

CHAROTAR UNIVERSITY OF SCIENCE & TECHNOLOGY



CHAROTAR INSTITUTE OF TECHNOLOGY - CHANGA
(FACULTY OF TECHNOLOGY & ENGINEERING)

Bachelor of Technology
First Year Syllabus

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DEPARTMENT OF CIVIL ENGINEERING

CL101: FUNDAMENTALS OF CIVIL ENGINEERING

B TECH 1ST SEMESTER (EC/ME/CL) | B TECH 2ND SEMESTER (CE/IT/EE)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	3	2	5	4
Marks	100	50	150	

A. Objective of the Course:

The main objective to give the course fundamentals of civil engineering is

- To satisfy the technical requirement of understanding various principles associated with civil engineering.
- To make the students persuade the civil engineering works that is an integral part of very engineering professional's life irrespective of the discipline.
- To give a broad perspective to the students to identify the oldest branch of engineering providing basic infrastructure for development.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Introduction to civil engineering	04
2.	Surveying	18
3.	Elements of building construction	12
4.	Water resources development	06
5.	Transportation engineering	05

Total hours (Theory): 45 Hrs

Total hours (Lab): 30 Hrs.

Total hours: 75 Hrs

C. Detailed Syllabus:

1.	Introduction to civil engineering	04 hours	08 %
1.1	Civil engineering and basic human needs, Role of Civil Engineer		2 hr
1.2	Branches of civil engineering		2 hr
2.	Surveying	18 hours	40 %
2.1	Introduction: Surveying and leveling, Object and uses, Primary divisions, Fundamental principles, Classification of surveying, Plans and maps, Scales, Units of measure, Conventional symbols		2 hrs
2.2	Linear measurements: Methods, Instruments used in chaining, Chain surveying, Ranging; Obstacles, Errors in chaining, Tape corrections		3 hrs
2.3	Compass surveying: Types and uses of compass, Bearings, Whole Circle Bearings, and Reduced Bearings, Computation of angles, Meridians; declinations and dip of needle, Local attraction		5 hrs
2.4	Elevation measurements: Levelling - object and uses, Terms used in leveling, Leveling		4 hrs
2.5	Modern Tools of Surveying and Mapping: Introduction to Theodolite, Total Station, Global Positioning System, Remote Sensing and Geographic Information System		4 hrs
3.	Elements of building construction	12 hours	26%
3.1	Planning:		6 hrs

Elementary principles and basic requirements of a building planning, Elements of building drawing, Layout and drawing of residential & industrial buildings, Foundation plan, Electrical installation plan			
3.2 Construction: Classification of buildings based upon occupancy and structure, Design Loads, Common building components their functions and nominal dimensions, Building byelaws		6 hrs	
4.	Water resources development	06 hours	14 %
4.1	Introduction to Hydrology		1 hr
4.2	Sources of water		1 hr
4.3	Water requirements, water conservation		2 hr
4.4	Water Conveyance System		2 hr
5.	Transportation engineering	05 hours	12%
5.1	Role of Transportation in National development		1 hr
5.2	Elements of Traffic Engineering, Suitability and requirement of different Transportation systems		1 hr
5.3	Introduction to Railway engineering		1 hr
5.4	BOT Projects, Traffic Control		2 hr

D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations, black board – mix of both.
- Assignments based on above course content will be given to the students at the end of each chapter. Each assignment contains minimum 5 questions.
- Quizzes and Surprise tests will be conducted for testing the knowledge of students for particular topic.

E. Student Learning Outcome:

By taking this course fundamentals of civil engineering

- The students will get an overview of surveying, building planning, water resources and transportation engineering.
- The course provides an essential tool to understand the basics of civil engineering works that an engineer come across in professional as well as personal life.
- The students learn to prepare the layouts of buildings and other infrastructures, obtain understanding of the basic elements of the transportation system, techniques for water conservation, to prepare layouts of different buildings.

