Semester 1 (Group A) (B.Tech. 1st Year , 2020 Batch)								
Sl No	**Type of Course**	**Course Code**	**Course Name**	**L**	**T**	**P**	**S**	**Total Contact Hours**
Theory Papers								
1	Basic Science Course	BSC101	Physics	4	0	0	0	4
2	Basic Science Course	BSC103	Mathematics and Statistics- I	3	0	0	0	3
3	Engineering Science Course	ESC101	Basic Electrical Engineering	2	0	0	0	2
4	Humanities and social sciences including Management	HSMC101	English Communication and Public Speaking Skills-I	2	0	0	0	2
5	Humanities and social sciences including Management	HSMC102	Essential Studies for Professionals - I	2	0	0	0	2
			Total Credit Points of Theory	13	0	0	0	13
Practical Papers								
1	Basic Science Course	BSC191	Physics Lab	0	0	2	0	2
2	Engineering Science Course	ESC191	Basic Electrical Engineering Lab	0	0	2	0	2
3	Engineering Science Course	ESC193	Workshop & Manufacturing Practices - I	0	0	2	0	2
4	Humanities and social sciences including Management	HSMC191	English Communication and Public Speaking Skills - I Lab	0	0	2	0	2
Total Credit Points of Practical				0	0	8	0	8
Sessional Papers								
1	Engineering Science Course	ESC181	Computer Programming and Problem Solving using Python and C - I	0	0	0	5	5
2	Humanities and social sciences including Management	HSMC182	Skill Development for Professionals – I	0	0	0	2	2
Total Credit Points of Sessional				0	0	0	7	7
MOOCs								
1	MOOCs	MOOC101	Economics, Finance and Entrepreneurship Skills - I	0	0	0	1	1

2	MOOCs	MOOC102	Design Thinking & Innovation- I	0	0	0	1	1	
Total Credit Points of MOOCs				0	0	0	2	2	
Total Credit Points of Semester				14	0	8	8	30	

Semester 1 (Group – B) (B.Tech. 1st Year , 2020 Batch)									
Sl No	**Type of Course**	**Course Code**	**Course Name**	**L**	**T**	**P**	**S**	**Total Contact Hours**	**Credit Points**
Theory Papers									
1	Basic Science Course	BSC102	Chemistry	4	0	0	0	4	4
2	Basic Science Course	BSC103	Mathematics and Statistics- I	3	0	0	0	3	3
3	Engineering Science Course	ESC102	Basic Electronics Engineering	2	0	0	0	2	2
4	Humanities and social sciences including Management	HSMC101	English Communication and Public Speaking Skills-I	2	0	0	0	2	2
5	Humanities and social sciences including Management	HSMC102	Essential Studies for Professionals - I	2	0	0	0	2	**2**
			Total Credit Points of Theory	13	0	0	0	13	**13**
Practical Papers									
1	Basic Science Course	BSC192	Chemistry Lab	0	0	2	0	2	**1**
2	Engineering Science Course	ESC192	Basic Electronics Engineering Lab	0	0	2	0	2	**1**
3	Engineering Science Course	ESC194	Engineering Drawing, 3D Design Lab	0	0	2	0	2	**1**
4	Humanities and social sciences including Management	HSMC191	English Communication and Public Speaking Skills - I Lab	0	0	2	0	2	**1**
Total Credit Points of Practical				0	0	8	0	8	**4**
Sessional Papers									
1	Engineering Science Course	ESC181	Computer Programming and Problem Solving using Python and C - I	0	0	0	5	5	**2.5**

2	Humanities and social sciences including Management	HSMC182	Skill Development for Professionals – I	0	0	0	2	2	**1**
Total Credit Points of Sessional				0	0	0	7	7	**3.5**
MOOCs									
1	MOOC	MOOC101	Economics, Finance and Entrepreneurship Skills - I	0	0	0	1	1	**1**
2	MOOC	MOOC102	Design Thinking & Innovation- I	0	0	0	1	1	**1**
Total Credit Points of MOOCs				0	0	0	2	2	**2**
Total Credit Points of Semester				14	0	8	8	30	**22.5**

First Year 1st Semester Curriculum Structure for B.Tech Course

Physics (BSC 101/BSC 201)	
Department	Basic Science and Humanities
Program	B. Tech.
Course Code	**BSC-101/BSC-201**
Title of Course	**Physics**
Year of Study	First Year
Semester	**First**
Contact Hours	L-T-P: 4-0-0
Credits (Theory)	Credit – 4
Type of course (theory, tutorial, seminar, project, etc.),	**Theory**
Class/Laboratory/Tutorial schedule	4 hours Lecture
Duration	One Semester
Total Lecture Hours	40
Pre-requisites Courses	Basic knowledge of classical mechanics at XI, XII level. Basic knowledge of wave theory of light. Basic knowledge of Vector calculus, Differential and Integral calculus along with differential equations, concept of Cartesian and spherical coordinate, linear algebra and partial differential equation. Basic knowledge of probability and statistics. Basic knowledge of electrostatics and magneto statics at XI, XII level
Course Outcome	Upon successful completion of this course, students should be able to: BSC101/BSC201.1: Develop a knowledge of classical mechanics for applications in engineering BSC101/BSC201.2:Apply the knowledge of optics in varieties of technologies like optical instruments, optical software etc. BSC101/BSC201.3:Develop ability to analyse and solve physical problems.

	BSC101/BSC201.4:Develop knowledge of Electromagnetic theory for applications in engineering. BSC-101/BSC 201.5: Formulate and solve the engineering problems on Quantum theory. BS-101/BSC201.6: Apply the knowledge of Quantum mechanics in engineering applications. BSC-101/BSC201.7: Develop understanding of Statistical mechanics and their applications.

Physics course for B.Tech. 1st Year 1st Semester/2nd Semester Curriculum.

Modules	Serial of Modules	Chapter No	Text Book as per Syllabus	No. of lectures
Module 1 : Vector Calculus & Classical Mechanics	Ordinary integrals of vectors, Line Integrals, Surface Integrals and Volume Integrals. The Divergence Theorem of Gauss, Stokes' theorem, Greens's Theorem in the plane **Classical Mechanics**: Constrained Motion, Discrete and Continuous Systems, Rigid and Elastic Bodies, Degrees of Freedom, Constraints-Holonomic and Non-Holonomic Constraints	5 7	Theory and problems of Vector analysis –Murray R Spiegel, Schaum's outline series, McGraw-Hill book Company, SI (metric) edition Theory and problems of Theoretical Mechanics by Murray R. Spiegel SI(Metric) edition)	5L
Module 2: Oscillation	**Oscillations** Free vibration, Forced vibration and Resonance, Mathematical treatment of damped vibration, Time constant or Modulus of decay, Energy relations, Evaluation of α and ω_0,	3	Advanced Acoustics – Dr. D. P. Raychaudhuri, The new book stall, Revised Ninth Edition, 2009	4L

	Logarithmic Decrement, Mathematical treatment of forced vibration, Expression for velocity in steady state, Resonance, Power in forced vibration and resonance, Work done against retarding force, Sharpness of resonance.			
Module 3 *Optics*	**Interference**: Applications- Young's Double Slit Experiment: width of interference fringes and Newton's rings **Diffraction**: Fraunhofer and Fresnel diffraction, Fraunhofer diffraction at single slit, double slit, and multiple slits(qualitative analysis only); Rayleigh Criteria, Resolving Power of grating and telescope, Applications **Polarization:** Introduction, Circular and Elliptical polarization, Polarisation by Reflection, Brewster's Law, Polarisation by Double Reflection, E-ray, O-Ray, Nicol Prism, Wave plates - Half wave plate and Quarter wave plate, Optical activity, Specific rotation, Fresnel theory of Optical rotation, Applications. **Laser**: Spontaneous emission, Stimulated emission, Absorption, Principles and working of laser: Population inversion, Optical pumping, various methods of pumping, Einstein's A and B coefficients (Qualitative idea), Fibre Optics,	9, 12, 13	A textbook on Optics, B. Ghosh and K.G. Majumder, Sreedhar Publishers, fifth edition	10L

