Semester 1 (Group A) (B.Tech. 1st Year, 2020 Batch)							
Type of Course Course Course Code			L	T	P	S	Tota l Cont act Hou rs
Theory Papers							
Basic Science Course	BSC101	Physics	4	0	0	0	4
Basic Science Course	BSC103	Mathematics and Statistics- I	3	0	0	0	3
Engineering Science Course	ESC101	Basic Electrical Engineering	2	0	0	0	2
Humanities and social sciences including Management	HSMC10	English Communication and Public Speaking Skills-I	2	0	0	0	2
Humanities and social sciences including Management	HSMC10 2	Essential Studies for Professionals - I	2	0	0	0	2
Total Credit Points of Theory		13	0	0	0	13	
Practical Papers							
Basic Science Course	BSC191	Physics Lab	0	0	2	0	2
Engineering Science Course	ESC191	Basic Electrical Engineering Lab	0	0	2	0	2
Engineering Science Course	ESC193	Workshop & Manufacturing Practices - I	0	0	2	0	2
Humanities and social sciences including Management	HSMC19	English Communication and Public Speaking Skills - I Lab	0	0	2	0	2
Total C	redit Points	of Practical	0	0	8	0	8
		Sessional Papers		•	1	ı	
Engineering Science Course	ESC181	Computer Programming and Problem Solving using Python and C - I	0	0	0	5	5
2 Humanities and social sciences HSMC18 Skill Development for including 2 Professionals – I Management		0	0	0	2	2	
							7
		MOOCs		<u> </u>	<u> </u>		
MOOCs	MOOC10	Economics, Finance and Entrepreneurship Skills - I	0	0	0	1	1
	Basic Science Course Engineering Science Course Humanities and social sciences including Management Humanities and social sciences including Management Basic Science Course Engineering Science Course Engineering Science Course Humanities and social sciences including Management Total C Engineering Science Course Humanities and social sciences including Management Total C	Basic Science Course Basic Science Course Course Course Engineering Science Course Humanities and social sciences including Management Humanities and social sciences including Management Basic Science Course Engineering Science Course Engineering Science Course Engineering Science Course Humanities and social sciences including HSMC10 2 BSC191 ESC191 Engineering Science Course Humanities and social sciences including Management Fotal Credit Points Total Credit Points Total Credit Points	Type of Course Code Theory Papers Basic Science Course BSC101 Basic Science Course Engineering Science Course Humanities and social sciences including Management Humanities and social sciences including Management Humanities and social sciences including Management Humanities and social sciences including Management Humanities and social sciences including Management Fortal Credit Points of Professionals Engineering Science Course Engineering Science Course Engineering Science Course Humanities and social sciences including Management Fortal Credit Points of Practical Engineering Science Course Engineering Science Course Humanities and social sciences including Management Fortal Credit Points of Practical Engineering Science Course Engineering Science Course Fortal Credit Points of Practical Engineering Science Course Engineering Science Course Fortal Credit Points of Practical Engineering Science Course Engineering Science Course Engineering Science Course Fortal Credit Points of Practical Engineering Science Course Fortal Credit Points of Practical Engineering Science Course Fortal Credit Points of Practical Sessional Papers Computer Programming and Problem Solving using Python and C - 1 Humanities and social sciences including Adnagement Fortal Credit Points of Sessional Fortal Credit Points of Sessional MOOCs MOOCs	Type of Course Code Course Code Theory Papers Basic Science Course BSC101 Basic Science Course BSC103 Basic Electrical Engineering Course Humanities and social sciences including Management Humanities and social sciences including Management HSMC10 English Communication and Public Speaking Skills-I HSMC10 English Communication and Public Speaking Skills-I Fractical Papers Basic Science Course BSC191 Basic Electrical Engineering 1 Total Credit Points of Theory 13 Practical Papers Basic Science Course Engineering Science Course Engineering Science Course Humanities and social sciences including Management Fotal Credit Points of Practical Engineering Science Course ESC191 Basic Electrical Engineering Lab O Basic Electrical Engineering Lab O Engineering Science Course ESC191 Basic Electrical Engineering Lab O Engineering Science Course ESC191 Basic Electrical Engineering Lab O Engineering Science Course ESC191 Basic Electrical Engineering Lab O Engineering Science Course ESC191 Basic Electrical Engineering Lab O Engineering Science Course ESC191 Basic Electrical Engineering Lab O English Communication and Public Speaking Skills - I Lab Problem Solving using Python and C - I Humanities and social sciences including Management HSMC18 Skill Development for Professionals - I Total Credit Points of Sessional Total Credit Points of Sessional MOOCs MOOCs MOOC10 Economics, Finance and	Theory Papers Basic Science Course BSC101 Physics 4 0 Basic Science Course BSC103 Mathematics and Statistics- 1 3 0 Engineering Science Course Humanities and social sciences including Management Humanities and social sciences including Management HSMC10 Essential Studies for Professionals - 1 Total Credit Points of Theory Engineering Science Course BSC191 Basic Electrical Engineering 2 0 Practical Papers Basic Science Course BSC191 Physics Lab 0 0 Engineering Science Course BSC191 Basic Electrical Engineering Lab 0 0 Engineering Science Course BSC191 Basic Electrical Engineering Lab 0 0 Engineering Science Course Humanities and social sciences including Management Total Credit Points of Practical Engineering Science Course HSMC19 English Communication and Public Speaking Skills - 1 Lab Management Total Credit Points of Practical Engineering Science Course ESC181 Computer Programming and Problem Solving using Python and C - 1 Humanities and social sciences including Management Total Credit Points of Sessional HSMC18 Skill Development for professionals - 1 Total Credit Points of Sessional MOOCs MOOCs MOOC10 Economics, Finance and 0 0 0	Type of Course BSC101 Physics 4 0 0 0 0 0 0 0 0 0	Type of Course Co