F. Recommended Study Material:

❖ **Text Books:**

1. Surveying Vol. I, II by Dr. B.C. Punamia
2. Building planning, designing and scheduling by Gurcharan Singh

❖ **Reference Books:**

1. Surveying Vol. I, II by Dr. B.C. Punamia
2. Surveying and Levelling Vol. I and II by T.P Kanetkar and S.V Kulkarni
3. Surveying Theory and Practice (Seventh Edition) by James M. Anderson, Edward M. Mikhail
4. Transportation Engineering & Planning by Papacostas C S
5. Irrigation Water Resources & Water Engineering by Modi P. N
6. Remote sensing and Image interpretation by T.M Lillesand,. R.W Kiefer,. And J.W Chipman 5th edition
7. Building Science and Planning by S.V.Doedhar
8. Principles of Town planning by Keeble Lewis

❖ **Reference Links/ e-content:**

1. <http://www.nptel.iitm.ac.in/courses.php?branch=Civil>
2. <http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT-ROORKEE/SURVEYING/home.htm>
3. <http://www.nptel.iitm.ac.in/video.php?courseId=1040>
4. <http://www.nptel.iitm.ac.in/video.php?courseId=1059>

DEPARTMENT OF CIVIL ENGINEERING

CL102: ENVIRONMENTAL SCIENCES

B TECH 1ST SEMESTER (EC/ME/CL) | B TECH 2ND SEMESTER (CE/IT/EE)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	3	0	3	3
Marks	100	0	100	

A. Objective of the Course:

The main objectives of the course are

- Imparting basic knowledge about environment and its problems.
- Creating awareness about environmental problems amongst people.
- Developing an attitude of concern for environment.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Introduction	07
2.	Environmental Pollution	14
3.	Ecology & Ecosystems	12
4.	Population & Natural Resources	12

Total hours (Theory): 45 Hrs

Total hours (Lab): 0 Hrs.

Total hours: 45 Hrs

C. Detailed Syllabus:

1. Introduction	07 hours	16 %
1.3 Basic definitions		1 hr
1.4 Objectives and Guiding principles of Environmental Studies		1 hr
1.5 Components of Environment		1 hr
1.6 Structures of atmosphere		1 hr
1.7 Man-Environment relationship		1 hr
1.8 Impact of Technology on the environment		2 hr
2. Environmental Pollution	14 hours	32 %
2.1. Environmental Degradation 2.2. Pollution, Sources of Pollution, 2.3. Types of Environmental Pollution 2.4. Air Pollution: Definition, Sources of Air pollution, Pollutants, Classifications of Air pollutants (common like SO _x & NO _x), Sources & Effects of common air pollutants Ambient Air Quality Standards		4 hrs
2.5. Water Pollution: Definition, Sources Water pollution, Pollutants & Classification of water pollutants, Water Quality Standards, Effects of Water Pollution, Eutrophications		4 hrs
2.6. Noise Pollution: Sources of Noise Pollution, Effects of noise pollution		3 hr
2.7. Soil Pollution Current Environmental Global issues, Global Warming & Green Houses, Effects, Acid Rain, Depletion of Ozone Layer		3 hrs

3 Ecology & Ecosystems	12 hours	26 %
3.1. Ecology- Objectives and Classification		1 hr
3.2. Concept of an ecosystem - structure & function		2 hr
3.3. Components of ecosystem - Producers, Consumers, Decomposers		1 hr
3.4. Bio-Geo- Chemical Cycles & its Environmental significance.		1 hr
3.5. Energy Flow in Ecosystem		1 hr
3.6. Food Chains: Types & Food webs		2 hr
3.7. Ecological Pyramids		2 hr
3.8. Major Ecosystems		2 hr
4 Population & Natural Resources	12 hours	26 %
4.1 Natural Resources: Renewable & Nonrenewable Resources: Renewable Resources, Nonrenewable Resources, Destruction versus Conservation		4 hrs
4.2 Water Resources: Water Resources-Indian Scenario, Water Sources- Surface & Ground, Water Sources, Uses & overuses of water resources, problems due to Overexploitation of Water Resources		2 hrs.
4.3 Forest Resources: Forest Resources - Indian Scenario , Importance of forests- Ecologically & Economically, Uses of forest products, Forest Types, Deforestations-Causes and effects, Forest Degradation in India		2 hrs.
4.4 Energy Resources: Energy Resources - Indian Scenario , Conventional Energy Sources & its		2 hrs.

problems, non-conventional energy sources-Advantages & its limitations , Problems due to Overexploitation of Energy Resources	
4.5 Demographic Studies Development of Habitation patterns and Environmental factors governing human settlement, Population & Pollution ,Demographic Projections and Population Structures	2 hrs.