	Designing of LASER with example.			
Module 4: (Electromagnetic Theory)	**Electrodynamics** Maxwell's Equation: Electrodynamics before Maxwell, How Maxwell Fixed Up Ampere's Law, Maxwell's Equations and Magnetic Charge, Maxwell's Equations Inside Matter, Poynting's theorem **Electromagnetic Waves** The wave equation: Introduction, Electromagnetic waves in non-conducting media: Monochromatic plane waves in vacuum, Electromagnetic waves in conductors: The modified wave equation.	7, 8	Introduction to Electrodynamics by David J. Griffiths 3rd Edition	6L
Module 5 Quantum Theory	Quantum Theory : **Particle properties of Waves** Electromagnetic Waves, Blackbody Radiation, Ultraviolet Catastrophe, Planck radiation Formula, Photoelectric Effect, Quantum Theory of Light, Compton Effect **Wave properties of Particles** de Broglie Waves, Waves of Probability, Phase and Group Velocities,Particle DiffractionUncertainty Principle (II), Applying the Uncertainty Principle,.	2,3	Concepts of Modern Physics (Sixth Edition) by Arthur Beiser (Published by McGraw-Hill	5L
	Quantum Mechanics: Classical Mechanics is an approximation of Quantum Mechanics, Wave Function, Well Behaved		Concepts of Modern Physics (Sixth Edition) by Arthur Beiser	

Module 6 (Quantum Mechanics)	Wave Functions, The Wave Equation, Schrodinger's Equation: Time dependent Form, Linearity and Superposition, Expectation Values, Operators, Schrodinger's Equation : Steady State Form, Particle in a Box, Finite Potential Well, Tunnel Effect	5	(Published by McGraw-Hill	6L
Module 7: Statistical Mechanics	Statistical Distributions (Three different kinds) , Maxwell Boltzmann Statistics (Classical particles such as gas molecules obey them), Molecular energies in an ideal gas(Average molecular energy),Equipartition of Energy, Distribution of Molecular speeds , Quantum Statistics (Bosons and Fermions have different distribution function),Names of the functions, Bose-Einstein Condensate, Comparison of the three statistical distribution functions. Planck Radiation Law, Free Electrons in a Metal	9	(Concepts of Modern Physics (Sixth Edition) by Arthur Beiser (Published by McGraw-Hill))	4L

Book list module wise:

Module No.	Module Name	Text Books
1	Vectors and Classical Mechanics	Theory and problems of Vector analysis –Murray R Spiegel, Schaum's outline series, McGraw-Hill book Company, SI (metric) edition Theory and problems of Theoretical Mechanics by Murray R. Spiegel SI(Metric) edition
2	Oscillations	Advanced Acoustics – Dr. D. P. Raychaudhuri, The new book stall, Revised Ninth Edition, 2009
3	Optics	A textbook on Optics, B. Ghosh and K. G. Majumder, Sreedhar Publishers, fifth edition

4	Electromagnetic Theory	Introduction to Electrodynamics by David J. Griffiths 3rd Edition
5	Quantum Theory	Concepts of Modern Physics (Sixth Edition) by Arthur Beiser (Published by McGraw-Hill)
6	Quantum Mechanics	Concepts of Modern Physics (Sixth Edition) by Arthur Beiser (Published by McGraw-Hill)
7	Statistical Mechanics	Concepts of Modern Physics (Sixth Edition) by Arthur Beiser (Published by McGraw-Hill)

First Year 1st Semester Curriculum Structure for B.Tech Course

Course Code: BSC 103	**Category:** Basic Science Course
Course Title: Mathematics& Statistics-I	**Semester :** First (All streams)
L-T-P: 3-0-0	**Credits: 3**
Pre-Requisites: High School Mathematics	

Course Outcomes:

CO1 Apply the concept and techniques of differential and integral calculus to determine curvature and evaluation of different types of improper integrals.

CO2 Understand the domain of applications of mean value theorems to engineering problems.

CO3 Apply the knowledge for addressing the real life problems which comprises of several variables or attributes and identify extreme points of different surfaces of higher dimensions.

CO4 Learn the tools of power series to analyze engineering problems and apply the concept of convergence of infinite series in many approximation techniques in engineering disciplines.

CO5 Learn the concept of probability with their properties and their applications in physical and engineering environment.

Module No	Description	Lecture Hours
1	**Calculus of a single variable (Differentiation):** Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin's theorems with remainders; Maclaurin's infinite series **Application of Taylor's Theorem**: Maxima and Minima of functions of One Variables. Indeterminate forms and L'Hospital's rule; Evolutes and involutes. **Text Book: Chapter 1 of B. Basu Mallik &Krishanu Deyasi,**	**8**

	Engineering Mathematics-1B, CengageLearning	
2	**Calculus of a single variable (Integration):** **Definite Integral**: Definition, Properties of Definite Integrals, Reduction Formulae, **Applications of definite integrals**: Length, Area and Volume enclosed by plane curves. Evaluate surface areas and volumes of revolutions, Moment of Inertia. **Improper integrals**: Definition, classification, Test for convergence. Beta and Gamma function and their properties. **Text Book: Chapter 2 of B.Basu Mallik &KrishanuDeyasi, Engineering Mathematics-1B, CengageLearning**	**8**
3	**Multivariate Calculus (Differentiation):** Limit, continuity and partial derivatives, Euler's theorem on Homogeneous function, Chain rule, Total derivative, derivative of implicit functions; Jacobians for two & three independent variables and related problems, Maxima, minima and saddle points; Method of Lagrange's undetermined multipliers; Scalar & Vector fields, Scalar point functions & Vector point functions, Gradient of a scalar point function, Directional derivative-Related problems, Divergence & curl of a vector point function **Text Book: Chapter 5 & 6 of B.Basu Mallik &KrishanuDeyasi, Engineering Mathematics-1B, CengageLearning**	**10**
4	**Sequence & Series:** Preliminary ideas of sequence, Infinite series and their convergence/divergence, Infinite series of positive terms, Tests for convergence: Comparison test, Cauchy's Root test, D' Alembert's Ratio test, Raabe's test(statements and related problems on these tests), Alternating series, Leibnitz's Test (statement, definition) and related problems, Absolute convergence and Conditional convergence. **Text Book: Chapter 3 of B.Basu Mallik &KrishanuDeyasi, Engineering Mathematics-1B, CengageLearning**	**7**
5	**Theory of Probability** Basic terminology, Classical & Axiomatic definition of probability, Some elementary deductions- $0 \le P(A) \le 1, P(\overline{A}) = 1 - P(A)$ etc., Addition rule for two events (proof) & three events (statement only) -Related problems, Concept of Conditional probability, Multiplication rule of probability, Bayes' theorem (statement only)-related problems, Independent events –properties and related problems.	**7**

	Text Book: Chapter 26 (upto article 26.6) of B.S. Grewal, Higher Engineering Mathematics, KhannaPublishers, 43rd Edition	
Total		**40**

Learning Resources:

1. M. Greenberg, Advanced Engineering Mathematics, 2ND Edition, Pearson, India.
2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley &Sons.
3. B.S. Grewal, Higher Engineering Mathematics, KhannaPublishers, 43rd Edition.
4. B.Basu Mallik &KrishanuDeyasi, Engineering Mathematics-1B, CengageLearning.
5. B.Basu Mallik &KrishanuDeyasi, Engineering Mathematics-2B, Cengage Learning.
6. Das & Mukherjee- Differential Calculus, U.N.Dhar& Sons
7. Das & Mukherjee- Integral Calculus, U.N. Dhar& Sons
8. Jain &Iyengar, Advanced Engineering Mathematics,Narosa.
9. H.K.Dass, Advanced Engineering Mathematics, SultanChand.
10. S. Ross, A First Course in Probability, Pearson EducationIndia
11. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1,Wiley.
12. Miller & Freund's, Probability and Statistics for Engineers, Pearson Education

First Year 1st Semester Curriculum Structure for B.Tech Course

<table>
<tr><td>Course code</td><td></td><td colspan="6">HSMC 101</td></tr>
<tr><td>Category</td><td></td><td colspan="6">Humanities Course</td></tr>
<tr><td>Course title</td><td></td><td colspan="6">English Communication & Public Speaking Skills I
(Theory)</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>S</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>2</td><td>0</td><td>0</td><td>0</td><td>2</td></tr>
<tr><td></td><td></td><td colspan="6"><u>Course contents</u>
(i) English Language
(ii) Communication</td></tr>
</table>

Pre requisites: Basic Grammar, Comprehension, Writing skills and Basic Communication.