2	MOOCs	MOOC10	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)								
SI No	Type of Course	Course Code	Course Name	L	Т	P	S	Total Cont act Hour s	Credi t Point s
			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	HSMC10	English Communication and Public Speaking Skills-I	2	0	0	0	2	2
5	Humanities and social sciences including Management	HSMC10	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
	Tota	al Credit Poin	ts 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						7	7	3.5
	MOOCs								
1	МООС	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	2	2	2
_	Total Credit Points of Semester 14 0 8 8 30 22.5						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,	Theory
project, etc.),	
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.

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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
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	Text Book as per	No.
		No	Syllabus	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	5	Theory and problems of Vector analysis –Murray R Spiegel, Schaum's outline series, McGraw-Hill book Company, SI (metric) edition	5L
	Classical Mechanics: Constrained Motion, Discrete and Continuous Systems, Rigid and Elastic Bodies, Degrees of Freedom, Constraints- Holonomic and Non-Holonomic Constraints	7	Theory and problems of Theoretical Mechanics by Murray R. Spiegel SI(Metric) edition)	
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

	[1
	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	Interference:	9, 12,	A textbook on Optics,	10L
Optics	Applications- Young's	13	B. Ghosh and K.G.	
	Double Slit Experiment: width of interference		Majumder, Sreedhar Publishers, fifth edition	
	fringes and Newton's rings		ruonshers, mui edition	
	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,			
	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,			

	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	7, 8	Introduction to Electrodynamics by David J. Griffiths 3 rd Edition	6L
	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.			
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,	5	(Published by McGraw-Hill	6L
	Expectation Values, Operators, Schrodinger's Equation: Steady State Form, Particle in a Box, Finite Potential Well,			
	Tunnel Effect			
	Statistical Distributions (Three different kinds) , Maxwell Boltzmann		(Concepts of Modern Physics (Sixth Edition) by	
Module 7: Statistical Mechanics	Statistics (Classical particles such as gas molecules obey them), Molecular energies in an ideal gas(Average molecular energy), Equipartition of Energy, Distribution of	9	Arthur Beiser (Published by McGraw-Hill))	4L
	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			

