used in every industry now-a-days.

5. Understanding of bulk properties and processes using thermodynamic considerations.

6. Elementary knowledge of IR, UV, NMR and X-ray spectroscopy is usable in structure elucidation and characterisation of various molecules.

7. Knowledge of electronic effect and stereochemistry for understanding mechanism of the major chemical reactions involved in synthesis of various drug molecules.

MODULE 1
Atomic structure and Wave Mechanics:

Brief outline of the atomic structure, Duel character of electron, De Broglies's equation, the Heisenberg uncertainty principle, brief introduction of quantum mechanics, the Schrodinger wave equation, Hermitian operator, solution of the Schrodinger equation for particle in a one dimensional box, interpretation of the wave function Ψ, concept of atomic orbital.   3**L**

Thermodynamics:

Carnot cycle, 2nd law of thermodynamics, entropy, Clausius inequality, free energy and work function, Clausius Clapeyron Equation, Chemical Potential, Activity and Activity coefficient. Gibbs Duhem Relation.   4**L**

Spectroscopic Techniques & Application

Electromagnetic spectrum: EMR interaction with matter - absorption and emission of radiation.
Principle and application of UV- visible and IR spectroscopy
Principles of NMR Spectroscopy and X-ray diffraction technique   **3L**

MODULE 2
Chemical Bonding

Covalent bond, VSEPR Theory, hybridization, molecular geometries, Dipole moment, Intermolecular forces, V.B. and M.O. Theory and its application in Homo and Heteronuclear diatomic molecules, Band theory of solids, Pi-molecular orbitals of ethylene and butadiene. **5L**

Periodicity

Effective nuclear charge, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electro-negativity, inert pair effect.   **3L**

Ionic Equilibria

Acid Base Equilibria, Salt Hydrolysis and Henderson Equation, Buffer solutions, pH indicator, Common ion Effect, Solubility product, Fractional Precipitation .   **2L**

MODULE 3
Conductance
Conductance of electrolytic solutions, Strong and Weak electrolytes, effect of temperature and concentration. Kohlrausch's law of independent migration of ions, transport numbers and hydration of ions. Application of conductance Acid-base and precipitation titration.

                                                                                    3L

Electrochemical Cell

Thermodynamic derivation of Nernst equation, Electrode potential and its application to predict redox reaction; Standard Hydrogen Electrode, Reference electrode, cell configuration, half cell reactions, evaluation of thermodynamic functions; Reversible and Irreversible cells; Electrochemical corrosion.

Electrochemical Energy Conversion: Primary & Secondary batteries, Fuel Cells.

                                                                                    4L

Reaction dynamics

Rate Laws, Order & Molecularity; zero, first and second order kinetics.

Pseudo-unimolecular reaction, Arrhenius equation.
Mechanism and theories of reaction rates (Transition state theory, Collison theory).
Catalysis: Homogeneous catalysis (Definition, example, mechanism, kinetics).

                                                                                    3L

MODULE 4

Stereochemistry

Representations of 3- dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.   **4L**

Structure and reactivity of Organic molecule

Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion, free radicals, aromaticity.   **3L**

Organic reactions and synthesis of drug molecule (4 lectures)
Introduction to reaction mechanisms involving substitution, addition, elimination and oxidation-reduction reactions. Synthesis of commonly used drug molecules.   **3L**

TEXT BOOKS
1. Atkins' Physical Chemistry, P.W. Atkins (10th Edition)
2. Organic Chemistry, I. L. Finar, Vol-1 (6th Edition)
3. Engineering Chemistry, Jain & Jain,(16th Edition)
4. Fundamental Concepts of Inorganic Chemistry, A. K. Das, (2nd Edition)
5. Engineering Chemistry -I, Gourkrishna Dasmohapatra, (3rd Edition)

REFERENCE BOOKS
1. General & Inorganic Chemistry, R. P. Sarkar
2. Physical Chemistry, P. C. Rakshit, (7th Edition)
3. Organic Chemistry, Morrison & Boyd , (7th Edition)
4. Fundamentals of Molecular Spectroscopy, C.N. Banwell, (4th Edition)
5. Physical Chemistry, G. W. Castellan, (3rd Edition)
6. Basic Stereo chemistry of Organic Molecules, Subrata Sen Gupta, (1st Edition)

Course Name : Mathematics-I					
Course Code: MATH1101					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	1	0	4	4

Course Outcomes:

The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.

The students will learn:
• to apply the notion of matrices for solving a system of linear simultaneous equations and some basic concepts of linear algebra in a comprehensive manner.
• to test the convergence of an infinite series
• some analytical techniques to solve ordinary differential equations that model physical processes.
• the concept of differentiation and integration for functions of several variables and some of their applications in Vector Calculus.

Module I [10L]
Matrix:

Inverse and rank of a matrix; Elementary row and column operations over a matrix; System of linear equations and its consistency; Symmetric, skew symmetric and orthogonal matrices; Determinants; Eigen values and eigen vectors; Diagonalization of matrices; Cayley Hamilton theorem; Orthogonal transformation.

Module II [10 L]
Vector Calculus:

Vector function of a scalar variable, Differentiation of a vector function, Scalar and vector point functions, Gradient of a scalar point function, divergence and curl of a vector point function, Directional derivative, Related problems on these topics.

Infinite Series:
Convergence of sequence and series; Tests for convergence: Comparison test, Cauchy's Root test, D'Alembert's Ratio test(statements and related problems on these tests), Raabe's test; Alternating series; Leibnitz's Test (statement, definition); Absolute convergence and Conditional convergence.

Module III [10 L]
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.

Ordinary differential equations of higher orders:
General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods,
Method of variation of parameters, Cauchy-Euler equations.