<u>Course Objective:</u>

- To enable students listen, speak, read and write effectively for academic purposes and face real life situations.

<u>Expected Course Outcome:</u>

- The course will facilitate students to communicate effectively in academic and social contexts.
- It will enable students acquire vocabulary and enrich their speaking skills.
- It will help students to be industry ready.
- It will help students acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.

Detailed Syllabus :

Module	Serial of Modules	Days	Recommended Text Books
1. **Basic Communication Skills**	1.1 Purpose of communication and Importance of building relationship through communication(TB: Part1,Chap-1,2)	Day 1	Model Business Letters, Emails And Other Business Documents by Shirley Taylor, Pearson Publication, 7th Edition
	1.2 Key Factors in Building great relationship (TB: Part1,Chap-1,2)		
	1.3 Understanding Inter and Cross cultural nuances (TB: Part1,Chap-1,2)	Day 2	
	1.4CBLL (Content Based language learning)(TB: Part1,Chap-1)		
2. **Basics of Grammar**	2.1 Types of Nouns(TB: Chap 5-8, pg 5-15)	Day 3	High School English Grammar and Composition by Wren and Martin, S Chand publication, 2nd Edition
	2.2 Types of Pronouns(TB: Chap 15-19, pg43-62)		
	2.3 Various Forms and Moods of Verbs (TB: Chap 20,21,23Pg 65-77, Chap 31-33pg 102-117)	Day 4	
	2.4 Gerund(TB: Chap 30,pg 99-100)		
	2.5 Adverbs and its Usages (TB: Chap 34-37, pg 118-125)	Day 5	
3. **Advanced Grammar**	3.1 Varieties of English TB: (Part 1, pg9-20)	Day 6	A Communicative Grammar of English by Geffrey Leech & Jan Svartvik, Routledge Publication, 3rd Edition
	3.2 Intonation (TB: Part 2,pg 21-25)	Day 7	
	3.3 Mood, Emotion and Attitude of sentences (TB: Part 3, pg 117-138)	Day 8	
	3.4 Linking of Words and sentences (TB: Part 3, pg-139-158)	Day 9	

4. Business writing Skills	4.1 **Business writing language**(TB: Part 2,Chap-3)	Day 10	Model Business Letters, Emails And Other Business Documents by Shirley Taylor, Pearson Publication, 7th Edition
	4.2 Structuring of Messages and Presentation(TB: Part 2,Chap-4)		
	4.3Online Writing: Email, Websites, Blogs and Social Networking(TB: Part 3,Chap-6,7)	Day 11	
	4.4Writing Enquiries, Quotations, Invoice, Tenders(TB: Part 4,Chap-9,10,11)	Day 12	
	4.5Business Correspondences(TB: Part 4,Chap-15)	Day 13	
5.Advanced Writing Skills	**5.1 Proposal writing: project proposal for getting funds for university building, road repairing, start up of website, establishment of share trading company, proposal for building construction business.**(TB: Part 5,Chap-20)	Day 14	Model Business Letters, Emails And Other Business Documents by Shirley Taylor, Pearson Publication, 7th Edition
	5.2 Secretarial and Administrative Correspondence(TB: Part 5,Chap-17)	Day 15	
	5.3 Meeting Documentation(TB: Part 5,Chap-18)	Day 16	
	5.4 Complaints and Adjustment Letters (TB: Part 6,Chap-21)		
	5.5 Writing Notice, Advertisement and Circular (TB: Part 6,Chap-23)	Day 17	
6. Reading Science Fiction	6.1 Nathaniel Hawthorne: *The Birth Mark* (pg 19)	Day 18	The Phoenix Pick Anthology of Classic Science Fiction Stories by *Arc Manor 2008,* ISBN: 978-1-60450-258-9 , 2nd Edition
	6.2 Herman Melville: *The Bell Tower* (pg 37)	Day 19	
	6.3 E.M. Forster: *The Machine Stops* (pg 109)	Day 20	

Textbooks:

1) Model Business Letters, Emails And Other Business Documents by Shirley Taylor, Pearson Publication, 7th Edition

2) A Communicative Grammar of English by Geffrey Leech & Jan Svartvik, Routledge Publication, 3rd Edition
3) High School English Grammar and Composition by Wren and Martin, S Chand publication, 2nd Edition
4) The Phoenix Pick Anthology of Classic Science Fiction Stories by Arc Manor 2008, ISBN: 978-1-60450-258-9, 2nd Edition

First Year 1st/ 2nd Semester Curriculum Structure for B.Tech Course

Course Code: BSC102	**Category: Basic Science Courses**
Course Title: Chemistry	**Semester: First/ Second**
L-T-P: 3-1-0	**Credit: 4**
Pre-Requisites: I. Fundamental ideas of inorganic chemistry and DNA sequencing at XI, XII level. II. Knowledge of electromagnetic spectrum, photons and its properties along with Planck's Hypothesis. III. Knowledge of the basic concepts of thermodynamics. IV. Basic knowledge of conductors, insulators and semi- conductors. V. Introduction to Organic Molecules and their orientation.	

Detailed contents

Module 1: Fundamental Chemistry

Topics of Module	Chapter No.	Text Book as per syllabus	Focused branch of Engineering
1a. Acid base, concept of pH and pOH, buffer solutions, ionic equilibria, solubility equilibria, Ostwald's dilution law, electrolytic conductance. 1b. Coordination Chemistry: Definitions and classification of ligands, coordination number and stereochemistry, isomerism, Crystal Field Theory, Crystal	5,31	Engineering Chemistry, Jain and Jain, Dhanpat Rai Publishing Co. 17th Edition	Basic understanding of chemistry required for all branches.

field splitting of d-orbitals in octahedral complexes and tetrahedral complexes, Crystal Field Stabilisation Energy, Colors and magnetism of Coordination Complexes.			

Module 2: Chemistry of Smart Materials

Topics of Module	Chapter No.	Text Book as per syllabus	Focused branch of Engineering
2a. Introduction to conductor, semi-conductor, insulator, band structure of solids and the role of doping on band structures. 2b. Coordination Chemistry: Definitions and classification of ligands, coordination number and stereochemistry, isomerism, Crystal Field Theory, Crystal field splitting of d-orbitals in octahedral complexes and tetrahedral complexes, Crystal Field Stabilisation Energy, Colors and magnetism of Coordination Complexes.	22 Vol. 1 (Chap 1-8)	Engineering Chemistry, Jain and Jain, Dhanpat Rai Publishing Co. 17th Edition Chemistry of Nanostructures, Nanocomposites, graphene and other 2D materials - By C.N.R. Rao, A. Muller, A.K.Cheetham, Wiley. Applications of Graphene and Graphene- Oxide based nanomaterials, Sekhar Chandra Ray, Micro & Nano Technologies Series	ECE, EEE, Mechanical Engineering.

Module 3: Organic reactions mechanism

Topics of Module	Chapter No.	Text Book as per syllabus	Focused branch of Engineering
Introduction to reactions involving substitution, addition, elimination, cyclization and ring openings. Steric hindrance, Hydride and alkyl shift, Aldol condensation, Beckmann rearrangement, Cannizzaro reaction, Diels Alder reaction, Hoffmann reaction.	26	Engineering Chemistry, Jain and Jain, Dhanpat Rai Publishing Co. 17th Edition	Biotechnology, CSE, IT

Module 4: Computational Chemistry

Topics of Module	Chapter No.	Text Book as per syllabus	Focused branch of Engineering
Bioinformatics: Biology as an information science, history of bioinformatics, types of data, introduction to DNA, genome organization, introduction to different resources of bioinformatics and application.		Introduction to Bioinformatics, Fourth Edition. Arthur M. Lesk. Publisher: OUP Oxford.	Biotechnology, CSE, IT

Module 5: Spectroscopic techniques and applications

Topics of Module	Chapter No.	Text Book as per syllabus	Focused branch of Engineering

Introduction, Types of energy present in molecules, Types of spectra, General features of absorption spectrometer, selection rules, Frank Condon Principle, Ultraviolet and Visible spectra, Microwave Spectroscopy, Vibrational Spectroscopy, Electronic spectroscopy. Fluorescence and its applications.	35	Engineering Chemistry, Jain and Jain, Dhanpat Rai Publishing Co. 17th Edition. Fundamentals of Molecular Spectroscopy, C.N. Banwell, McGraw-Hill 3rd Edition	Biotechnology ECE