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	Introduction to Electrodynamics by David J. Griffiths 3rd
	Theory	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	Lectur
		e
		Hours
1	Calculus of a single variable (Differentiation):	8
	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,	

	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.	8
	Text Book: Chapter 2 of B.Basu Mallik & KrishanuDeyasi,	
3	Engineering Mathematics-1B, CengageLearning Multivariate Calculus (Differentiation):	10
	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 & Krishanu Deyasi,	
	Engineering Mathematics-1B, CengageLearning	
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, 43 rd 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 & Krishanu Deyasi, Engineering Mathematics-1B, Cengage Learning.
- 5. B.Basu Mallik & Krishanu Deyasi, 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

Course code		HS	HSMC 101					
Category		Hu	manitie	es Course				
Course title		"	English Communication & Public Speaking Skills I (Theory)					
Scheme and	L	T	T P S Credits Semester-I					
Credits	2	0	0 0 0 2					
		Co	Course contents					
			(i) English Language					
			(ii) Communication					

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

Course Objective:

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

Expected Course Outcome:

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

4. Business writing Skills	4.1 Business writing language(TB: Part 2,Chap-3) 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 10 Day 11	Model Business Letters, Emails And Other Business Documents by Shirley Taylor, Pearson Publication, 7 th Edition
	4.4Writing Enquiries, Quotations, Invoice, Tenders(TB: Part 4,Chap-9,10,11) 4.5Business Correspondences(TB: Part	Day 12	
	4,Chap-15)	13	Model Business
	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	Letters, Emails And Other Business Documents by Shirley Taylor, Pearson Publication, 7 th
5.Advanced Writing	5.2 Secretarial and Administrative Correspondence(TB: Part 5,Chap-17)	Day 15	Edition
Skills	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	
	6.1 Nathaniel Hawthorne: <i>The Birth Mark</i> (pg 19)	Day 18	The Phoenix Pick Anthology of Classic Science
6. Reading Science Fiction	6.2 Herman Melville: <i>The Bell Tower</i> (pg 37)	Day 19	Fiction Stories by Arc Manor 2008, ISBN:
	6.3 E.M. Forster: <i>The Machine Stops</i> (pg 109)	Day 20	978-1-60450-258-9 , 2 nd Edition

Textbooks:

1) Model Business Letters, Emails And Other Business Documents by Shirley Taylor, Pearson Publication, 7^{th} 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	Text Book as per syllabus	Focused branch of
	No.		Engineering
1a. Acid base, concept of pH	5,31	Engineering Chemistry,	Basic understanding
and pOH, buffer solutions, ionic		Jain and Jain, Dhanpat Rai	of chemistry required
equilibria, solubility equilibria,		Publishing Co. 17 th Edition	for all branches.
Ostwald's dilution law,			
electrolytic conductance.			
1b. 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.		

Module 2: Chemistry of Smart Materials

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

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Module 3: Organic reactions mechanism

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

Module 4: Computational Chemistry

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

Module 5: Spectroscopic techniques and applications

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

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

Module 6: Thermodynamics

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

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

First Year 1st/ 2nd Semester Curriculum Structure for B.Tech Course <u>Basic Electronics Engineering</u>

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	Description of Topic	Lecture
No.		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: To conceptualize 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
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.	Hours 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 ma effective grammatical concept of English.	thematics up to class 10 th standard,

