

JHARKHAND RAI UNIVERSITY



MINING ENGINEERING

B.Tech



SYLLABUS **(2020 – 2024)** SEMESTER II

Kamre | Ratu Road | Ranchi | Jharkhand

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B.TECH SEMESTER II

BATCH 2020-2024												
BTECH IN MINING ENGINEERING												
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	BSC103	Chemistry I	3	1	0	20	10	30	70	100	4
2	Basic Science Course	BSC104	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	HSMC102	**Life Skills	2	0	0	20	10	30	70	100	0
PRACTICAL /SESSIONAL												
1	Basic Science Course	BSC103P	Chemistry I Lab	0	0	3			30	20	50	1.5
2	Engineering Science Course	ESC103P	Programming for Problem Solving Lab	0	0	4			30	20	50	2
3	Engineering Science Course	ESC104P	Workshop Practice Lab	0	0	4			30	20	50	2
										TOTAL	750	17.5

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

Program: B.Tech
Semester: Second
Course: Chemistry I
Course Code: BSC103

L	T	P	C
3	1	0	4

Course Objective:

- To bring adaptability to new developments in Engineering Chemistry and to acquire the skills required to become a perfect engineer.
- To include the importance of water in industrial usage, significance of corrosion control to protect the structures, polymers and their controlled usage.
- To acquire knowledge of elements, their periodic properties and engineering materials and about fuels and batteries.
- To acquire required knowledge about few drug molecules and their synthesis and composites.
- The knowledge gained on polymer chemistry, thermodynamics, spectroscopy, stereochemistry will provide a strong platform to understand the concepts on these subjects for further learning.

Course Outcome:**After the completion of the course, student will be able to:**

- **CO 1:** Solve the conceptual questions using the knowledge gained by studying the quantum mechanical model of the atom, quantum numbers, electronic configuration, radial and angular distribution curves, shapes of s, p, and d orbitals, and periodicity in atomic radii, ionic radii, ionization energy and electron affinity of elements.
- **CO 2:** Learn about limitations of classical mechanics and solution in terms of quantum mechanics for atomic/molecular systems. Gain insight into the basic principles of UV, IR and NMR spectroscopic techniques. Use spectroscopic techniques to determine structure and stereochemistry of known and unknown compounds.
- **CO 3:** Knowledge of ideal gases and real gases, Van der Waals forces, distinguish between intramolecular forces and intermolecular forces
- **CO 4:** Use the concepts learnt to predict feasibility of chemical reactions and to study the behavior of reactions in equilibrium.
- **CO 5:** Rationalize periodic properties such as ionization potential, electro negativity, oxidation states.
- **CO 6:** Identify and differentiate prochirality and chirality at centres, axis, planes and determine the absolute configuration. Evaluate the stability of various conformers of acyclic and cyclic systems using steric, electronic and stereo electronic effects and correlate them to reactivity.
- **CO 7:** Gain insight into retro-synthesis approach in relation to drug design and drug discovery.

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: Second
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 sols and/or coagulation of the white part of egg

Program: B.Tech
Semester: Second
Course: Mathematics II
Course Code: BSC104

L	T	P	C
3	1	0	4

Course Objective:

- The subject helps the students to develop the fundamentals and basic concepts of Differential Equation. Students will be able to solve problems related to engineering applications by using these techniques.
- Apply the principles of Power series to solve a variety of practical problems in Engineering and Applied Science.
- Apply the concept of line, surface and volume integral with various theorems to solve practical problems.

Course Outcome:**After the completion of the course, student will be able to:**

- CO 1: To introduce the basic concepts required to understand, construct, solve and interpret ordinary differential equations.
- CO 2: To teach methods to solve differential equations of various types.
- CO 3: To give an idea about Power series solutions; Legendre polynomials, Bessel functions.
- CO 4: To give an ability to apply knowledge of Partial Differential equation on engineering problems.
- CO 5: Formulate and solve problems related to vector calculus in the field of Industrial Organization Engineering.