Module 6: Thermodynamics

Topics of Module	Chapter No.	Text Book as per syllabus	Focused branch of Engineering
Introduction, Terminology of thermodynamics, Zeroth Law of thermodynamics, 1st law of thermodynamics, Enthalpy, Reversible Isothermal expansion, Thermochemical definition, Hess's law of constant heat summation, Heat capacity, Relation between Cp and Cv, Adiabatic expansion, Kirchoff's equation, 2nd law of thermodynamics, Carnot's theorem, Entropy, Entropy change in	18	1. Engineering Chemistry, Jain and Jain, Dhanpat Rai Publishing Co. 17th Edition. 2. Physical Chemistry, P.C. Rakshit, Sarat Book Distributors, Calcutta, 7th Ed.	Mechanical Engineering, Civil Engineering, EEE

reversible process, Entropy change in irreversible process., Entropy of phase transition, Entropy change for ideal gas, Entropy change during mixing of ideal gases, Free energy, Joule-Thomson effect, Gibbs-Helmholtz equation, Maxwell's thermodynamic relations, Clausius- Clapeyron equation.			

Module 7: Electrochemistry and electromotive force.

Topics of Module	Chapter No.	Text Book as per syllabus	Focused branch of Engineering
Free energy and emf, Cell potentials, Nernst equation and applications, Redox Reactions, Electrode Potential, Electrochemical Cell, Weston Standard Cadmium Cell, Emf of an Electrochemical Cell, Concentration Cell, Reference Electrodes, Batteries, Fuel Cells	18	Engineering Chemistry, Jain and Jain, Dhanpat Rai Publishing Co. 17th Edition.	ECE, EEE, Mechanical Engineering.

First Year 1st/ 2nd Semester Curriculum Structure for B.Tech Course

Basic Electronics Engineering

Course Code: ESC102	**Category:** Engineering Science
Course Title: Basic Electronics Engineering	**Semester:** First
L-T-P: 2-0-0	**Credit:** 2
Pre-Requisites: High School Mathematics & Physics	

Course Objective:

COE1: To be able to identify semiconductor materials, distinguish between types of semiconductor.

COE2: Tobe able to explain the junction properties and the phenomenon of rectification, I-V characteristics and identify operating points.

COE3: To be able to draw and explain the I-V characteristics of BJTs– both input and output, biasing and its application as switch as well as amplifier.

COE4: To be able to understand the concept of field effect transistor, operational amplifier and its application.

Detailed Syllabus:

Module No.	Description of Topic	Lecture Hours
1	**Semiconductors:** Crystalline material and their properties, Energy band theory, Fermi levels; Conductors, Semiconductors and Insulators: electrical properties, band diagrams. Semiconductors: intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers.	**4**

2	**Diodes and Diode Circuits:** Formation of P-N junction, energy band diagram, built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Simple diode circuits, load line, linear piecewise model; Rectifier circuits: half wave, full wave.	**5**
3	**Bipolar Junction Transistors:** Device structure and physical operation, current – voltage characteristics, the BJT as an amplifier and a switch, Biasing BJT Amplifier Circuits, Single stage BJT amplifiers CE, CB, CC.	**4**
4	**Field Effect Transistors:** Device structure and physical operation, current – voltage characteristics, JFET & MOSFET Structure and characteristics; MOSFET as an amplifier and a switch, Biasing MOSFET Amplifier Circuits, Single stage MOS amplifiers Amplifier Configuration, Common Source, Source Follower, Common Gate Configuration; CMOS inverter.	**6**
5	**Feed Back Amplifier, Oscillators:** Concept (Block diagram), properties, positive and negative feedback, effect of positive feedback: instability and oscillation, Barkhausen criteria.	**2**
6	**Introduction to Integrated circuits:** Operational amplifier and its terminal properties; Application of operational amplifier; Inverting and non-inverting mode of operation, Adders, Subtractors, Constant-gain multiplier, Voltage follower, Comparator, Integrator, Differentiator.	**4**

Course Code: ESC101	**Category:** Engineering Science
Course Title: Basic Electrical Engineering	**Semester:** First
L-T-P: 2-0-0	**Credit:** 2
Pre-Requisites: High School Mathematics & Physics	

Course Outcome:

CO1: Student will be able to understand the fundamentals of semiconductors, diode circuits and rectifier and working of basic electrical instruments and electronic components.

CO2: Student will be able to explain the working principle and operations of basic diode, BJT, JFET, MOSFET.

CO3: Student will be able to understand the concept of feedback, oscillator and fundamentals of operational amplifiers and its application.

CO4: Student will be to develop the understanding regarding application of elementary ideas of electrical and electronics in modern technology.

Learning Resources

1. Salivahanan: "Electronics Devices & Circuits", Tata McGraw-Hill Education, 3rd Edition 2012

2. JB Gupta: "Electronic devices and circuits", S K KATARIA & SONS, 1st edition, 2012

3. Rakshit Chattopadhyay: "Electronics Fundamentals and Applications", 11th Edition, 2010

4. Boylestad&Nashelsky : "Electronic Devices & Circuit Theory", Pearson, 11th Edition, 2015

First Year 1st Semester Curriculum Structure for B.Tech Course

Course Objective:

COE1: Toconceptualize the fundamental principles and theorems of ac and dc network and signals.

COE2: Tobe able to understand the basics of networks and circuits and methods to solve them.

COE3: To be able to understand Electrostatics and Electromagnetism and their applications.

COE4: To be able to understand the concept single phase transformer, DC Machines and working principle of induction motor.

Detailed Syllabus:

Module No.	Description of Topic	Lecture Hours
1	**DC Circuits &Network Theorems:** Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, Kirchhoff's law, Principle of superposition. Source equivalence and conversion, Thevenin's theorem, Norton Theorem, nodal analysis, mesh analysis, star-delta conversion. Maximum power transfer theorem with proof.	**7**
2	**Electrostatics:** Coulomb's law, Electric Field Intensity, Electric field due to a group of charges, continuous charge distribution, Electric flux, Flux density, Electric potential, potential difference, Gauss's law, proof of gauss's law, its applications to electric field and potential calculation, Capacitor, capacitance of parallel plate capacitor, spherical	**8**

	capacitor, isolated spheres, concentric conductors, parallel conductors. Energy stored in a capacitor. **Electromagnetism:** Biot-savart law, Ampere's circuital law, field calculation using Biot-savart &ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faraday's law, Self and mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses.	
3	**AC Circuit Analysis**: RMS Values, average value, phasor representation of alternating quantities. Concept of j-operator, Steady state AC circuit analysis for R, L, C, RL, RC & RLC series and parallel circuits. Series and parallel resonance condition. AC power calculations. Introduction to three phase systems, balanced. Star and delta connections. Measurement of three phase power.	**5**
4	**DC Machines:** Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Speed-torque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control)	**5**
5	**Single phase transformer:** Core and shell type construction, EMF equation, no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation. **3 phase induction motor:** Types, Construction, production of rotating field, principle of operation, equivalent circuit and phasor diagram, rating, torque-speed characteristics (qualitative only). Starter for squirrel cage and wound rotor induction motor. Brief introduction of speed control of 3 phase induction motor (voltage control, frequency control, resistance control)	**6**

Course Outcome:

CO1: Student will be able to understand the fundamentals of DC and AC analysis of circuit.

CO2: Student will be able to use KCL and KVL as fundamental tool for network solutions

CO3: Student will be able to understand the concept of resonance in RLC circuits, concept of DC machines.

CO4: Student will be to develop the understanding of single phase transformer, induction motor.

Learning Resources

1. Basic Electrical Engineering -Abhijit Chakrabarti, Sudipta Nath,Chandan Kumar Chanda

2. Basic Electrical Engineering (vol2)-B.L.Thereja

3. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition

4. Hughes Electrical & Electronics Technology, 8/e, Hughes, Pearson Education

First Year 1st/ 2nd Semester Curriculum Structure for B.Tech Course

Course Code: HSMC182	**Category: Basic Science Courses**
Course Title: Skill Development For Professionals-I	**Semester: First**
Credit: 1	
Pre-Requisites: Basic & fundamental knowledge of mathematics up to class 10th standard , effective grammatical concept of English .	