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	L	S P Credits Semester – I				
Credits	0 1 0 0.5					
Pre-requisite s (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	Т	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,	Laboratory	
project, etc.),		
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
Course Outcome	graph plot. 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∼=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_physic s/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∼=602&cnt=1 http://vlab.amrita.edu/?sub=1&brch =74∼=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∼=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∼=360&cnt=1
6.	Determination of Planck's constant by photoelectric emission process.	http://vlab.amrita.edu/?sub=1&brch =195∼=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∼=1512&cnt=1
8	Calculation of Stefan- Boltzmann Constant using the concept of black body radiation	http://htv-au.vlabs.ac.in/heat-thermo dynamics/Black_Body_Radiation/in dex.html
9	Determination of e/m by Thomson's experiment.	Link not available Or
	Millikan oil drop experiment.	https://vlab.amrita.edu/?sub=1&brch =195∼=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∼=346&cnt=1
11	Determination the excitation potential of a given gas by Franck-Hertz experiment.	http://vlab.amrita.edu/?sub=1&brch =195∼=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∼=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:

- 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			HS	MC 19)1		
Category			Hu	Humanities Course			
Course title			Eng	English Communication and Public Speaking Skills I			
			Lal	Laboratory			
Scheme	and	L	T	P	S	Credits	Semester-I
Credits		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	Virtual Lab
			Book	

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

5. Public speaking skills	1. Introducing Oneself (Text Book, Chap 5) 2. Impromptu speech Delivery (Text Book, Chap 5)	Day 10 Day 11	English Language Laboratories: A Comprehensive Manual by Nira Konar, PHI Publication, 2 nd Edition	smartSTEMLearning App smartSTEMLearning App
6.Leadership Skill Development	1. Strategies for making and working in a group (Text Book, Chap 5) 2. Features of a group leader (Text Book, Chap 5)	Day 12	A Manual For English Language laboratory by D. Sudha Rani, Pearson Publication, 2011 Edition	smartSTEMLearning App 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, 2 nd Edition	smartSTEMLearning App
8.Soft Skill	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, 2 nd Edition	smartSTEMLearning App
Acquisition				

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

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	Semester : First		
Design			
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 Different types of lines, Dimensioning, Construction of different scales, Construction of different polygons		6
	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 Engineering curve: Cycloid, Epicycloid, Involute etc. Different conic section such as ellipse, parabola, hyperbola etc.	Manual/ AutoCAD	6
3	Projection Of Points, Line And Planes: Projection of Points, Line, Rectangular plane, Pentagonal plane, Hexagonal plane	Manual/ AutoCAD	4
4	Projection Of Regular Solids 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,	Manual/ AutoCAD	6
5	Isometric Projections: 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	Manual/ AutoCAD	6

6	Sections And Sectional View Of Right Angular Solids	Manual/	
	Development of surfaces of right regular solid- Prism, Pyramid,	AutoCAD	
	Cylinder and Cone.		6
	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	Manual/Aut	6
	Functions	oCAD/	
	Regular solids in mutual contact with each other like Spheres in	TinkerCAD	
	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/	4
	Creation of engineering models and their presentation in standard	AutoCAD/ TinkerCAD	
	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).		
	macaconon to Building Information Prodoming (Birt).		

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	BSH
Program	B. Tech.
Course Code	BSC192
Title of Course	Chemistry Lab (Laboratory)
Year of Study	First Year
Semester	First
Contact Hours	L-T-P: 0-0-2
Credits (Theory+Laboratory)	Credit – 2
Type of course (theory, tutorial, seminar,	Laboratory
project, etc.),	
Class/Laboratory/Tutorial schedule	2 hours Lecture
Duration	One Semester
Total Lecture Hours	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.	3
	b) To find the Cut-in voltage, Static Resistance, Dynamic Resistance for Forward Bias & Reverse Bias	
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 the Characteristics. 	3
5	c) To Obtain the Load Regulation Characteristics. 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 $R=100\Omega$. 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 $R=70\Omega$. 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	-	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 3	
	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 the value of armature voltage(Va)120V and armature current(Ia) constant.	
	Draw the characteristics between field current(If) and	
	speed of the motor	
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 a Logical & Analytical skill.	mathematics up to class 10 th standard,

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