Module IV [10L]
Calculus of functions of several variables

Introduction to functions of several variables with examples, Knowledge of limit and continuity,
Determination of partial derivatives of higher orders with examples, Homogeneous functions and
Euler's theorem and related problems up to three variables.

Multiple Integration

Concept of line integrals, Double and triple integrals. Green's Theorem, Stokes Theorem and
Gauss Divergence Theorem.

Suggested Books:
1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2000.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 2006.
3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,
2008.
4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th
Reprint, 2010.
3. K. F. Riley, M. P. Hobson, S. J. Bence. Mathematical Methods for Physics and Engineering,
Cambridge University Press, 23-Mar-2006.
4. S. L. Ross, Differential Equations", Wiley India, 1984.
5. G.F. Simmons and S.G. Krantz, Differential Equations, McGraw Hill, 2007.
6.Vector Analysis(Schaum's outline series): M.R. Spiegel, Seymour Lipschutz, Dennis Spellman
(McGraw Hill Education)
7. Engineering Mathematics: S. S. Sastry (PHI)
8. Advanced Engineering Mathematics: M.C. Potter, J.L. Goldberg and E.F. Abonfadel
(OUP),Indian
Edition.
9. Linear Algebra (Schaum's outline series): Seymour Lipschutz, Marc Lipson (McGraw Hill
Education)

Course Name: BASIC ELECTRICAL ENGINEERING					
Course Code: ELEC1001					
Contact	L	T	P	Total	Credit Points
Hours per week	3	1	0	4	4

Course Outcomes

After attending the course, the students will be able to
- Study and analyze the basic concept of DC and AC electric circuits.
- Understand and analyze the concept of basic magnetic circuits.
- Study the working principles of different electrical machines.

Module-I:

DC Network Theorem: Kirchhoff's laws, Nodal analysis, Mesh analysis, Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Star-Delta conversion. [6L]

Electromagnetism: Review of magnetic flux, Force on current carrying conductors, Magnetic circuit analysis, Self and Mutual inductance, B-H loop, Hysteresis and Eddy current loss, Lifting power of magnet. [5L]

Module-II

AC single phase system: Generation of alternating emf, Average value, RMS value, Form factor, Peak factor, representation of an alternating quantity by a phasor, phasor diagram, AC series, parallel and series-parallel circuits, Active power, Reactive power, Apparent power, power factor, Resonance in RLC series and parallel circuit. [10L]

Module-III

Three phase system: Generation of three-phase AC power, Balanced three phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams, power measurement by two wattmeter method. [4L]

DC Machines: Construction, EMF equation, Principle of operation of DC generator, Open circuit characteristics, External characteristics, Principle of operation of DC motor, speed-torque characteristics of shunt and series machine, starting of DC motor, speed control of DC motor. [7L]

Module-IV
Transformer: Construction, EMF equation, no load and on load operation and their phasor diagrams, Equivalent circuit, Regulation, losses of a transformer, Open and Short circuit tests, Efficiency, Introduction to three phase transformer. [6L]
Three-phase induction motor: Concept of rotating magnetic field, Principle of operation, Construction, Equivalent circuit and phasor diagram, torque-speed/slip characteristics. [4L]

Text Books:
1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition
2. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
3. Basic Electrical Engineering, Hughes
4. Electrical Technology, Vol-I,Vol-II,Surinder Pal Bali, Pearson Publication
5. A Text Book of Electrical Technology, Vol. I & II, B.L. Theraja, A.K. Theraja, S.Chand & Company

Reference Books:
1. Electrical Engineering Fundamentals, Vincent Del Toro, Prentice-Hall
2. Advance Electrical Technology, H.Cotton, Reem Publication
3. Basic Electrical Engineering, R.A. Natarajan, P.R. Babu, Sictech Publishers
4. Basic Electrical Engineering, N.K. Mondal, Dhanpat Rai
5. Basic Electrical Engineering, Nath & Chakraborti
6. Fundamental of Electrical Engineering, Rajendra Prasad, PHI, Edition 2005.

Course Name: Chemistry –I Lab					
Course Code: CHEM1011					
Contact Hours per week	L	T	P	Total	Credit Points
	0	0	3	3	1.5

Course outcome for the subject code CHEM1051:

The subject code CHEM1051 corresponds to chemistry laboratory classes for the first year B. Tech students. This course enhances the students' experience regarding handling of various chemicals along with various laboratory equipments. Hands on experiments increase the depth of knowledge that is taught in the theory classes as well as it increases research aptitude in students because they can see the direct application of theoretical knowledge in practical field. The course outcomes of the subject are

1. Knowledge to estimate the hardness of water which is required to determine the usability of water used in industries.
2. Estimation of ions like Fe^{2+}, Cu^{2+} and Cl^- present in water sample to know the composition of industrial water.
3. Study of reaction dynamics to control the speed and yield of various manufactured goods produced in polymer, metallurgical and pharmaceutical industries.
4. Handling physico-chemical instruments like viscometer, stalagmometer, pH-meter, potentiometer and conductometer.
5. Understanding the miscibility of solutes in various solvents required in paint, emulsion, biochemical and material industries.
6. Knowledge of sampling water can be employed for water treatment to prepare pollution free water.

List of Experiments:

1. Estimation of iron using KMnO4 self indicator.

2. Iodometric estimation of Cu^{2+}.

3. Determination of Viscosity.

4. Determination of surface tension.

5. Adsorption of acetic acid by charcoal.

6. Potentiometric determination of redox potentials.

7. Determination of total hardness and amount of calcium and magnesium separately in a given water sample.

8. Determination of the rate constant for acid catalyzed hydrolysis of ethyl acetate.

9. Heterogeneous equilibrium (determination of partition coefficient of acetic acid in n-butanol and water mixture).

10. Conductometric titration for the determination of strength of a given HCl solution against a standard NaOH solution.

11. pH-metric titration for determination of strength of a given HCl solution against a standard

   NaOH solution.