Course Outcome:

1. It will improve verbal ability skill among students.
2. Students will communicate effectively & appropriately in real life situation.
3. It will enhance student's problem solving skill.
4. Students will be able to prepare for various public and private sector exams & placement drives.

Detailed syllabus

Module-1

Objective English-1

1) Introduction of Parts of speech: Introduction, Brief discussion of Parts of speech

2) What is **noun**, Kinds of Noun, Rules & Application.

3) Definition of **Pronoun**, Examples, Rules & Application

4) Definition of **Verb**, Kinds of Verb, Rules & Application, Definition of Tense, Different types of Tenses, Examples, Rules & Application

5) Definition of **Adjective**, Kinds of Adjective, Rules & Application,

6) Definition of **Adverb**, Kinds of Adverb, Rules & Application

7) Definition of **Preposition**, Examples , Rules & Application,

8) Definition of **Interjection**, Examples, Rules & Its Application,

9) Definition of **Conjunction**, Examples, Rules & Application

10) Different types of **Articles**, Examples, Rules & Application English Grammar, News paper reading: The Hindu & Economic Times.

Module-2

Data Interpretation level-I.

Ref Books:

1. R.S agarwal –Competitive English

2. Practice set of objective English- Arihant publication

3. Data Interpretation- Arihant publication

First Year 1st Semester Curriculum Structure for B.Tech Course

Course Code	HSMC183				
Category	Engineering Science Course				
Course title	Design Thinking & Innovations I				
Scheme and Credits	**L**	**S**	**P**	**Credits**	Semester – I
	0	**1**	**0**	**0.5**	
Pre-requisites (if any)	Mathematics (+2 Level), Basics of C Programming Language				

Design Thinking & Innovations I: [Contact hours: 10]

Course Outcomes:

The course titled Design Thinking & Innovations is designed to give an in-depth understanding on various aspects of thinking, innovations, creativity, evolving business models, incubation and entrepreneurship. The course also includes sessions on Engineering and Technology incubation which will help everyone as a game changer in nowadays competitive scenario. The course is a blend of theory and practice. As the course is designed for B. Tech 1st year students therefore this course does not require any prerequisite knowledge except

Mathematics and Basics of C programming language and will be useful to understand innovation and its applications in different areas of development and growth.

Detailed contents:

Module 1: Introduction to Design Thinking (**4 lectures**)

- Empathy: Problem Discovery & Evoking the 'right problem' (**1 lecture**)
- Research and Analysis: Context Research and Design Insights and Strategy (**1 lecture**)
- Solve: Concepting and Building – Generating Ideas, Building Ideas and Create a Concept (**1 lecture**)
- Testing, Refine and Enhance Design (**1 lecture**)

Module 2: Workshop: Case studies (**6 lectures**)

- Computer Science Related problems (**3 lectures)**
- Mechanical Engineering problem (**1 lecture)**
- Electrical Engineering problem (**1 lecture)**
- Electronics Engineering problem (**1 lecture)**

Links: No standard text books are available. Online Links :

(i) https://nptel.ac.in/courses/110/106/110106124/

(ii) https://nptel.ac.in/courses/109104109/

First Year 1st Semester Curriculum Structure for B.Tech Course

Course Code	ESC 181				
Category	Engineering Science Course				
Course title	Computer Programming and Problem Solving using C				
Scheme and	**L**	**T**	**P**	**Credits**	Semester – I
Credits	**1**	**0**	**3**	**2**	
Pre-requisites (if any)	Basic knowledge of Mathematics				

Computer Programming and Problem Solving using C ([L: 2; T: 0; P: 1 (3 credits)] [contact hrs: 36]

Course Outcome:

CO1: To learn about basics of computation & principles of Computer Programming.

CO2: To impart the basic concepts of digital computers.

CO3: To impart the basic concepts of C programming language through C character set, expression, operators.

CO4: Fundamentals of C through Standard input and output Flow of Control and Program Structures.

CO5: To impart the basic knowledge on C array, function, pointers and file handling.

CO6: Impart the knowledge of real life projects on programming language.

Detailed contents

Module 1: Introduction to Programming (**2 lectures**)

- Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.) - (1 lecture).
- Idea of Algorithm: steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudo code with examples. (1 lecture)

From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code- (2 lectures)

Module 2: Arithmetic expressions and precedence (**1 lecture**)

Module 3: Conditional Branching and Loops (**3 lectures**)

- Writing and evaluation of conditionals and consequent branching (1 lectures)
- Iteration and loops (2 lectures)

Module 4: Arrays (**3 lectures**)

- Arrays (1-D, 2-D)
- Character arrays and Strings

Module 5: Basic Algorithms (**3 lectures**)

- Notion of order of complexity through example programs
- Searching
- Basic Sorting Algorithms (Bubble, Insertion).

Module 6: Function (**3 lectures**)

- Functions (including using built in libraries)
- Parameter passing in functions, call by value
- Passing arrays to functions: Call by reference
- Return by refence

Module 7: Recursion (**2 lectures**)

- Recursion, as a different way of solving problems. Example programs, such as Finding

Factorial, Fibonacci series, Ackerman function etc.

- Quick sort or Merge sort.

Module 8: Structure (**2 lectures**)

- Structures, Defining structures and Array of Structures

Module 9: Pointers (**2 lectures**)

- Idea of pointers
- Defining pointers
- Use of Pointers in self-referential structures
- Notion oflinked list (no implementation)

Module 10: File handling (only if time is available, otherwise should be done as part of the lab)

Suggested Text Books

(i) Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice

Hall of India

(ii) Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill

(iii) E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill

Suggested Reference Books

(i) Reema Thareja, Computer Fundamentals and programming in C, Oxford University Press

(ii) Yashavant Kanetkar, Let Us C, BPB Publications

Course Outcomes

The student will learn

- ❖ To formulate simple algorithms for arithmetic and logical problems.
- ❖ To translate the algorithms to programs (in C language).
- ❖ To test and execute the programs and correct syntax and logical errors.
- ❖ To implement conditional branching, iteration and recursion.
- ❖ To decompose a problem into functions and synthesize a complete program using
- ❖ divide and conquer approach.
- ❖ To use arrays, pointers and structures to formulate algorithms and programs.

- To apply programming to solve matrix addition and multiplication problems and
- searching and sorting problems.
- To apply programming to solve simple numerical method problems, namely rot
- finding of function, differentiation of function and simple integration.

Computer Programming and Problem Solving using C -All experiment must be done using gcc or dev c/Turbo c

Assignment 1: implementation of various operators in C

Assignment 2: Design of different patterns , accessing lists and other structures using loops. Implementation of different conditional statements.

Assignment 3: Switch case

Assignment 4: Array fundamentals

Assignment 5: Advanced array programming with functions

Assignment 6: Pointers and functions

Assignment 7: Creation of array using pointers

Assignment 8: Structures and union

Assignment 9:creation of basic data structures using pointers and structure

Assignment 10: Dynamic memory allocation

Assignment 11:pre-processor and their utility

Assignment 12: File handling programs in C

First Year 1st Semester Curriculum Structure for B.Tech Course

Physics Laboratory (BSC 191)	
Department	Basic Science and Humanities
Program	B. Tech.
Course Code	**BSC 191**
Title of Course	**Physics Laboratory**
Year of Study	First Year
Semester	**First**
Contact Hours	L-T-P: 0-0-2
Credits (Laboratory)	Credit – 2
Type of course (theory, tutorial, seminar, project, etc.),	**Laboratory**
Class/Laboratory/Tutorial schedule	2 hours
Duration	One Semester

Total Laboratory Hours	30
Pre-requisites Courses	Basic knowledge about measurement techniques by vernier calipers and screw gauge Basic concepts of 12^{th} standard physics Basic knowledge of algebraic calculation and graph plot.
Course Outcome	Upon successful completion of this course, students should be able to: BSC191/BSC291.1: Develop familiarity with range of experimental methods. BSC191/BSC291.2: Design, perform, document and analyze experiments in physics. BSC191/BSC291.3: Learn to work in a group. BSC191/BSC291.4: Verify the theories learnt with the help of instruments and measurement techniques, learn the sources of error in the experiment and calculate the error percentage.