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: Second
Course: Programming for Problem Solving
Course Code: ESC103

L	T	P	C
3	0	0	3

Course Objective:

The objective of this course is to help the students

- To impart basic knowledge about simple algorithms, fundamentals of Programming Skills particularly in C Programming Language.
- To enable how to implement conditional branching, iteration and recursion.
- To enable them to use functions, arrays, pointers, strings and structures in solving problems.
- To understand how to solve problems related to matrices, searching, sorting, use files to perform read and write operations.

Course Outcome:

After the completion of the course, student will be able to:

- **CO1:** Understand the fundamentals of computer and C programming language, along with flow chart and algorithm to solve given program.
- **CO2:** Able to choose the loops and decision-making statements to solve the problem.
- **CO3:** Gain the knowledge of function, array , pointer and structure.
- **CO4:** Learn about implementation of file Operations in C programming for a given application.

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*

Program: B.Tech
Semester: Second
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 Practice
Course Code: ESC104

L	T	P	C
1	0	0	1

Course Objective:

- Students able to understand different tool & equipment for work shop practice.
- Students acquire skills for the preparation of different Carpentry/fitting/welding models.
- Students able to understand the safety precaution in the workshop
- Student acquires skills of Application orientated tasks.

Course Outcome:**After the completion of the course, student will be able to:**

- CO 1: Understand the concepts of various manufacturing methods such as casting, forming machining.
- CO 2: Understand the additive manufacturing with its implication in manufacturing.
- CO 3: Ability to Produce Fitting jobs as per specified dimensions with the use of various fitting tools.
- CO 4: Understand the basic concepts of electrical & electronics and understand the working principle of motors.
- CO 5: Ability to understand the recyclable plastics & non-recyclable plastics and various manufacturing process & also understand the various additives & fillers used in plastics & its implications.
- CO 6: Understand the various the types of welding such as Arc welding, TIG, MIG & various advanced welding & its practical implications in industrial arena.

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 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:

- **Knowledge:** to help students, gain a variety of experiences and acquire a basic understanding of the environment and its associated problems.
- **Awareness:** to help students acquire an awareness of and sensitivity to the total environment and its allied problems.
- **Attitudes:** to help students to acquire a set of values and promote a feeling of concern for the environment and provide motivation for actively participating in environmental improvement and protection.
- **Participation:** to provide students with an opportunity to be actively involved at all levels, working towards the resolution of environmental problems.
- **Skills:** to help students to acquires the skills for identifying and solving environmental problems
- **Evaluation Ability:** to evaluate environmental measures and education programs in terms of ecological, economic, social and aesthetic factors.

Course Outcome:

After the completion of the course, student will be able to:

- **CO 1:** Articulate the interconnected and interdisciplinary nature of environmental studies; Demonstrate an integrative approach to environmental issues with a focus on sustainability
- **CO 2:** Predict the consequences of human actions on the web of life, global economy and quality of human life, develop critical thinking for shaping strategies (scientific, social, economic and legal) for environmental protection and conservation of biodiversity, social equity and sustainable development
- **CO 3:** Acquire values and attitudes towards understanding complex environmental-economic social challenges, and participating actively in solving current environmental problems and preventing the future ones
- **CO 4:** Reflect critically on their roles, responsibilities, and identities as citizens, consumers and environmental actors in a complex, interconnected world, adopt sustainability as a practice in life, society and industry.

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
3. E. Bharucha, Environmental Studies, University Grants Commission, New Delhi and Bharati Vidyapeeth Institute of Environment and Research, Pune

Program: B.Tech
Semester: Second
Course: Life Skills
Course Code: HSMC102

L	T	P	C
2	0	0	0

Course Objective:

The objectives of the course are:

- To familiarize students with basic aspect of Life Skills and its conceptual treatment, theoretical perspectives and practical strategies.
- To equip students with the social and interpersonal skills that enable them to cope with the demands of everyday life.
- To build self-confidence, encourage critical thinking, foster independence and help people to communicate more effectively.
- To enhance one's ability to meet the challenges of everyday life.
- To develop psychosocial competency.

Course Outcome:

After the completion of the course, student will be able to:

- CO 1: To develop Personal, Social and Professional Competency.
- CO 2: Gain Intellectual Competency.
- CO 3: Develop effective communication skills and practice effective written and oral communication
- CO 4: Develop wellness skills.
- CO 5: Develop life and career path.
- CO 6: Understand and develop professionalism and self responsibility.

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