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D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board work – mix of both.
- Minimum four assignments based on above Course content.

E. Students learning outcomes:

On the successful completion of the course one should be able to understand:

- The basics about environment and its related recent problems.
- Acquiring skills to help the concerned individuals in identifying and solving environmental problems.
- Motivating public to participate in environment protection & environment improvement.

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F. Recommended Study Material:

Text Books:

1. Basics of Environmental Studies by Prof. N.S. Varandani
2. Basics of Environmental Studies by Dr. J. P. Sharma

Reference Books:

1. Basics of Environmental Studies by Shefali Shah & Rupali Goyal
2. Environmental Pollution : Causes, Effects & Control by K.C Agrawal
3. Environmental Engineering & Management by Suresh K Dameja
4. Environmental Studies: R. Rajagopalan, Oxford University Press
5. Environmental Science by Richard T Wright & Bernard J Nebel
6. Environmental Science by Daniel B Botkin & Edward A Keller
7. Basics of Environmental Studies by S.G. Shah, S.G. Shah, Gopal N. Shah - Superior Publications, Vadodara.

Important Web Links:

1. http://apollo.lsc.vsc.edu/classes/met130/notes/chapter1/vert_temp_all.html
2. <http://www.epa.gov>
3. <http://www.globalwarming.org.in>
4. <http://nopr.niscair.res.in>
5. <http://www.indiaenvironmentportal.org.in>

DEPARTMENT OF CIVIL ENGINEERING

CL103: MECHANICS OF SOLIDS

B TECH IST SEMESTER (CE/IT/EE) | B TECH IIND SEMESTER (EC/ME/CL)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	4	2	6	5
Marks	100	50	150	

A. Objective of the Course:

The objectives of the course are:

- To understand the laws of mechanics and the classification of different kinds of forces subjected to different structural components, effects of different forces and their solution techniques.
- To learn the fundamental concepts of stress, strain and deformation of solids.
- To understand the mechanical properties of materials and ability to calculate normal stresses and strains in specimens subjected to axial and distributed loading.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Introduction	04
2.	Fundamental of statics	08
3.	Distributed forces, centre of gravity	06
4.	Friction	06
5.	Truss	06
6.	Introduction to dynamics	06
7.	Physical & mechanical properties of structural material	04
8.	Simple stress & strain	10
9.	Shear force & Bending moment in Beams	10

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

C. Detailed Syllabus:

1. Introduction:	04 hours	06%
1.9 Scalar and Vector Quantities		1 hr
1.10 Laws of mechanics & System of Units		1 hr
1.11 Composition and resolution of vector		1 hr
1.12 Fundamental concepts and idealization of mechanics		1 hr
2. Fundamental of static:	08 hours	14%
2.1 Force and effect of force		1 hr
2.2 Planar force system and parallel force system		1 hr
2.3 Composition and Resolution of force system		1 hrs
2.4 Equilibrant, Equilibrium of forces		1 hrs
2.5 Basic concepts of moment & couple system		2 hr
2.6 Free body diagram		1 hr
3. Distributed forces, centre of gravity:	06 hours	10%
3.1 Centre of gravity of lines, plane areas		2 hrs
3.2 Centroid of volumes and bodies		2 hr
3.3 Pappus-Guldinus theorems		2 hr
4. Friction:	06 hours	10%
4.1 Friction and its applications		2 hrs
4.2 Simple frictionless rigid body assemblies		2 hrs

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4.3 Rigid body assemblies including friction		2 hrs
5. Truss:	06 hours	10%
5.1 Classification of Truss, Perfect & Imperfect Truss		2 hrs
5.2 Analysis of pin-jointed perfect truss using method of joints & method of section		4 hrs
6. Introduction to Dynamics:	06 hours	10%
6.1 Single degree of freedom system		3 hrs
6.1 Application of single degree of freedom system		3 hrs
7. Physical and mechanical properties of structural materials:	04 hours	06%
7.1 Properties related to axial, bending and torsional & shear loading		2 hr
7.2 Ductility, Toughness, Hardness, Proof stress		1 hr
7.3 Factor of safety, working stress, load factor		1 hr
8. Simple stress and strain:	10 hours	17%
8.1 Concept of stress and strain		1 hr
8.2 Normal and shear stress, strain		1 hr
8.3 Constitutive relations for ductile and brittle materials, hooke's law		1 hr
8.4 Force and deflections for axially loaded members, tapered sections,		2 hrs
8.5 Thermal stress and strain		2 hrs
8.6 Applications to composite material stepped & tapered bars		1 hr
8.7 Elastic constants		1 hr
9. Shear force and Bending moment in Beams:	10 hours	17%