12. Determination of chloride ion in a given water sample by Argentometric method (using chromate indicator solution)

Reference Books:

1. Vogel's Textbook of Quantitative Chemical Analysis-G. H. Jeffery, J. Bassett, J. Mendham, R. C. Denney.

2. Advanced Practical Chemistry- S. C. Das

3. Practicals in Physical Chemistry- P. S. Sindhu

Course Name: BASIC ELECTRICAL ENGINEERING LABORATORY					
Course Code: ELEC1051					
Contact Hours per week	L	T	P	Total	Credit Points
	0	0	2	2	1

Course Outcomes:

The students are expected to
- Get an exposure to common electrical apparatus and their ratings.
- Make electrical connections by wires of appropriate ratings.
- Understand the application of common electrical measuring instruments.
- Understand the basic characteristics of different electrical machines.

List of Experiments:

1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. Verification of Thevenin's & Norton's theorem.
4. Verification of Superposition theorem
5. Verification of Maximum Power Transfer theorem
6. Calibration of ammeter and voltmeter.
7. Open circuit and Short circuit test of a single phase Transformer.
8. Study of R-L-C Series / Parallel circuit
9. Starting and reversing of speed of a D.C. shunt Motor
10. Speed control of DC shunt motor.
11. No load characteristics of D.C shunt Generators
12. Measurement of power in a three phase circuit by two wattmeter method.

Course Name: Engineering Graphics & Design					
Course Code: MECH 1052					
Contact hrs per week:	L	T	P	Total	Credit Points
	1	0	4	5	3

Course Outcomes:
After going through the course, the students will be able

- To understand the meaning of engineering drawing.
- To have acquaintance with the various standards (like lines, dimensions, scale etc.) and symbols followed in engineering drawing.
- To represent a 3-D object into 2-D drawing with the help of orthographic and isometric projections.
- To read and understand projection drawings.
- To use engineering drawing software (CAD).

Lecture Plan (13 L)

1. Importance and principles of engineering drawing (1 L)
2. Concepts of lettering, dimensioning and Scale   (2 L)
3. Conic sections   (1 L)
4. Orthographic projection   (2 L)
5. Definitions of different solids and their projections (1 L)
6. Section of solids and sectional view   (1 L)
7. Isometric projection   (2 L)
8. Introduction to CAD   (2 L)
9. Viva Voci   (1 L)

Detailed contents of Lab hours (52 hrs)

Module 1: Introduction to Engineering Drawing covering,
Principles of Engineering Graphics and their significance, usage of Drawing instruments, lines, lettering & dimensioning, Conic section like Ellipse (General method only); Involute; Scales – Plain, Diagonal.

(4 hrs + 4 hrs)

Module 2: Orthographic Projections covering,
Principles of Orthographic Projections - Conventions - Projections of Points and lines inclined to both planes; Projections on Auxiliary Planes. Projection of lamina.

(4 hrs + 2 hrs)

Module 3: Projections of Regular Solids covering,
those inclined to both the Planes- Auxiliary Views.

(2 hrs + 4 hrs)

Module 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.

(4 hrs + 2 hrs)

Module 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.

(2 hrs + 4 hrs)

Module 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.

(4 hrs)

Module 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;

(4 hrs + 2 hrs)

Module 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.

(2 hrs + 4 hrs)

Module 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.

(4 hrs)

References:

1. Bhatt, N.D., Panchal V.M. & Ingle P.R., (2014) "Elementary Engineering Drawing" ; Charotan Publishing House
2. Narayana, K.L. and Kannaaiah P "Engineering Graphics"; TMH
3. Lakshminarayanan, V. and Vaish Wanar, R.S "Engineering Graphics" Jain Brothers.
4. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Edication.
5. Agarwal B. & Agarwal C. M. (2012), Engineering graphics, TMH Publications.

Honours:

Course Name : **COMMUNICATION for PROFESSIONALS**				
Course Code: HMTS1011				
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	0	0	3	3

Course Outcomes:

Students will be able to:

1. Write business letters and reports
2. Communicate in an official and formal environment.
3. Effectively use the various channels of communicationatwork place.
4. Use language as a tool to build bridges and develop interpersonal relations in multicultural environment.

Module- I (9hrs.)
Introduction to Linguistics
- Phonetics- Vowel and Consonant Sounds (Identification & Articulation)
- Word- stress, stress in connected speech
- Intonation (Falling and Rising Tone)
- Voice Modulation
- Accent Training
- 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 Englishto formderivatives
- Synonyms, Antonyms and standard abbreviations

Module- II (10hrs.)
Communication Skills
- Definition, nature & attributes of Communication
- Process of Communication
- Models or Theories of Communication
- Types of Communication
- Levels or Channels of Communication
- Barriers to Communication

Module- III (10hrs.)
Professional Writing Skills
- Letter Writing : Importance, Types , Process, Form and Structure, Style and Tone
- Proposal Writing: Purpose,Types of Proposals, Structure of Formal Proposals.
- Report Writing: Importance and Purpose, Types of Reports, Report Formats, Structure of Formal Reports, Writing Strategies.