Physics Laboratory course for B.Tech. 1st Year 1st Semester/2nd Semester Curriculum

Experiment No.	Experiment	Link for the experiment
1.	Determination of the Young's modulus of elasticity of the material of a given bar by flexure method.	https://vlab.amrita.edu/?sub=1&brch=280&sim=1509&cnt=1
2.	Study the formation of Newton's rings in the air-film in between a plano-convex Lens and a glass plate using nearly monochromatic light and hence to determine the Radius of curvature of the plano-convex lens	http://vlabs.iitb.ac.in/vlabs-dev/labs/mit_bootcamp/engg_physics/labs/exp1/simulation.php

3.	Determination of the modulus of rigidity of the material of a rod by static / dynamic method.	https://vlab.amrita.edu/?sub=1&brch=280&sim=602&cnt=1 http://vlab.amrita.edu/?sub=1&brch=74&sim=1523&cnt=4
4.	Determination of the wavelength of a given LASER source by forming diffraction pattern with a plane transmission grating.	http://vlab.amrita.edu/index.php/index.php?sub=1&brch=189&sim=334&cnt=4
5.	Study the Current vs. Voltage curve for a solar cell under various illumination conditions.	http://vlab.amrita.edu/?sub=1&brch=195&sim=360&cnt=1
6.	Determination of Planck's constant by photoelectric emission process.	http://vlab.amrita.edu/?sub=1&brch=195&sim=547&cnt=1
7.	Determination of the band-gap of a semiconductor by measuring the resistivity at different temperatures by four-probe method	https://vlab.amrita.edu/?sub=1&brch=282&sim=1512&cnt=1
8	Calculation of Stefan- Boltzmann Constant using the concept of black body radiation	http://htv-au.vlabs.ac.in/heat-thermodynamics/Black_Body_Radiation/index.html
9	Determination of e/m by Thomson's experiment. or Millikan oil drop experiment.	Link not available Or https://vlab.amrita.edu/?sub=1&brch=195&sim=357&cnt=1

10	Determination of the resistance per unit length of a wire using Carey Foster bridge.	https://vlab.amrita.edu/?sub=1&brch=192&sim=346&cnt=1
11	Determination the excitation potential of a given gas by Franck-Hertz experiment.	http://vlab.amrita.edu/?sub=1&brch=195&sim=355&cnt=1
12	Medle's Experiment: To determine the frequency of a electrically driven Tuning Fork.	https://vlab.amrita.edu/?sub=1&brch=201&sim=882&cnt=1
13	Determination of acceleration due to gravity (g) using bar pendulum.	Link not available

A student will perform any 10 experiments of the above list in a given semester.

First Year 1st Semester Curriculum Structure for B.Tech Course

Subject Code : ESC 193	**Category** : Engineering Science Courses
Subject Name : Workshop Practice I	**Semester** : First
L-T-P : **0-0-2**	**Credit:1**
Pre-Requisites: Knowledge in dimensions and units, Usage of geometrical instruments and analytical ability.	

Course Objective:

- To develop general machining skills in the students.
- To develop a skill in dignity of labour, precision, safety at work place, team working and development of right attitude.

Course Contents:

Fitting shop **(4 hours)**

Typical jobs that may be made in this practice module:

- To make a Gauge from MS plate.

Casting **(4 hours)**

Typical jobs that may be made in this practice module:

- Green sand moulds to prepare (Design of sprue, runner, and riser) and a casting be demonstrated.

Welding shop (Arc welding 4 hrs + gas welding 4 hrs) **(8 hours)**

Typical jobs that may be made in this practice module:

- ARC WELDING (4 hours): To join two thick (approx. 6mm) MS plates by manual metal arc welding.
- GAS WELDING (4 hours): To join two thin mild steel plates or sheets by gas welding.

Plastic moulding **(4 hours)**

Typical jobs that may be made in this practice module:

- For plastic moulding, making at least one simple plastic component should be made.

Carpentry **(4 hours)**

Typical jobs that may be made in this practice module:

- To make wooden joints and/or a pattern or like.

Smithy **(4 hours)**

Typical jobs that may be made in this practice module:

- A simple job of making a square rod from a round bar or like.

Machine shop **(8 hours)**

Typical jobs that may be made in this practice module:

- To make a pin from a mild steel rod in a lathe.
- To make rectangular and vee slot in a block of cast iron or mild steel in a shaping and / or milling machine.

Additive manufacturing **(4 Hours)**

Typical jobs that may be made in this practice module:

- Prepare a simple component by 3D printing

Electrical & Electronics I **(4 hours)**

- Familiarization with LT switchgear elements, making its sketches and noting down its specification. Kitkat fuse, Glass cartridge fuse, Plastic fuse holders (optional), Iron clad isolators, MCB style isolators, Single phase MCB, Single-phase wire, wiring cable.
- Demonstration of domestic wiring involving two MCB, two piano key switches, one incandescent lamp, one LED lamp and plug point.
- Simple wiring exercise to be executed to understand the basic electrical circuit.

Laboratory Outcomes

- Upon completion of this laboratory course, students will be able to fabricate components with their own hands.
- They will also get practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.
- By assembling different components, they will be able to produce small devices of their interest.

Learning Resources:

1. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of WorkshopTechnology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.

2. Kalpakjian S. and Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition,Pearson Education India Edition, 2002.

3. Gowri P. Hariharan and A. Suresh Babu,"Manufacturing Technology – I" Pearson Education, 2008.

4. Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.

5. Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGrawHill House, 2017.

First Year 1st Semester Curriculum Structure for B.Tech Course

English Communicationand Public Speaking Skills I

(Laboratory)

Course code		**HSMC 191**				
Category		Humanities Course				
Course title		**English Communication and Public Speaking Skills I Laboratory**				
Scheme and Credits	**L**	**T**	**P**	**S**	**Credits**	Semester-I
	0	**0**	**2**	**0**	**1**	

Pre requisites: Language Acquisition model, Technological aids for language simulation, Hands-on Training and practice

Course Objective:

- To enable students acquire English and the skill of communication through hands on training and mock sessions so that they can perform well in the job market.

Expected Course Outcome:

- The course will facilitate students to understand the codes and conducts of Business communication.
- It will help students acquire proper body language, speaking nuances in order to become industry ready.
- It will enable students experience real-life interview situations through various simulation based lab experiments.
- It will help in students' brain storming through various real-life situations. Enabling leadership qualities through mock-interview, telephonic conversations and group communication amongst students.

Topics	Assignments	Days	Recommended Text Book	Virtual Lab

1. Development of Listening skills	1. Casual and academic listening (Text Book, Chap 11)	Day 1	A Manual For English Language laboratory by D. Sudha Rani, Pearson Publication, 2011 Edition	smartSTEMLearning App
	2. Listening to Speeches and evaluating them(Text Book, Chap 11)	Day 2		smartSTEMLearning App
2. Hands on Practice of Reading Skills and its sub skills	1. Skimming and scanning, extensive reading, newspaper reading (Text Book, Chap 7)	Day 3	English Language Laboratories: A Comprehensive Manual by Nira Konar, PHI Publication, 2nd Edition	smartSTEMLearning App
	2. Reading non/technical passage, graphics, diagrams etc. (Text Book, Chap 7)	Day 4		smartSTEMLearning App
3.Creative Writing Skills	1. Creative writing (Text Book, Chap 1)	Day 5	English Language Laboratories: A Comprehensive Manual by Nira Konar, PHI Publication, 2nd Edition	smartSTEMLearning App
	2. Writing a piece of Fiction(Text Book, Chap 1)	Day 6		smartSTEMLearning App
	3. Dialogues writing on day-to-day situation(Text Book, Chap 1)	Day 7		smartSTEMLearning App
4. Acquiring Speaking Skills	1. Storytelling (Text Book, Chap 4)	Day 8	English Language Laboratories: A Comprehensive Manual by Nira Konar, PHI Publication, 2nd Edition	smartSTEMLearning App
	2. Discussion about current affairs, mock job/ placement interviews. (Text Book, Chap 5)	Day 9		smartSTEMLearning App

