

B.TECH SEMESTER II

B.TECH CE 2018-2022												
SEMESTER II												
S.No.	CATEGORY	CODE	COURSE TITLE	Periods			Evaluation Scheme			Subject Total	Credit	
				L	T	P	Assign ment	TA	Total			ESE
1	Basic Science Course	BSC 103	Chemistry I	3	1	0	20	10	30	70	100	4
2	Basic Science Course	5ABSC104	Mathematics II	3	1	0	20	10	30	70	100	4
3	Engineering Science Course	ESC103	Programming for Problem Solving	3	0	0	20	10	30	70	100	3
4	Engineering Science Course	ESC104	Workshop Practice	1	0	0	20	10	30	70	100	1
5	Mandatory Course	MC101	**Environmental Science	3	0	0	20	10	30	70	100	0
6	Humanities and Social Sciences including Management courses	HSMC102	**Life Skills	2	0	0	20	10	30	70	100	0
PRACTICAL /SESSIONAL												
1	Basic Science Course	BSC103P	Chemistry I	0	0	3			30	20	50	1.5
2	Engineering Science Course	ESC103P	Programming for Problem Solving	0	0	4			30	20	50	2
3	Engineering Science Course	ESC104P	Workshop Practice	0	0	4			30	20	50	2
									TOTAL	750	17.5	

**** NOTE: Qualifying Non Credit Course**

Program: B.Tech

Semester: First

Course: Chemistry I

Course Code: BSC103

L	T	P	C
3	1	0	4

Course Objective:

The concepts developed in this course will aid in quantification of several concepts in chemistry that have been introduced at the 10+2 levels in schools. Technology is being increasingly based on the electronic, atomic and molecular level modifications.

Quantum theory is more than 100 years old and to understand phenomena at nanometer levels, one has to base the description of all chemical processes at molecular levels. The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Rationalise bulk properties and processes using thermodynamic considerations.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electronegativity.
- List major chemical reactions that are used in the synthesis of molecules.

Module I: Atomic and molecular structure (8)

Schrodinger equation. Molecular orbitals of diatomic molecules and plots of the multicentre orbitals. Equations for atomic and molecular orbitals. Energy level diagrams of diatomics. Pi-molecular orbitals of butadiene and benzene and aromaticity. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Band structure of solids and the role of doping on band structures.

Module II: Spectroscopic techniques and applications (7 lectures)

Principles of spectroscopy. Fluorescence and its applications in medicine. Vibrational and rotational spectroscopy of diatomic molecules. Applications. Nuclear magnetic resonance and magnetic resonance imaging.

Module III: Intermolecular forces and potential energy surfaces (4 lectures)

Ionic, dipolar and van Der Waals interactions. Equations of state of real gases and critical phenomena.

Module IV: Use of free energy in chemical equilibria (6 lectures)

Thermodynamic functions: energy, entropy and free energy. Estimations of entropy and free energies. Free energy and emf. Cell potentials, the Nernst equation and applications. Acid base, oxidation reduction and solubility equilibria. Water chemistry. Corrosion.

Module V: Periodic properties (6 Lectures)

Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries

Module VI: Stereochemistry (5 lectures)

Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations and symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis. Isomerism in transitional metal compounds.

Module VII: Organic reactions and synthesis of a drug molecule (4 lectures)

Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization and ring openings. Synthesis of a commonly used drug molecule.

Suggested Reading:

(i) *University chemistry, by B. H. Mahan*

(ii) *Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane*

(iii) *Fundamentals of Molecular Spectroscopy, by C. N. Banwell*

(iv) *Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan*

(v) *Physical Chemistry, by P. W. Atkins*

(vi) *Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore.*

(vii) *Engineering Chemistry by Jain & Jain.*

(viii) *Engineering Chemistry by O P Agarwal.*

Program: B.Tech
Semester: First
Course: Chemistry I Lab
Course Code: BSC103P

L	T	P	C
0	0	3	1.5

List of Laboratory Experiments/Demonstrations:

1. Determination of surface tension and viscosity
2. Thin layer chromatography
3. Ion exchange column for removal of hardness of water
4. Determination of chloride content of water
5. Colligative properties using freezing point depression
6. Determination of the rate constant of a reaction
7. Determination of cell constant and conductance of solutions
8. Potentiometry - determination of redox potentials and emfs.
9. Synthesis of a polymer/drug
10. Saponification/acid value of an oil
11. Chemical analysis of a salt
12. Lattice structures and packing of spheres
13. Models of potential energy surfaces
14. Chemical oscillations- Iodine clock reaction
15. Estimation of HCl solution supplied titrating it against N/10 HCl solution.
16. Adsorption of acetic acid by charcoal
17. Use of the capillary viscosimeters to demonstrate the isoelectric point as the pH of minimum viscosity for gelatin in solutions and/or coagulation of the white part of egg

Program: B.Tech

Semester: Second

Course: Mathematics II

Course Code: 5ABSC104

L	T	P	C
3	1	0	4

Course Objective:

The objective of this course is to familiarize the prospective engineers with techniques in vector calculus, ordinary and partial differential equations. It aims to equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

The students will learn:

- The tool of power series for learning advanced Engineering Mathematics
- The mathematical tools needed in evaluating vector space.
- The effective mathematical tools for the solutions of differential equations that model physical processes.

Module 1: First order ordinary differential equations:

Exact, linear and Bernoulli's equations, Euler's equations, Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.

Module 2: Ordinary differential equations of higher orders:

Second order linear differential equations with variable coefficients, method of variation of parameters, Cauchy-Euler equation.

Module 3: Power series

Power series solutions; Legendre polynomials, Bessel functions of the first kind and their properties.

Module 4: Partial Differential Equations

Definition of Partial Differential Equations, First order partial differential equations, solutions of first order linear PDEs; Solution to homogenous and non-homogenous linear partial differential equations of second order by complimentary function and particular integral method. Second-order linear equations and their classification, Initial and boundary conditions, D'Alembert's solution of the wave equation; Heat diffusion and vibration problems, Separation of variables method to simple problems in Cartesian coordinates.

Module 5: Vector calculus

Gradient, curl and divergence ; Scalar line integrals, vector line integrals, scalar surface integrals, vector surface integrals, Theorems of Green, Gauss and Stokes.

Suggested Readings:

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

Program: B.Tech

Semester: First

Course: Programming for Problem Solving

Course Code: ESC103

L	T	P	C
3	0	0	3

Course Objective:

The course will enable the students

- 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 root finding of function, differentiation of function and simple integration

Unit 1: Introduction to Programming (2 hrs)

Introduction to Programming (Flow chart/pseudocode, compilation etc.), Variables (including data types)

Unit 2: Arithmetic expressions and precedence (2 hrs)

Unit 3: Conditional Branching and Loops (8 hrs)

Writing and evaluation of conditionals and consequent branching, Iteration and loops

Unit 4: Arrays (6 hrs)

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

Unit 5: Basic Algorithms (6 hrs)

Searching, Basic Sorting Algorithms, Finding roots of equations, idea of time complexity

Unit 6: Function and Recursion (8 hrs)

Functions (including using built in libraries), Recursion with example programs such as Quick sort, Ackerman function etc.

Unit 7: Structure and Pointers (6 hrs)

Pointers, Structures (including self referential structures e.g., linked list, notional introduction)

Unit 8: File handling (2 hrs)

Suggested Reading:

1. *E. Balagurusamy – Programming in ANSI C, 3rd Edn. , TMH, New Delhi, 2004*
2. *Programming with C, B.S.Gottfried (TMH)*
3. *Y. Kanetkar – Let us C, 4th Edition, BPB Publication, New Delhi; 2002*
4. *The C Programming Language, B.W. Kernighan, Dennis M.Ritchie, PHI/Pearson Education*
5. *C Programming with problem solving, J.A. Jones & K. Harrow, Dreamtech Press*
6. *Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of*

Program: B.Tech

Semester: First

Course: Programming for Problem Solving

Course Code: ESC103P

L	T	P	C
0	0	4	2

Tutorial and Lab:

Tutorial 1: Problem solving using computers: Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions: Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions: Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops: Lab 4: Iterative problems e.g., sum of series

Tutorial 5: 1D Arrays: searching, sorting: Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings, memory structure: Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value: Lab 7: Simple functions

Tutorial 8 &9: Numerical methods (Root finding, numerical differentiation, numerical integration): Lab 8 and 9: Numerical methods problems

Tutorial 10: Recursion, structure of recursive calls: Lab 10: Recursive functions

Tutorial 11: Pointers, structures and dynamic memory allocation Lab 11: Pointers and structures

Tutorial 12: File handling: Lab 12: File operations

Program: B.Tech

Semester: Second

Course: Workshop Manufacturing Practices

Course Code: ESC104

L	T	P	C
1	0	0	1

Course Objective:

- Students will be able to use their skills during their project work.
- Students will be able to understand the practical difficulties encountered in industries during assembly work.
- Students will be able to do simple electronic and electrical work throughout their career.
- Students will be able to rectify simple problems connected with fittings.
- Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.