Module- IV (10hrs.)
Communication skills at Work
- Communication and its role in the workplace
- Benefits of effective communication in the workplace
- Common obstacles to effective communication
- Approaches and Communication techniques for multiple needs at workplace: persuading, convincing, responding, resolving conflict, delivering bad news, making positive connections,
- Identify common audiences and design techniques for communicating with each audience

References:
1 Kumar,S. &Lata, P. Communication Skills, OUP, New Delhi2011
2 Rizvi,Ashraf,M. Effective Technical Communication, Mc Graw Hill Education(India) Pvt. Ltd..Chennai,2018
3 Raman, M. and Sharma, S., Technical Communication: Principles and Practice, [2nd] Ed., 2011

Course Name : **Professional Communication Lab**					
Course Code: HMTS1061					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	2	0	0	2	1

Course Outcomes:

Students will be skilled in the following areas:
1. Using English to communicate.
2. Learn to articulate opinions and views in a comprehensive manner.
3. Gain knowledge of phonetics and learn correct pronunciation.
4. Prepare and present formal presentations.

Module- I (4hrs)
Techniques for Effective Speaking
Voice Modulation: Developing correct tone
Using correct stress patterns: word stress, primary stress, secondary stress
Rhythm in connected speech
Module- II (6hrs.)
Effective Speaking and Social awareness
The Art of Speaking

- Encoding Meaning Using Nonverbal Symbols
- How to Improve Body Language
- Eye Communication, Facial Expression, Dress and Appearance
- Posture and Movement, Gesture, Paralanguage
- Encoding meaning using Verbal symbols: How words work and how to use words
- Volume, Pace, Pitch and Pause
- Cross-Cultural Communication : Multiple aspects/dimensions of culture
- Challenges of cross-cultural communication
- Improving cross-cultural communication skills at workplace.

Module- III (6hrs)

- Group Discussion:Nature and purpose
- Characteristics of a successful Group Discussion
- Group discussion Strategies: Getting the GD started, contributing systematically, moving the discussion along, promoting optimal participation, Handling conflict, Effecting closure.

Professional Presentation Skills
Nature and Importance of Presentation skills
Planning the Presentation: Define the purpose, analyze the Audience, Analyze the occasion and choose a suitable title.
Preparing the Presentation: The central idea, main ideas, collecting support material, plan visual aids, design the slides
Organizing the Presentation: Introduction-Getting audience attention, introduce the subject, establish credibility, preview the main ideas, Body-develop the main idea, present information sequentially and logically, Conclusion-summaries, re-emphasize, focus on the purpose, provide closure.
Improving Delivery: Choosing Delivery methods, handling stage fright
Post-Presentation discussion: Handling Questions-opportunities and challenges.

References:

1. Carter, R. And Nunan, D. (Eds), The Cambridge guide to Teaching English to Speakers of Other Languages, CUP, 2001
2. Edward P. Bailey, Writing and Speaking At Work: A Practical Guide for Business Communication, Prentice Hall, 3rd Ed., 2004
3. Munter, M., Guide to Managerial Communication: Effective Business Writing and Speaking, Prentice Hall, 5th Ed., 1999
4. R. Anand, Job Readiness For IT & ITES- A Placement and Career Companion, , McGraw Hill Education.2015
5. Malhotra, A.,Campus Placements, McGraw Hill Education.2015

Syllabus of 2nd semester:

Course Name : Physics-I					
Course Code: PHYS1001					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	1	0	4	4

Course Outcomes:

1. To develop basic understanding of the modern science to the technology related domain.
2. Analytical & logical skill development through solving problems.
3. To impart idea of concise notation for presenting equations arising from mathematical formulation of physical as well as geometrical problems percolating ability of forming mental pictures of them.
4. Imparting the essence and developing the knowledge of controlling distant object like satellite, data transfer through optical fiber, implication of laser technology, handling materials in terms of their electrical and magnetic properties etc.

Module 1 : Mechanics   (7+5)= 12L

Elementary concepts of grad, divergence and curl. Potential energy function; F=-grad V, Equipotential surfaces and meaning of gradient; Conservative and non-conservative forces, Curl of a force field; Central forces ; conservation of angular momentum; Energy equation and energy diagrams; elliptical, parabolic and hyperbolic orbit; Kepler Problem; Application : Satellite manoeuvres .

Non-inertial frames of reference; rotating coordinate system; five term acceleration formula-centripetal and coriolis accelerations; applications: Weather system, Foucault pendulum.

Module 2 : Optics = (4 +3+ 5) = 12 L

Oscillatory Motion**:**
Damped harmonic motion – Over damped, critically damped and lightly damped oscillators; Forced oscillation and resonance. Electrical   equivalent of mechanical oscillator, Wave equation, plane wave solution.

Optics:
Elementary features of polarization of light waves. Double refraction, Production and analysis of linearly, elliptic and Circularly polarized light, Polaroid and application of polarizations.: Polarimeter.

Laser & Fiber Optics:

Characteristics of Lasers, Spontaneous and Stimulated Emission of Radiation, Meta-stable State, Population Inversion, Lasing Action, Einstein's Coefficients and Relation between them, Ruby Laser, Helium-Neon Laser, Semiconductor Diode Laser, Applications of Lasers.
Fiber optics - principle of operation, numerical aperture, acceptance angle, Single mode , graded indexed fiber.

Module 3: Electrostatics (8+4) = 12 L

Electrostatics in free space
Calculation of electric field and electrostatic potential for a charge distribution, Divergence and curl of electrostatic field, Laplace's and Poisson's equation for electrostatic potential. Boundary conditions of electric field and electrostatic potential. Method of images , energy of a charge distribution and its expression in terms of electric field.

Electrostatics in a linear dielectric medium
Electrostatic field and potential of a dipole, Bound charges due to electric polarization, Electric displacement, Boundary conditions on displacement, Solving simple electrostatic problem in presence of dielectric – point charge at the centre of a dielectric sphere, charge in front of dielectric slab, Dielectric slab and dielectric sphere in uniform electric field.