5. Public speaking skills	1. Introducing Oneself (Text Book, Chap 5)	Day 10 Day 11	English Language Laboratories: A Comprehensive Manual by Nira Konar, PHI Publication, 2nd Edition	smartSTEMLearning App
	2. Impromptu speech Delivery (Text Book, Chap 5)			smartSTEMLearning App
6.Leadership Skill Development	1. Strategies for making and working in a group (Text Book, Chap 5)	Day 12	A Manual For English Language laboratory by D. Sudha Rani, Pearson Publication, 2011 Edition	smartSTEMLearning App
	2. Features of a group leader (Text Book, Chap 5)			smartSTEMLearning App
7.Life Skill Acquisition	Acquiring Decision-making and problem-solving ability, Acquiring Creative thinking and Critical thinking, Acquiring Assertiveness and Self-Control, Influencing others(Text Book, Chap 2, Chap 7)	Day 13	English Language Laboratories: A Comprehensive Manual by Nira Konar, PHI Publication, 2nd Edition	smartSTEMLearning App
8.Soft Skill Acquisition	1. Business Etiquette, Formal approach in work field, Codes of Conduct, Body Language, Non-verbal techniques of Communication (Text Book, Chap 2)	Day 14	English Language Laboratories: A Comprehensive Manual by Nira Konar, PHI Publication, 2nd Edition	smartSTEMLearning App

	2.Developing Intra and Interpersonal Skills through practice, Acquiring Business attributes (Text Book, Chap 2)	Day 15		smartSTEMLearning App

Textbooks and links:

1. *English Language Laboratories: A Comprehensive Manual by Nira Konar, PHI Publication, 2nd Edition*
2. *A Manual For English Language laboratory by D. Sudha Rani, Pearson Publication, 2011 Edition*
3. *https://play.google.com/store/apps/details?id=com.iemlabs.smartstemlearning*

First Year 1st Semester Curriculum Structure for B.Tech Course

Subject Code : ESC 194	**Category** : Engineering Science Courses
Subject Name : Engineering Drawing, 3D Design	**Semester** : First
L-T-P : **0-0-2**	**Credit:1**
Pre-Requisites: Basic Knowledge of Geometry	

Course Objective:

a. Learn to sketch and take field dimensions.
b. Learn to take data and transform it into graphic drawings.
c. Learn basic Auto Cad skills.
d. Learn basic engineering drawing formats
e. Learn isometric and sectional views.
f. Learn graphic drawings of combine regular solid.
g. Learn basic engineering drawing formats
h. Learn basic Auto Cad based design project.

Course Content:

1	Introduction To Engineering Drawing:	Conduction mode	Contact Hour
	Principles of engineering graphics, significance & applications	Manual/ AutoCAD	6
	Different types of lines, Dimensioning, Construction of different scales, Construction of different polygons		
	Basics of AutoCAD as drawing tool [Demonstrating knowledge of the theory of CAD software, software installation, The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension) Text command etc.		
2.	Curves & Conic Sections	Manual/ AutoCAD	6
	Engineering curve: Cycloid, Epicycloid, Involute etc. Different conic section such as ellipse, parabola, hyperbola etc.		
3	Projection Of Points, Line And Planes:	Manual/ AutoCAD	4
	Projection of Points, Line, Rectangular plane, Pentagonal plane, Hexagonal plane		
4	Projection Of Regular Solids	Manual/ AutoCAD	6
	Orthographic projection(F.V., T.V, S.V.) of solids like cube, Pyramid, Prism, Cylinder, cone in 1st angle and 3rd angle projection 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,		
5	Isometric Projections**:**	Manual/ AutoCAD	6
	Drawing Isometric scale, Isometric circle and hexagon. Drawing Isometric view of cylinder and cone system on a cone and pyramid		
	Isometric views of lines, plane, and simple and compound solidsfrom orthographic projection		

6	Sections And Sectional View Of Right Angular Solids	Manual/ AutoCAD	6
	Development of surfaces of right regular solid- Prism, Pyramid, Cylinder and Cone. Sectional view of truncated cone, prism, pyramid, and cylinder with true shape of section.		
	Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface using AutoCAD		
7	Combination Of Regular Solids, Floor Plans, Annotations & Other Functions	Manual/AutoCAD/ TinkerCAD	6
	Regular solids in mutual contact with each other like Spheres in contact with cones standing on their base. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.		
	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 modelling of parts and assemblies. Parametric and non-parametric solid, surface, and wireframe models. Planar projection theory, including sketching of perspective, isometric, multi-view, auxiliary, and section views.		
8	**Demonstration Of A Simple Team Design Project**	Manual/ AutoCAD/ TinkerCAD	4
	Creation of engineering models and their presentation in standard 2D blueprint form and as 3D model using solid modelling software; meshed topologies for engineering analysis and tool-path generation for component manufacture; assembly drawing; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling(BIM).		

Course Outcomes

The student will learn:

- Introduction to engineering design and its place in society

- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modelling

General Instructions

1. In every topic some problems are to be done in the class (online / offline) and some are to be given to students as home assignment.
2. The problems for class work are to be prepared on drawing sheet of A1 size in the class/ usingAutoCAD software.
3. The problems for home assignments are to be prepared on drawing copy/ using AutoCAD software.
4. Print out of every assignment is to be taken for CAD Drawings on Drawing sheets (A4 Sheets).
5. A title block must be prepared in each sheet/ assignment.

Following is the list of drawing instruments that required for making engineering drawings on paper with perfection.

1. Drawing Board
2. Mini drafter/ Set-squares (45°–45° & 60°–90°), T-square
3. Protractor (180°, 360°)
4. Scales (Plain, Diagonal), roller scale
5. Compass (Small and Large)
6. Divider (Small and Large)
7. French Curves, flexible curves
8. Drawing paper (A1 Size)
9. Drawing pencil (H, 2H, HB)
10. Sharpener
11. Eraser
12. Drawing pins & clips
13. Duster or handkerchief etc.

Following gadgets and software are required for digital class.

1. Desktop / Laptop with at least 4GB RAM
2. AutoCAD Software

3. TinkerCAD Software

Learning Resources:

1. Pradeep Jain, AnkitaMaheswari, A.P. Gautam, Engineering Graphics & Design, Khanna PublishingHouse

2. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication

4. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education

5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

6. Corresponding set of CAD Software Theory and User Manuals

First Year 1st Semester Curriculum Structure for B.Tech Course

Department Program Course Code Title of Course Year of Study Semester	BSH B. Tech. BSC192 **Chemistry Lab** (Laboratory) First Year First
Contact Hours Credits (Theory+Laboratory) Type of course (theory, tutorial, seminar, project, etc.), Class/Laboratory/Tutorial schedule Duration Total Lecture Hours	L-T-P: 0-0-2 Credit – 2 Laboratory 2 hours Lecture One Semester 30
Pre-requisites Courses	Basic knowledge of 12th standard Chemistry Basic concepts of qualitative and quantitative analysis Basic knowledge of algebraic calculation and graph plot.
Course Outcome	Upon successful completion of this course, students should be able to: BSC192/292.1: apply their knowledge in testing the quality of water samples like alkalinity, hardness, dissolved oxygen and chloride estimation.

	BSC192/292.2: apply the knowledge in finding Lab scale and industrial useful environmental parameters like Chemical Oxygen Demand (COD) BSC192/292.3: operate the instruments properly, record and interpret data. BSC192/292.4: work effectively in teams to accomplish the assigned responsibilities.