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9.1 Types of load, supports, beams	1 hr
9.2 Statically determinate beam, Support Reactions	2 hrs
9.3 Bending moment and Shear force diagrams for concentrated load and uniformly distributed load	6 hrs
9.4 Point of contra-flexure	1 hr

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D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations, black board, different charts related to topics, etc.
- Assignments based on above course content will be given to the students at the end of each chapter. Each assignment contains minimum 5 questions. Students are encouraged to attempt additional problems at the end of every chapter.
- Interactive discussions will also carry out in lecture.
- Unannounced quizzes will be planned to test the knowledge of students for particular subject.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the phenomenon being discussed in lecture.
- Minimum 8 experiments are suggested in the laboratory related to course content.

E. Students learning outcomes:

On the completion of the course:

- Students will be able to understand the laws of mechanics and their application to engineering problems.
- Students will be able to understand the fundamentals of stress/strain analysis and be able to apply them with confidence to simple structures.
- Fundamentals related to subject will be facilitated to students to design structures, predict failures and understand the physical properties of materials at higher semesters.

F. Recommended Study Material:

Text Books:

1. Mechanics of Structures Vol-1 & 2 by Junarkar S.B & Shah H.J.
2. Applied Mechanics S. B. Junnarkar & H. J. Shah
3. Engineering Mechanics (Statics & Dynamics): Beer and Johnston

Reference Books:

1. Mechanics of Materials: Beer and Johnston
2. Strength of Materials: Ryder G.H; Mcmillan
3. Mechanics of Materials: Gere & Timoshenko; CBS Publishers & Distributors, Delhi
4. Mechanics of Materials: Hibbler R C; Pearson Education
5. Strength of materials; Ramamutthram
6. Engineering Mechanics of Solids: Popov E.P; Prentice Hall of India, New Delhi

Reference Links/ e-material:

1. <http://www.nptel.iitm.ac.in/courses.php?branch=Civil>
2. <http://www.nptel.iitm.ac.in/video.php?courseId=1053>
3. <http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT-Delhi/Mechanics%20of%20Solids/index.htm>
4. <http://www.nptel.iitm.ac.in/video.php?courseId=1069>

DEPARTMENT OF COMMUNICATION SKILLS

CS 101: COMMUNICATION SKILLS – 1

B TECH 1ST SEMESTER

Credit Hours:

TEACHING SCHEME	THEORY	PRACTICAL	TOTAL
Hours/week	3	2	5
Marks	100	50	150

A. Objectives of the Course are:

- 1) To hone basic Communication Skills (LSRW) of the students by exposing them to the key communication techniques, and thereby
- 2) To improvise Comprehensional and Expressional Skills of the students required for day to day; and classroom, academic and cultural situations.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	An Introduction to Communication and Key Concepts in Communication	06
2.	Major Communication Techniques and Styles	06
3.	Listening Skills	14
4.	Presentation Skills	14
5.	Reading Skills	14
6.	Writing Skills	14
7.	Grammar and Vocabulary	07

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

C. Detailed Syllabus:

1. An Introduction to Communication and Key Concepts in Communication:	06hours	8%
1.1 An Introduction to Communication		½ hr
1.2 Basic terms, concepts, and contexts of communication		1 hr
1.3 Factors influencing message encoding, the nature of messages, and message uses and effects		1 hr
1.4 Importance, Types and Principles of Communication		2½ hrs
1.5 General Vs Technical Communication		1 hr
2. Major Communication Techniques and Styles:	06 hours	8%
2.1 Introduction to Communication styles and techniques		½ hr
2.2 Assertive Communication		1 hr
2.3 Aggressive Communication		1 hr
2.4 Passive Communication		1 hr
2.5 Passive – Aggressive Communication		1 hr
2.6 Working with different Styles		1 ½ hrs
3. Listening Skills:	14 hours	18%
3.1 Introduction to Listening		1 hr
3.2 Purpose and Types of Listening		3 hrs
3.3 Active Listening V/s Passive Listening		1 ½ hrs
3.4 Difference among Listening, Hearing and Overhearing		1 ½ hrs