Module 4: (6+3+3)= 12L
Magnetostatics :
Biot-Savart law, divergence and curl of static magnetic field; vector potential and calculating it for a given magnetic field using Stokes' theorem; equation for vector potential and it's solutions for given current densities .

Magnetostatics in a linear magnetic medium:
Magnetization and associated bound currents; Auxiliary magnetic field $\overset{\scriptscriptstyle 1}{H}$; boundary conditions on $\overset{\scriptscriptstyle 1}{B}$ and $\overset{\scriptscriptstyle 1}{H}$. Solving for magnetic field due to simple magnet like a bar magnet; Magnetic susceptibility ; ferromagnetic , paramagnetic and diamagnetic materials; Qualitative discussion of magnetic field in presence of magnetic materials.

Faraday's Law:
Differential form of Faraday's law expressing curl of electric field in terms of time derivative of magnetic field and calculating electric field due to changing magnetic fields in quasi static approximation. Energy stored in a magnetic field.

Course Name : **Mathematics-II**					
Course Code: **MATH1201**					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	**1**	**0**	**4**	**4**

Course Outcomes:

The objective of this course is to familiarize the students with numerical techniques, integral transforms, graph theory and probability. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling various problems in the discipline.
The students will learn:
• the ideas of probability and random variables and various discrete and continuous probability distributions and their properties.
• numerical techniques to solve problems which in general have no analytic solution.
• to apply techniques of integral transforms for advanced engineering problems.
• to represent certain physical problems as graphs and find out the shortest path between two vertices.

Module-I Fundamentals of Probability (10L)

• Random experiment, Sample space and events
• Classical and Axiomatic definition of probability
• Addition and Multiplication law of probability
• Conditional probability
• Bayes' Theorem
• Random variables
• General discussion on discrete and continuous distributions
• Expectation and Variance
• Examples of special distribution: Binomial and Normal Distribution

Module-II Numerical Methods (10L)

• Solution of non-linear algebraic and transcendental equations: Bisection Method, Newton-Raphson Method, Regula-Falsi Method.
• Solution of linear system of equations: Gauss elimination method, Gauss-Seidel Method, LU Factorization Method, Matrix Inversion Method.
• Solution of Ordinary differential equations: Euler's and Modified Euler's Method , Runge-Kutta Method of 4th order.

Module-III Basic Graph Theory (10L)

- Graphs: Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph
- Walks, Paths, Circuits, Euler Graph, Cut sets and cut vertices
- Matrix representation of a graph, Adjacency and incidence matrices of a graph
- Graph isomorphism
- Bipartite graph
- Definition and properties of a tree
- Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees
- Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using DFS, BFS, Kruskal's and Prim's algorithms

Module-IV Laplace Transformation (10L)

- Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations.
- Introduction to integral transformation
- Functions of exponential order, Definition and existence of Laplace Transform(LT) (statement of initial and final value theorem only)
- LT of elementary functions, Properties of Laplace Transformations , Evaluation of sine, cosine and exponential integrals using LT
- LT of periodic and step functions
- Definition and properties of inverse LT
- Convolution Theorem (statement only) and its application to the evaluation of inverse LT
- Solution of linear ODEs with constant coefficients (initial value problem) using LT

Suggested Books:
1. **Advanced Engineering Mathematics** , *E.Kreyszig*, Wiley Publications
2. **Introduction to Probability and Statistics for Engineers and Scientists**, *S.Ross*, Elsevier
3. **Introductory methods of Numerical Analysis**, *S.S. Sastry*, PHI learning
4. **Introduction to Graph Theory,** *D. B. West*, Prentice-Hall of India
5. **Engineering Mathematics,** *B.S. Grewal,* S. Chand & Co.

Course Name: Programming for Problem Solving					
Course Code: CSEN 1001					
Contact Hours per week	L	T	P	Total	Credit Points
	3	0	0	3	3

Learning Objectives: Introduction to the concept of computer and computation and solving of problems using C as a programming language. Coverage of C will include basic concepts, arithmetic and logic, flow control, and data handling using arrays, structures, pointers and files.

Course Outcomes:

On completion of this course, students are expected to be capable of solving problems using mathematics and generalize those solutions into flowcharts to form programs. This course is directed towards teaching the students, how to automate those solutions by implementing them in C programming language. It is expected that due to the use of C programming language, the students will learn the basics of how a high-level language works in tandem with memory. The students should be able to identify coding inefficiencies and errors in C code and turn those programs into efficient ones and remove programming bugs, primarily with manual inspection and later with the use of debuggers.

Module I: [10L]
Fundamentals of Computer

History of Computers, Generations of Computers, Classification of Computers.
Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices. Basic Concepts of Assembly language, High level language, Compiler and Assembler.
Binary & Allied number systems (decimal, octal and hexadecimal) with signed and unsigned numbers (using 1's and 2's complement) - their representation, conversion and arithmetic operations. Packed and unpacked BCD system, ASCII. IEEE-754 floating point representation (half- 16 bit, full- 32 bit, double- 64 bit).
Basic concepts of operating systems like MS WINDOWS, LINUX
How to write algorithms & draw flow charts.

Module II: [10L]
Basic Concepts of C

C Fundamentals:
The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements.
Operators & Expressions:
Arithmetic operators, relational and logical operators, type, conversion, increment and decrement operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation. Standard input and output, formatted output -- printf, formatted input scanf.
Flow of Control:
Statement and blocks, if-else, switch-case, loops (while, for, do-while), break and continue, go to and labels.