Lectures & videos: (10 hours)

Manufacturing Methods- casting, forming, machining, joining, advanced manufacturing methods (3 lectures)

CNC machining, Additive manufacturing (1 lecture)

Fitting operations & power tools (1 lecture)

Electrical & Electronics (1 lecture)

Carpentry (1 lecture)

Plastic moulding, glass cutting (1 lecture)

Metal casting (1 lecture)

Welding (arc welding & gas welding), brazing (1 lecture)

Suggested Reading:

1. *Workshop technology* by Hajara Chaudhary
2. Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., “*Elements of Workshop Technology*”, Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
3. Kalpakjian S. And Steven S. Schmid, “*Manufacturing Engineering and Technology*”,
4. 4th edition, Pearson Education India Edition, 2002.
5. (iii)Gowri P. Hariharan and A. Suresh Babu, “*Manufacturing Technology – I*” Pearson Education, 2008.
6. Roy A. Lindberg, “*Processes and Materials of Manufacture*”, 4th edition, Prentice Hall India, 1998.
7. Rao P.N., “*Manufacturing Technology*”, Vol. I and Vol. II, Tata McGrawHill House, 2017.

Program: B.Tech

Semester: Second

Course: Workshop Manufacturing Practice Lab

Course Code: ESC104P

L	T	P	C
0	0	4	2

Workshop Practice: (60 hours)

1. Machine shop - 10 hours
2. Fitting shop - 8 hours
3. Carpentry - 6 hours
4. Electrical & Electronics - 8 hours
5. Welding shop - 8 hours (Arc welding 4 hrs + gas welding 4 hrs)
6. Casting - 8 hours
7. Smithy - 6 hours
8. Plastic moulding & Glass Cutting -6 hours

Program: B.Tech

Semester: Second

Course: Environmental Science

Course Code: MC101

L	T	P	C
3	0	0	0

Course Objective:

- Now a day all regulatory bodies have given emphasis on environmental studies to save our environmental.
- In B.Tech course students are studying environmental study because in every aspect of their studies.
- They are studying about machine or land or water or space all are the important component of environment.
- The Environmental studies are based on intellectual property right (IPRs) have become important in a biodiversity-rich country like India to protect microbes, plant and animals that have useful genetic properties. Destruction of habitats, over-use of energy resource and environmental pollution has been found to be responsible for the loss of a large number of lives.
- It is feared that a large portion of life on the earth may get wiped out in the near future.

Unit I

Multidisciplinary nature of environmental studies, Natural Resources

Definition, scope and importance need for public awareness.

Renewable and non-renewable resources:

Natural resources and associated problems.

a) Forest resources: Use and over-exploitation, deforestation, case studies.

Timber extraction, mining, dams and their effects on forest and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

Unit II

Ecosystems, Biodiversity and its conservation

- Concept of an ecosystem.
- Structure and function of an ecosystem.
- Producers, consumers and decomposers.
- Energy flow in the ecosystem.
- Ecological succession.
- Food chains, food webs and ecological pyramids.
- Introduction, types, characteristic features, structure and function of the following ecosystem:-
 - a. Forest ecosystem
 - b. Grassland ecosystem
 - c. Desert ecosystem
 - d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
- Introduction – Definition: genetic, species and ecosystem diversity.
- Bio geographical classification of India
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation
- Hot-spots of biodiversity.
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Unit III:

Environmental Pollution, Social Issues and the Environment

Definition, Cause, effects and control measures of:-

- a. Air pollution
 - b. Water pollution
 - c. Soil pollution
 - d. Marine pollution
 - e. Noise pollution
 - f. Thermal pollution
 - g. Nuclear hazards
- Solid waste Management: Causes, effects and control measures of urban and industrial wastes.
 - Role of an individual in prevention of pollution.
 - Pollution case studies.
 - Disaster management: floods, earthquake, cyclone and landslides.