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3.5 Traits of a good listener		3 hrs
3.6 Barriers to effective listening and Tips for effective listening		4 hrs
4. Presentation Skills:	14 hours	18%
4.1 Introduction to Presentation and its importance		2 hrs
4.2 Modes, Means and Purposes of Presentation		3 ½ hrs
4.3 Defining purpose, analyzing audience and organizing the contents		3 ½ hrs
4.4 Visual aids and nuances of delivery		2 ½ hrs
4.5 Body language and effective presentation		2 ½ hrs
5. Reading Skills:	14 hours	19%
5.1 An Introduction to Reading and Comprehension		1 hr
5.2 Types and Techniques - Skimming and Scanning of Reading		5 hrs
5.3 Inferencing in Reading		4 hrs
5.4 Reading data in various forms		4 hrs

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6. Writing Skills:	14 hours	19%
6.1 Introduction to Writing and Importance of effective writing		1 hr
6.2 Paragraph Development, Coherence – Topic Sentence, Supporting Sentence, Authentication, and Examples		3 ½ hrs
6.3 Letter Writing and Resume Making		4 hrs
6.4 Report Writing		2 ½ hrs
6.5 Drafting...press notes, memo, circulars, notices, telegrams, agenda, minutes etc		3 hrs
7. Grammar and Vocabulary:	07 hours	10%
8.1 Tenses and the Concept of Time		2 hrs
8.2 Active and Passive Constructions		1 hr
8.3 Direct – Indirect Speeches		1 hr
8.4 Prepositions and Conditionals		1 hr
8.5 Idioms, Confusables, One-word Substitutes, Synonyms, Antonyms		2 hrs

D. Instructional Method and Pedagogy:

- Lectures will be taken in the class room and practicals in the language lab.
- Classroom Teaching will be facilitated by Reading Material and Explanations on the Blackboard.
- Interpersonal Activities such as group discussions, role plays, simulations, just a minute sessions and presentations will be the focused activities in the Lab. They will be facilitated by an extensive use of multi-media presentations and listening exercises.
- Every student will compulsorily be making a 15 minute Presentation (during Praticals) during the course of the semester. Topic can be decided in consultation with the teacher.
- At regular intervals some assignments will be given. In all, a student will be submitting 10 assignments. Submissions will have 50% of practical weightage.
- Rest 50% of the practical weightage lies with the Viva Voce. Viva will be conducted at the end of the semester.
- Two evaluations (through written tests) - Internal (at Department / Institute Level) and External (at University Level) will have 30% and 70% of the Theory Marks Weightage respectively.

E. Learning Outcomes:

1. At the end of the Course, a student will be able to express himself and to participate in the classroom discussions and other such academic or academic support activities.
2. The student will also be able to comprehend whatever he/she receives from Informal Interactions with the family, teachers and friends; and from Formal Communications taking Place in Lectures, Laboratories and the like.
3. In general, the students will develop the ability to communicate effectively using suitable styles and techniques.

F. Recommended Study Material:

a. Reference Reading:

Communication Skills for Engineers	Mishra S & Muralikrishna C
Communication Skills for Technical Students	Farthullah, T M
Effective English for Engineers and Technologists	Rai Ajay, Dr.
Technical Communication	Raman M & Sharma S
English for Technical Communication - Volume 1 & 2 Combined	Laxminarayan, R K

b. Reference Web Reading:

- <http://www.communicationskills.co.in/index.html>
- <http://www.hodu.com/default.htm>
- <http://www.bbc.co.uk/worldservice/learningenglish>
- <http://www.englishlearner.com/tests/test.html>
- <http://www.englishclub.com/vocabulary/idioms-body.htm>
- <http://dictionary.cambridge.org>

Additional Reading:

- Developing Communication Skills by Krishna Mohan & Meera Banerji

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- Written Communication in English by Freeman Sardh
- ABC of Common Grammatical Errors by Nigel B. Turton
- English Vocabulary in use 100 units.....practice by Mccarthy M & Odell F
- Webster`s New World College Dictionary by Agnes Micheal

CITC

DEPARTMENT OF COMMUNICATION SKILLS

CS 101: COMMUNICATION SKILLS – 2

B TECH 2ND SEMESTER

Credit Hours:

TEACHING SCHEME	THEORY	PRACTICAL	TOTAL
Hours/week	3	2	5
Marks	100	50	150

A. Objectives of the Course are:

- 3) To sharpen Communication Skills of the students with reference to Organizational Structure,
- 4) To expose them to the modern modes of communication,
- 5) To show the students importance of team work and give practice in Group Communication with reference to Group Dynamics, and
- 6) To prepare the students for Campus Interviews.

B. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	The Internet, Communication, and Contemporary Society	09
2.	Advanced Interpersonal and Organizational Communication	10
3.	Group Communication and Group Dynamics	14
4.	Effective Presentation Strategies	14
5.	Group Discussion	14
6.	Interview Skills	14

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

C. Detailed Syllabus:

1. The Internet, Communication, and Contemporary Society:	09 hours	12%
1.1 An Introduction to Modern Day Communication		1 hr
1.2 Theories of group and community communication		2 ½ hrs
1.3 Understanding Internet communication and its social implications		1 ½ hrs
1.4 Historical, technical, relational, economic, legal, political, and social dimensions of Internet Communication		2 ½ hrs
1.5 Basic terms, concepts, and contexts of Internet Communication		1 ½ hrs
2. Advanced Interpersonal and Organizational Communication :	10 hours	13%
2.1 Introduction to Interpersonal and Organizational Communication		1 ½ hrs
2.2 Theories of Interpersonal, Group and Organizational Communication		3 ½ hrs
2.3 Levels of Communication		2 ½ hrs
2.4 Essentials of Organizational Communication		2 ½ hrs
3. Group Communication and Group Dynamics :	14 hours	18%
3.1 Introduction to Group Communication		3 hrs
3.2 Introduction to Group Dynamics		3 hrs
3.3 Communication Networks within and outside the Groups		4 hrs
3.4 Social & Behavioural Sciences and Group Communication		4 hrs

4. Effective Presentation Strategies:	14 hours	19%
5.1 Why and How in Presentation		2 hrs
5.2 Audience Analysis and Supporting Material		3 ½ hrs
5.3 Presentation Mechanics and Presentation Process		3 ½ hrs
5.4 Managing Yourself during Q and A Session		2 ½ hrs
5.5 Fundamentals of Persuasions		2 ½ hrs
5. Group Discussion:	14 hours	19%
5.1 Introduction to Group discussions		3 hrs
5.2 Group Discussion as a part of the selection process		3 ½ hrs
5.3 Guidelines for group discussion		3 ½ hrs
5.4 Roles and functions in group discussion		3 hrs
6. Interviews:	14 hours	19%
6.1 Introduction to Interviews		2 hr
6.2 General preparations for an interview		2 ½ hrs
6.3 Types of questions generally asked at the interviews		3 ½ hrs
6.4 Types of interviews		3 ½ hrs
6.5 Importance of nonverbal aspects		2 ½ hrs

D. Instructional Method and Pedagogy:

- Lectures will be taken in the class room and practicals in the language lab.
- Classroom Teaching will be facilitated by Reading Material and Explanations on the Blackboard.
- Interpersonal Activities such as group discussions, role plays, just a minute sessions, presentations, and Mock Interviews will be the focused activities in the Lab. They will be facilitated by an extensive use of multi-media presentations and listening exercises.
- Every student will compulsorily be making a 15 minute Presentation (during Practical) during the course of the semester. Topic can be decided in consultation with the teacher.
- At regular intervals some assignments will be given. In all, a student will be submitting 10 assignments. Submissions will have 50% of practical weightage.
- Rest 50% of the practical weightage lies with the Viva Voce. Viva will be conducted at the end of the semester.
- Two evaluations (through written tests) - Internal (at Department / Institute Level) and External (at University Level) will have 30% and 70% of the Theory Marks Weightage respectively.

E. Learning Outcomes:

4. At the end of the Course, a student will be able to express himself through the modern modes of communication and to participate in the group discussions and other such academic or academic support activities.
5. The student will also be able to perform well during GDs, Presentations, and Interviews.
6. The Course, in particular, will enable the students to be effective language user with reference to communication in groups and group behaviour.