Module III: [10L]
Program Structures in C

Basic of functions, function prototypes, functions returning values, functions not returning values. Storage classes - auto, external, static and register variables – comparison between them. Scope, longevity and visibility of variables.
C preprocessor (macro, header files), command line arguments.
Arrays and Pointers:
One dimensional arrays, pointers and functions – call by value and call by reference, array of arrays. Dynamic memory usage– using malloc(), calloc(), free(), realloc(). Array pointer duality. String and character arrays; C library string functions and their use.

Module IV: [10L]
Data Handling in C

User defined data types and files:
Basic of structures; structures and functions; arrays of structures.

Files – text files only, modes of operation. File related functions – fopen(), fclose(), fscanf(), fprintf(), fgets(), fputs(), fseek(), ftell();

Text Books
1. Schaum's outline of Programming with C – Byron Gottfried
2. Teach Yourself C- Herbert Schildt
3. Programming in ANSI C – E Balagurusamy

Reference Books
1. C: The Complete Reference – Herbert Schildt
2. The C Programming Language- D.M.Ritchie, B.W. Kernighan

Course Name: BUSINESS ENGLISH					
Course Code: HMTS 1201					
Contact Hours per week	L	T	P	Total	Credit Points
	2	0	0	2	2

Course Outcomes:

The learner will
   i) Acquire competence in using English language to communicate.
   ii) Be aware of the four essential skills of language usage-listening, speaking, reading and writing.

   iii)   Be adept at using various modes of written communication at work.
   iv)   Attain the skills to face formal interview sessions.

Module- I: (6hrs.)
Grammar (Identifying Common Errors in Writing)
   • Subject-verb agreement
   • Noun-pronoun agreement
   • Misplaced Modifiers
   • Articles
   • Prepositions
   • Redundancies

Module- II: (6hrs.)
Basic Writing Strategies
Sentence Structures
   • Use of phrases and clauses in sentences
   • Creating coherence
   • Organizing principles –accuracy, clarity, brevity
   • Techniques for writing precisely
   • Different styles of writing: descriptive,narrative, expository
   • Importance of proper punctuation

Module- III: (8hrs)

Business Communication- Scope & Importance

Writing Formal Business Letters:Form and Structure-Parts ofa Business letter, Business Letter Formats, Style and Tone, Writing strategies.

Organizational Communication: Agenda & minutes of a meeting, Notice, Memo, Circular

Organizing e-mail messages, E-mail etiquette.

Job Application Letter: Responding to Advertisements and Forced Applications, Qualities of well-written Application Letters: The You-Attitude, Length, Knowledge of Job Requirement, Reader-Benefit Information, Organization, Style, Mechanics – Letter Plan: Opening Section, Middle Section, Closing Section

Resume and CV: Difference, Content of the Resume – Formulating Career Plans: Self Analysis, Career Analysis, Job Analysis, Matching Personal Needs with Job Profile – Planning your Resume – Structuring the Resume: Chronological Resume, The Functional Resume, Combination of Chronological and Functional Resume, Content of the Resume: Heading, Career Goal or Objectives, Education, Work Experience, Summary of Job Skills/Key Qualifications, Activities, Honors and Achievements, Personal Profile, Special Interests, References

Module- IV:(6hrs)
  Writing skills
  - Comprehension: Identifying the central idea, inferring the lexical and contextual meaning, comprehension passage - practice
  - Paragraph Writing: Structure of a paragraph, Construction of a paragraph, Features of a paragraph, Writing techniques/developing a paragraph.
  - Précis: The Art of Condensation-some working principles and strategies. Practice sessions of writing précis of given passages.
  - Essay Writing:Characteristic features of an Essay, Stages in Essay writing, Components comprising an Essay, Types of Essays-Argumentative Essay, Analytical Essay, Descriptive Essays, Expository Essays, Reflective Essays

References:
  1. Theories of Communication: A Short Introduction, Armand Matterlart and Michele Matterlart, Sage Publications Ltd.
  2. Professional Writing Skills, Chan, Janis Fisher and Diane Lutovich. San Anselmo, CA: Advanced Communication Designs.
  3. Hauppauge, Geffner, Andrew P. Business English, New York: Barron's Educational Series.
  4. Kalia, S. &Agarwal,S. Business Communication,Wiley India Pvt. Ltd., New Delhi, 2015
  5. Mukherjee, H.S., Business Communication- Connecting at work., , Oxford University Press.2nd Edition.2015
  6. Raman, M. and Sharma, S., Technical Communication: Principles and Practice, 2nd Ed., 2011.

Course Name : Physics-I lab				
Course Code: PHYS1051				
Contact hrs per week:	L	T	P	Total	Credit points
	3	1	0	4	4

Course Outcomes:

1. To gain practical knowledge by applying the experimental methods to correlate with the Physics theory.
2. To learn the usage of electrical and optical systems for various measurements.
3. Apply the analytical techniques and graphical analysis to the experimental data.
4. Understand measurement technology, usage of new instruments and real time applications in engineering studies.
5. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group.

Minimum of six experiments taking at least one from each of the following four groups :

Group 1 : Experiments in General Properties of matter

1. Determination of **Young's modulus** by **Flexure Method**
2. Determination of **bending moment** and **shear force** of a rectangular beam of uniform cross-section.
3. Determination of **modulus of rigidity** of the material of a rod by **static method**
4. Determination of **rigidity modulus** of the material of a **wire by dynamic method.**
5. Determination of **coefficient of viscosity** by Poiseulle's capillary flow method.