- From Unsustainable to Sustainable development
- Urban problems related to energy
- Water conservation, rain water harvesting, watershed management
- Resettlement and rehabilitation of people; its problems and concerns. Case Studies
- Environmental ethics: Issues and possible solutions.
- Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust Case Studies.
- Wasteland reclamation.
- Consumerism and waste products.
- Environment Protection Act.
- Air (Prevention and Control of Pollution) Act.
- Water (Prevention and control of Pollution) Act
- Wildlife Protection Act
- Forest Conservation Act
- Issues involved in enforcement of environmental legislation.
- Public awareness.

Unit IV

Human Population and the Environment, Field work

- Population growth, variation among nations.
- Population explosion – Family Welfare Programme.
- Environment and human health.
- Human Rights.
- Value Education.
- HIV/AIDS.
- Women and Child Welfare.
- Role of Information Technology in Environment and human health.
- Case Studies.
- Visit to a local area to document environmental assets-river/forest/grassland/hill/mountain
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Suggested Reading:

1. *G. Kiely – Environmental Engineering Irwin/ McGraw Hill International Edition, 1997*
2. *M. L. Davis and S. J. Masen, Principles of Environmental Engineering and Science, McGraw Hill International Edition, 2004*

Program: B.Tech

Semester: Second

Course: Life Skills

Course Code: HSMC102

L	T	P	C
2	0	0	0

Course Objective:

The course aims to:

1. Identify and analyze the functions of grammatical categories in English, such as parts of speech and sentence elements.
2. Identify and analyze the functions of grammatical categories in English with different sentence structures and clause combinations.
3. Develop a critical approach with regards to grammatical proficiency in academic writing and develop the ability to formulate concise, correct, and well-structured English sentences.
4. Apply knowledge of English grammar when writing by recognizing and correcting errors in grammar and punctuation in their own written production as well as in that of their peers.

Unit I: Know Thyself / Discovering Self

- Introduction of the Subject, Learning Objective, Learning Outcome, Importance/ Benefit of the subject
- Know thyself/ Discovering Self, Snap shot of yourself
- Assess your Personal Traits
- Strength and Weaknesses
- Hobbies and Interest
- Etiquettes and Manners {Personal Etiquette, Professional Etiquette, Social Etiquette , Tour & Travel}

Unit II: Grammar

- The Sentence, Kinds of Sentences
- Parts Of Speech
- Article
- Verb, Kinds Of Verb, Modal Auxiliaries'
- Tense
- Voice {Active and Passive}
- Narration (Direct and Indirect Speech)
- Common Errors

Unit III: Vocabulary

- Homophones,
- Word Formation {Prefix, Suffix}
- Word Power {Antonym, Synonym}
- Word Exercise
- Degree of Comparison

- Idioms and Phrases

Unit IV: Letter Writing

- Letter Writing, the Forms of Letter,
- Classification of Letters
- Social Letters
- Letter of Application
- Official Letters/Business Letters
- Editorial Letter

Unit V: Phonetics & Phonology

BASICS OF PHONETICS

Introduction

Speech Mechanism

Phonetics Symbols

Classification of Sounds

Consonants, Vowels & Diphthongs

Stress Pattern,

USAGE OF PHONETICS

Syllable, Syllable Division, Word Syllable

Tone/ Accent/Pitch

Manner of Articulation

Voice Modulation

Suggested Books & Readings:

1. *Monippally, Matthukutty. M. 2001. Business Communication Strategies. 11th Reprint. Tata McGraw-Hill. New Delhi*
2. *Swets, Paul. W. 1983. The Art of Talking So That People Will Listen: Getting Through to Family, Friends and Business Associates. Prentice Hall Press. New York*
3. *Lewis, Norman. 1991. Word Power Made Easy. Pocket Books*
4. *Sen, Leena. Communication Skills ; Eastern Economy Edition*
5. *Ghanekar, Dr. Anjali. Essentials of Business Communication Skills ; Everest Publishing House*
6. *David Green. Contemporary English Grammar, Structure & Composition ; MacMillan*
7. *Dictionary; Oxford*
8. *Dictionary ; Longman*

Websites

- www.tatamcgrawhill.com/digital_solutions/monippally
- www.dictionary.cambridge.org
- www.wordsmith.org
- www.edufind.com
- www.english_the_easy_eay.com

- www.englishclub.com
- www.english_grammar_lessons.com