F. Recommended Study Material:

a. Reference Reading:

Title of the Book	Author
Basic Business Communication: Skills for Empowering the Internet Generation (10 th Edition)	Lesikar and Flatley
Spoken English 2nd ed	Sreevalsan, M C
Technical Communication	Raman M & Sharma S

b. Reference Web Reading:

- <http://www.communicationskills.co.in/index.html>
- <http://www.hodu.com/default.htm>
- <http://www.lc.unsw.edu.au/onlib/pdf/disc.pdf>
- <http://jobs.uk.hudson.com/node.asp?kwd=interviewing-skills>
- <http://www.effectivepresentationskills.com>
- <http://jobsearch.about.com/cs/interviews/a/behavioral.htm>

c. Additional Reading:

Title of the Book	Author
Learning to Communicate in English : A Resource Book for Scientists and Technologists 1 & 2	Rai Ajay, Dr.
Communication in English for Technical Students	Dutta Ramkrishna
The Essence of Effective Communication	Ludlow R & Panton F

DEPARTMENT OF ELECTRICAL ENGINEERING

EE 101: FUNDAMENTALS OF ELECTRICAL & ELECTRONICS ENGG.

B TECH 1ST SEMESTER (EC/ME/CL) | B TECH 2ND SEMESTER (CE/IT/EE)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	4	2	6	5
Marks	100	50	150	

A. Objectives of the Course:

The educational objectives of this course are:

- To present a problem oriented introductory knowledge of the Fundamentals of Electrical & Electronics Engineering.
- To focus on the study of electrical parameters & different engineering application based principles.
- To address the underlying concepts & methods behind Electrical and Electronics Engineering.
- To identify & formulate solutions to problems relevant to any discipline of engineering through the application of electrical engineering theory, tools & techniques.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
Unit 1 : Electrical Engineering		
1.	An introduction to electric circuits	06
2.	Series-parallel circuits and networks	03
3.	Capacitors and Capacitance	05
4.	Magnetic circuits, Electromagnetism & Electromagnetic Induction	08
5	A.C. Fundamentals and Single Phase A.C circuits	08
Unit 2 : Electronics Engineering		
1.	PN-Junction Diode and it's applications	12
2.	Transistor and it's applications	10
3.	Fundamental of Digital Electronics	08

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

C. Detailed Syllabus:

Unit 1 : Electrical Engineering		
1. An introduction to electric circuits :	06 hours	10%
1.1 SI units – Charge, Force, Work, Power, Electrical Potential and emf, Resistance and Conductance, Electrical/electronic system block diagrams - Standard symbols for and electric circuits		1 hr 1 hr
1.2 Electrical power and energy – summary of terms, units and their symbols, Electric current and quantity of electricity		
1.3 Potential difference and resistance, Linear and non-linear devices		1 hr
1.4 Ohm’s law, Conductors and insulators, Main effects of electric current - Resistance and resistivity		1 hr
1.5 Temperature coefficient of resistance, Solution of series and parallel combination of resistances in brief, star – delta combination of resistance, KCL and KVL		2 hr
2. Series-parallel circuits and networks :	03 hours	5%
2.1 Series circuits, Parallel networks		1 hr
2.2 Potential divider, Current division		1 hr
2.3 Wiring lamps in series and in parallel		1 hrs
3. Capacitors and Capacitance:	05 hours	8.3%
3.1 Introduction to capacitors, Electrostatic field, Electric field strength		1 hr
3.2 Capacitance, Capacitors, Electric flux density, Permittivity, Dielectric strength		1 hrs
3.3 Capacitors connected in parallel and series, The parallel plate capacitor		1 hr

3.4 Energy stored in capacitors, Types of capacitor, Charging and Discharging capacitors	2 hrs
4. Magnetic circuits, Electromagnetism & Electromagnetic Induction :	08 hours
4.1 Introduction to magnetism and magnetic circuits, Magnetic fields	1/2 hr
4.2 Magnetic flux and flux density, Magnetomotive force and magnetic field strength	1/2 hr
4.3 Permeability and B–H curves, Reluctance, Composite series magnetic circuits	1 hr
4.4 Comparison between electrical & magnetic quantities, Hysteresis and hysteresis loss	1 hrs
4.5 Magnetic field due to an electric current, Electromagnets	1 hr
4.6 Force on a current-carrying conductor, Force on a charge	1 hr
4.7 Introduction to electromagnetic induction, Laws of electromagnetic induction	1 hr
4.8 Rotation of a loop in a magnetic field, Inductance, Inductors	1 hr
4.9 Energy stored, Inductance of a coil, Mutual inductance	
5. A.C. Fundamentals and Single phase A.C. circuits	08 hours
5.1 Generation of Voltage and Current and their Equations, Definitions, RMS value	1 hrs
5.2 Average Value, Complex Algebra	1 hrs
5.3 Vector representation of alternating quantities	2 hrs
5.4 AC series and parallel circuit	2 hrs
5.5 Power and power factor, methods of circuit solution (Analytically and Vectorially)	2 hrs
5.6 Resonance in series and parallel circuits	1 hrs