Group 2: Experiments in Optics
1. Determination of **dispersive power** of the material of a prism
2. Determination of wavelength of light by **Newton's ring** method.
3. Determination of wavelength of light by **Fresnel's biprism method.**
4. Determination of the **wavelength of a given laser** source by diffraction method

Group 3: Electricity & Magnetism experiments
1. **Determination of** dielectric constant **of a given dielectric material.**
2. **Determination of resistance of** ballistic galvanometer by half deflection **method and study of variation of** logarithmic decrement **with series resistance.**
3. **Determination of the** thermo-electric power **at a certain temperature of the given thermocouple.**
4. **Determination of** specific charge (e/m) **of electron.**

<u>Group 4: Quantum Physics Experiments</u>

1. **Determination of** Planck's constant**.**
2. **Determination of** Stefan's radiation **constant.**
3. **Verification of** Bohr's atomic orbital **theory through** Frank-Hertz experiment**.**
4. **Determination of** Rydberg constant **by studying** Hydrogen/ Helium **spectrum.**
5. **Determination of** Hall co-efficient of semiconductors.
6. **Determination of** band gap **of semiconductors.**
7. **To study current-voltage characteristics, load response, areal characteristics and spectral response of photo voltaic solar cells.**

Books of reference:
1. Optics – **Eugene Hecht** Pearson Education India Private Limited
2. Introduction to Electrodynamics, **David J. Griffiths**, Pearson Education India Learning Private Limited
3. Waves and Oscillations by **N.K. Bajaj**
4. Principles of Physics, 10ed, **David Halliday, Robert Resnick Jearl Walker** , Wiley
5. Electricity, Magnetism, and Light, **Wayne M. Saslow**, Academic Press
6. Classical mechanics, **Narayan Rana, Pramod Joag**, McGraw Hill Education
7. Introduction to Classical Mechanics, **R Takwale, P Puranik**, McGraw Hill Education
8. Optics, **Ghatak**, McGraw Hill Education India Private Limited
9. Refresher Course in B.Sc. Physics – Vol1 and Vol 2 – **C.L.Arora**

Course Name: Programming for Problem Solving lab					
Course Code: CSEN 1051					
Contact	L	T	P	Total	Credit Points
Hours per week	0	0	4	4	2

Software to be used: GNU C Compiler (GCC) with LINUX
NB: Cygwin (Windows based) may be used in place of LINUX

Course outcomes:
After completion of this course the students should be able:

1. To write simple programs relating to arithmetic and logical problems.
2. To be able to interpret, understand and debug syntax errors reported by the compiler.
3. To implement conditional branching, iteration (loops) and recursion.
4. To decompose a problem into modules (functions) and amalgamating the modules to generate a complete program.
5. To use arrays, pointers and structures effectively in writing programs.
6. To be able to create, read from and write into simple text files.

Topic 1: LINUX commands and LINUX based editors
Topic 2: Basic Problem Solving
Topic 3: Control Statements (if, if-else, if-elseif-else, switch-case)
Topic 4: Loops - Part I (for, while, do-while)
Topic 5: Loops - Part II
Topic 6: One Dimensional Array
Topic 7: Array of Arrays
Topic 8: Character Arrays/ Strings
Topic 9: Basics of C Functions
Topic 10: Recursive Functions
Topic 11: Pointers
Topic 12: Structures
Topic 13: File Handling

Text Books
1. Schaum's outline of Programming with C – Byron Gottfried
2. Teach Yourself C- Herbert Schildt
3. Programming in ANSI C – E Balagurusamy

Course Name: Language Lab					
Course Code: HMTS 1251					
Contact Hours per week	L	T	P	Total	Credit Points
	0	0	2	2	1

Course Outcomes:

The learner will
i)   Acquire the techniques to become an effective listener.
ii)   Acquire the skill to become an effortless speaker.
iii)   Organize and present information for specific audience.
iv)   Communicate to make a positive impact in professional and personal environment.

Module- I: (4hrs)
Listening Skills
- Principles of Listening: Characteristics, Stages.
- Types of Listening: Passive listening, Marginal or superficiallistening, Projective Listening, Sensitive or Empathetic Listening, Active or Attentive listening.
- Guidelines for Effective Listening
- Barriers to Effective Listening
- Listening Comprehension

Module- II: (8hrs)
- Interviewing
  Types of Interviews, Format for Job Interviews: One-to-one and Panel Interviews, Telephonic Interviews,Interview through video conferencing.
- Interview Preparation Techniques, Frequently Asked Questions, Answering Strategies, Dress Code, Etiquette, Questions for the Interviewer, Simulated Interviews.

Module- III: (6hrs)
- Public Speaking:TheSpeech Process: The Message, The Audience, The Speech Style, Encoding, Feedback.
- Characteristics of a good speech : content and delivery, structure of a speech
- Modes of delivery in public speaking: Impromptu, Extemporaneous, Prepared or Memorized, Manuscript.
- Conversation: Types of conversation: formal and informal, Strategies for effective conversation, Improving fluency.
- Situational conversation practice: Greetings and making introductions, Asking for information and giving instructions, agreeing and disagreeing.

- Conversational skills in the business scenario: One-to-one and Group communication, Gender and Culture Sensitivity, Etiquette, Sample Business Conversation, Telephonic Conversation.