SOFTWARE MODE: Amrita Virtual lab /Simulator base lab (Theory, observation table, result)
Google Classroom (Practical and assignment submission)

1. **Determination of the concentration of strong acid by standardised NaOH solution.**
   http://chemcollective.org/activities/autograded/124
2. **Determination of the alkalinity present in water.**
   http://vlab.amrita.edu/?sub=2&brch=193&sim=1548&cnt=1
3. **Determination of the hardness of water present in the given sample of water.**
   http://vlab.amrita.edu/?sub=2&brch=193&sim=1548&cnt=1
4. **Determination of pH of different types of water by digital pHmeter.**
   http://vlab.amrita.edu/?sub=2&brch=193&sim=575&cnt=1
5. **Determination of the pH Scale by the Method of Successive Dilutions .**
   http://chemcollective.org/vlab/100
6. **pH metric titration for determination of strength of a given HCL solution against a standard NaOH solution.**
7. **Determination of the conductance of a given sample of water by digital conductivity meter.**

   http://vlab.amrita.edu/?sub=2&brch=193&sim=575&cnt=1
8. **Conductometric titration for determination of the strength of a given HCL solution by titration against a standard NaOH solution**
9. **Determination of cell constant of KCl and conductance of HCl by digital conductivity meter.**
10. **Heterogeneous equilibrium (Determination of partition coefficient of acetic acid b/w n-butanol and water)**

11. **Determination of dissolved oxygen present in a given water sample.**

12. **Determination of the Chemical Oxygen Demand by titration.**

http://vlab.amrita.edu/?sub=2&brch=193&sim=1548&cnt=1

13. **Determination of the viscosity of solution by viscometer.**
http://vlab.amrita.edu/?sub=2&brch=190&sim=339&cnt=1

14. **To determine chloride ion in a given water sample by Argentometric method(using chromate indicator solution)**

http://vlabs.iitb.ac.in/vlabs-dev/labs/nitk_labs/Environmental_Engineering_1/labs/determination-of-chloride-nitk/simulation.html

First Year 1st Semester Curriculum Structure for B.Tech Course

Course Code: ESC192	**Category:** Engineering Science
Course Title: Basic Electronics Engineering Lab	**Semester :** First
L-T-P: 0-0-2	**Credit:** 1
Pre-Requisites: Basic Physics	

Course Objective:

COE1: To get practical experience with the different components used by Electronics Engineers.

COE2: To get practical experience of the basic characteristics of different semiconductors, diode, transistor and to be able to apply this knowledge in various other applications.

COE3: To learn hand on experience such that students can design basic electronics circuits.

Detailed Syllabus:

Module No.	Description	Lecture Hours
1	Identifying and study of different components like resistor, capacitors, and to determine the stated value of the resistor using color code	3
2	Study of different instruments used in the laboratories like, power supply, Oscilloscope, Multi-meter etc.	3
3	CHARACTERISTICS OF PN JUNCTION DIODE: a) To Plot the Volt Ampere Characteristics of PN Junction Diode under Forward and Reverse BiasConditions. b) To find the Cut-in voltage, Static Resistance, Dynamic Resistance for Forward Bias & Reverse Bias	3
4	Characteristics Of Zener Diode & Load Regulation: a) To Obtain the Forward Bias and Reverse Bias characteristics of a Zener diode. b)Find out the Zener Break down Voltage from theCharacteristics. c) To Obtain the Load Regulation Characteristics.	3
5	Study of ripple characteristic of half wave and full wave rectifier	3
6	To study and plot the Input and Output characteristics of a BJT-Common Base Configuration	3
7	To study and plot the Input and Output characteristics of a BJT-Common Emitter Configuration	3
8	To study the characteristics of JFET	3

9	To study the characteristics of MOSFET	3
10	To study the operation of inverting amplifier and non-inverting operational amplifier	3
	Total	30

First Year 1st Semester Curriculum Structure for B.Tech Course

Course Code: ESC 191	**Category:** Engineering Science
Course Title: Basic Electrical Engineering Lab	**Semester :** First
L-T-P: 0-0-2	**Credit:** 1
Pre-Requisites: Basic Physics	

Course Objective:

COE1: To learn how we can connect the different elements (like resistance) series and parallel in breadboard.

COE2: Tolearn the practical verification of the network theorem with the theoretical results

COE3: Observe the speed variation of the DC motor by the resistance of the armature and field

COE4: To verify the open circuit and short circuit results and got the idea about the core loss and copper loss of the single phase transformer

Detailed Syllabus:

Module No.	Description	Lecture Hours
1	Design R-L-C series circuit set the input voltage 9V and resistance R=100Ω.Note down the voltage and current of the circuit. Determine the power factor and impedance of the circuit.	3
2	Design R-L-C parallel circuit set the input voltage 6V and resistance R=70Ω.Note down the voltage and current of the circuit. Determine the power factor and impedance of the circuit.	3
3	Verification of Thevenin's Theorem in breadboard	3
4	Verification of Norton's Theorem in breadboard	3
5	Verification of Superposition Theorem in breadboard	3
6	Verification of Maximum power Transfer Theorem in breadboard	3
7	The open circuit and short circuit tests on a 1kVA,55/220 V,50Hz,single phase transformer. Perform open circuit and short circuit test. I. Determine the parameters of the equivalent circuit. II. Draw the equivalent circuit refer to the LV side	3
8	a) In Speed control of DC shunt motor set the value of Armature current(Ia) 2.9A and field current(If) fixed. Draw the characteristics between armature voltage and speed of the motor. b) For the same experiment set the value of armature voltage (Va)100V and armature current(Ia) constant. Draw the characteristics between field current (If) and speed of the motor.	3
9	In no load characteristics of DC shunt generator driven at 400 RPM. Vary the voltage of Field current and also note down armature voltage at each step. Draw the no load characteristics of generator.	3
10	Two wattmeter are connected to measure power in 3-phase circuit. Set the supply variac such a way that one wattmeter showing 1Kw and note down the value of	3

	other wattmeter reading. Determine the value of power factor and reactive power of the network.	
11	a)In Speed control of DC shunt motor set the value of Armature current(Ia) 2.5A and field current(If) fixed. Draw the characteristics between armature voltage and speed of the motor. b)For the same experiment set th e value of armature voltage(Va)120V and armature current(Ia) constant. Draw the characteristics between field current(If) and speed of the motor	3
Total		33

First Year 1st/ 2nd Semester Curriculum Structure for B.Tech Course

Course Code: HSMC 102	**Category: Basic Science Courses**
Course Title: Essential Studies For Professional- I	**Semester: First/ Second**
	Credit: 2
Pre-Requisites: Basic & fundamental knowledge of mathematics up to class 10th standard , Logical & Analytical skill.	

Detailed syllabus :-

Module-1

Quantitative Aptitude

1) Quant foundation- Vedic Maths& Collective tricks.

2) Basic Multiplication – multiplying by numbers ending in zeroes, Multiplying by 2,3,4,5,6,7,8,9, 11,12 & 111.Multiplying 2 digits numbers ending in 9 & whose tens digit at to 10,Multiplying by 2 digits number of 9, multiplying by any 2 digit numbers ending in 9

3) Division- Divisibility by 2,3,4,5,6,7,8, 9, 11 & 13; Dividing by 5,9, 15,25,125,Dividing by Factors.

4) Squaring numbers- squaring any 2 digit numbers ending in 5, squaring any number ending in 5,squaring any 3 digit numbers ending with 25, squaring any numbers ending in 9, squaring any numbers consisting only nines. Squaring any 2 digit numbers. Cube & cube roots.

5) Percentage- Basic concept of percentage & it's shortcut rules & their applications.

6) Ratio- Basic concept of Ratio & Proportion, Shortcut tricks & their applications.

7) Simple equation- Linear equation of 2 & more than two variables.

8) Variation- Ratio , Proportion, Variation, concept of directly proportional &

9) Partnership – concept, rules & Applications, Percentage Advanced problems & shortcuts.

10) Profit & Loss- Basic concept, formulae, shortcut tricks & their Application.

Module-2

Logical Mental ability -1

1) Coding And Decoding & Direction Sense

a) Conditional Coding, b) Word-Pattern Coding, c) Chinese Coding, d) Direction Sense Test,

e) Direction Distance Test, f) Shadow based Questions

2) Series & Numbers

a)Alphabet Series, b)Random Series, c)Number Series, d)Letter Gap, e)Missing Number Series, f)Series Completion, g)Order And Ranking, h)Interchange, i)Comparison

3) Blood Relations

Family Tree Questions, Indication Type BR, Coding Blood Relations, Miscellaneous Blood Relations

4) Analogy

Word Analogy, Classification, Odd-Out

Outcome:

i. Students will learn advance tricky approach for solving Quantitative Aptitude questions.
ii. It will enhance students skill to appear in various aptitude test within limited time constrain.
iii. This module will enhance students Analytical skill & will also improve quick decision making skill.
iv. Students can prepare various competitive exams and different placement aptitude test as well.
v. Good analytical skill and sound knowledge in analogies will also enhance student's interview facing skill.

Ref Books:

1. Fast Track Arithmetic- Rajesh Verma
2. Verbal & non verbal reasoning- R.S Agarwal
3. Quantitative Aptitude- R.S Agarwal
4. Analytical Reasoning –Peeyush Bhardwaj