Module- IV: (8hrs)
Presentation Skills
- Speaking from a Manuscript, Speaking from Memory, Impromptu Delivery, Extemporaneous Delivery, Analyzing the Audience, Nonverbal Dimensions of Presentation
- Organizing the Presentation: The Message Statement, Organizing the Presentation: Organizing the Speech to Inform, The Conclusion, Supporting Your Ideas – Visual Aids: Designing and Presenting Visual Aids, Selecting the Right Medium.
- Project Team/Group Presentations

References:

6. Carter, R. And Nunan, D. (Eds), The Cambridge guide to Teaching English to Speakers of Other Languages, CUP, 2001
7. Edward P. Bailey, Writing and Speaking At Work: A Practical Guide for Business Communication, Prentice Hall, 3rd Ed., 2004
8. Munter, M., Guide to Managerial Communication: Effective Business Writing and Speaking, Prentice Hall, 5th Ed., 1999
9. Sen, S.,Mahendra,A. &Patnaik,P.,Communication and Language Skills, Cambridge University Press, 2015
10. Locker,Kitty O. Business and Administrative Communication McGraw-Hill/ Irwin.
11. Chaney,L.andMartin,J., Intercultural Business Communication. Prentice Hall

Course Name: Workshop /Manufacturing Practices					
Course Code: MECH 1051					
Contact	L	T	P	Total	Credit Points
Hours per week	1	0	4	5	3

Course Outcomes:
Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Workshop/Manufacturing Practices [L: 1; T: 0; P: 0 (1 credit)]
(i) Lectures & videos: (13 hours)
Detailed contents
1. Introduction on Workshop and Safety Precautions. **(1 lecture)**
2. Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods **(3 lectures)**
3. CNC machining, Additive manufacturing **(1 lecture)**
4. Fitting operations & power tools **(1 lecture)**
5. Electrical & Electronics **(1 lecture)**
6. Carpentry **(1 lecture)**
7. Plastic moulding, glass cutting **(1 lecture)**
8. Metal casting **(1 lecture)**
9. Welding (arc welding & gas welding), brazing **(2 lecture)**
10. Viva-voce **(1 lecture)**

Suggested Text/Reference Books:

(i) Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
(ii) Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
(iii)Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.
(iv) Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
(v) Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

Honours:

Course Name : Basic Electronics					
Course Code: ECEN1011					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	3	**0**	**0**	**3**	**3**

Course Outcomes:

1. The students will learn the conduction phenomenon in materials and importance of p-and n-type
   conductors, AC to Dc conversion.
2. They will have knowledge of BJT and its use.
3. Students will be able to explain FET, MOS operation, IC fabrication basics.
4. They will learn about the Op-AMP, feedback and some special devices.

Module I [10 L]

Basic Semiconductor Physics:
Crystalline materials, Energy band theory, Conductors, Semiconductors and Insulators, Concept of Fermi Energy level, intrinsic and extrinsic semiconductors, drift and diffusion currents in semiconductor

Diodes and Diode Circuits:
Formation of p-n junction, Energy Band diagram, forward & reverse biased configurations, V-I characteristics, load line, breakdown mechanisms, Zener Diode and its Application.
Rectifier circuits: half wave & full wave rectifiers: ripple factor, rectification efficiency.

Module II [8 L]

Bipolar Junction Transistors (BJT):
PNP & NPN BJT structures, current components in BJT, CE, CB, CC configurations, V-I Characteristics of CB & CE modes, regions of operation, Base width modulation & Early effect, thermal runaway, Concept of Biasing: DC load line, Q-point, basics of BJT amplifier operation, current amplification factors, different biasing circuits: fixed bias, collector to base bias, voltage divider bias.

Module III [9 L]

Field Effect Transistors (FET):
n-channel Junction Field Effect Transistor (JFET) structure & V-I characteristics.

Metal Oxide Semiconductor Field Effect Transistor (MOSFET): enhancement & depletion type MOSFETs (for both n & p channel devices), drain & transfer characteristics.

MOSFET as a digital switch, CMOS inverter, voltage transfer characteristic (VTC), NAND & NOR gate realization using CMOS logic.

Moore's Law, evolution of process node, state of integration (SSI, MSI, LSI, VLSI, ULSI), Classification of Integrated circuits (IC) and their applications.

Module IV [9 L]

Feedback in amplifiers :
Concept of feedback, advantages of negative feedback (qualitative), Barkhausen criteria.

Operational Amplifier:
Ideal OPAMP characteristics, OPAMP circuits: inverting and non-inverting amplifiers, Adder, Subtractor, Integrator, Differentiator, Basic Comparator.

Special Semiconductor Devices:
Light Emitting Diode (LED), Silicon Controlled Rectifier (SCR), Photodiode: Operations, characteristics & applications.

References:

1. Boylestad & Nashelsky:Electronic Devices & Circuit Theory
2. R.A Gayakwad:Op Amps and Linear IC's, PHI
3. D. Chattopadhyay, P. C Rakshit : Electronics Fundamentals and Applications
4. Adel S. Sedra, Kenneth Carless Smith: Microelectronics Engineering
5. Millman & Halkias: Integrated Electronics.
6. Salivahanan: Electronics Devices & Circuits.
7. Albert Paul Malvino: Electronic Principle.

Course Name : Basic Electronics Laboratory					
Course Code: ECEN1061					
Contact hrs per week:	**L**	**T**	**P**	**Total**	**Credit points**
	0	0	2	2	1

Course Outcomes:

1. The students will correlate theory with diode behavior.
2. They will design and check rectifier operation with regulation etc.
3. Students will design different modes with BJT and FET and check the operations.
4. They will design and study adder, integrator etc. with OP-AMPs.

List of Experiments (from)

1. Familiarization with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, multi-meters etc.
2. Familiarization with measuring and testing equipment like CRO, Signal generators etc.
3. Study of I-V characteristics of Junction diodes.
4. Study of I-V characteristics of Zener diodes.
5. Study of Half and Full wave rectifiers with Regulation and Ripple factors.
6. Study of I-V characteristics of BJTs in CB mode
7. Study of I-V characteristics of BJTs in CE mode
8. Study of I-V characteristics of Field Effect Transistors.
9. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
10. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
11. Study of OPAMP circuits: Inverting and Non-inverting amplifiers, Adders, Integrators and Differentiators.