Unit 2 : Electronics Engineering		
1. PN-Junction Diode and its Applications:	12 hours	20%
1.1 PN Junction, Forward & Reverse Bias PN Junction, V-I Charac. of PN Junction		2 hrs
1.2 Junction Break down, Zener and Avalanche Break down		1 hr
1.3 Junction Capacitor and Equivalent Circuit		1 hr
1.4 Diode Resistance, PN Junction Diode, V-I Characteristic and Diode Parameters		2 hrs
1.5 Diode Ratings or Specification, Photo Diode, Zener Diode		4 hrs
1.6 Full wave and half wave rectifiers, C, LC, π Filters		2 hrs
2. Transistor and its Characteristics:	10 hours	16.6%
2.1 Introduction of BJT, Transistor's components – emitter, base and collector		2 hrs
2.2 Transistor Construction and Biasing		1 hr
2.3 Transistor Circuit Configuration: Common Base, Common Emitter, Common Collector Configuration		3 hrs
2.4 DC–Operating point, Bias Stabilization,		1 hr
2.5 Stabilization Techniques, Bias Compensation		1 hr
2.6 Leakage current and Thermal Run Away, Photo Transistor		2 hrs
3. Fundamental of Digital Electronics:	08 hours	13.3%
3.1 Number Systems-Binary, Octal, Decimal, Hexadecimal		2 hrs
3.2 Base Conversions, Complements		2 hrs
3.3 Binary Arithmetic, Binary Codes		2 hrs
3.4 Boolean algebra & Logic Gates		2 hrs

D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board work – mix of both.
- Each unit of the course is followed by an assignment which is a component of course evaluation.
- Quizzes and interactive period will also carry out during lecture/s.

E. Outcome of the course:

On successful completion of the course, a student can acquire the basic knowledge of electric circuits, electrical and electronic fundamentals, thus being prepared to pursue any area of engineering spectrum in depth as desired. Students will be able to effectively employ electrical and electronic systems and lead the exploration of new applications and techniques for their use.

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F. Recommended Study Material:

a. Text Books:

1. Electrical Engineering by Del Toro
2. Electronics Principles by Malvino
3. Electrical and Electronic Principles and Technology by John Bird (3rd Edition)
4. Fundamental Electrical & Electronic Principle by Christopher Robertson (3rd Edition)

b. Reference Books:

- i. Introduction to Electrical Engineering by Mulukutla Sharma
- ii. Integrated Electronics by Millman and Halkias
- iii. Semiconductor Devices and Circuits by Alope K. Dutta
- iv. Digital Logic and Computer Design by Moris Mano
- v. Basic Electrical Technology-Version 2, IIT Kharagpur

c. Web Material:

- i. <http://www.wikipedia.org>
- ii. <http://hyperphysics.phy-astr.gsu.edu/hbase/Electronic/etroncon.html>
- iii. <http://www.facstaff.bucknell.edu/mastascu/eLessonsHTML/EEIndex.html>
- iv. <http://www.onesmartclick.com/engineering/basic-electrical-engineering.html>

DEPARTMENT OF MECHANICAL ENGINEERING

ME101: ENGINEERING GRAPHICS

B TECH IST SEMESTER (EC/ME/CL) | B TECH 2ND SEMESTER (CE/IT/EE)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	3	4	7	5
Marks	100	100	200	

A. Objective of the Course:

- To introduce the student to the universal language and tool of communication of engineers
- To make them thorough in understanding and using the various concepts – elements and grammar – of Engineering Graphics.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Fundamentals of Engineering Graphics	05
2.	Projections of points and lines	04
3.	Projections of planes	04
4.	Projections & section of Solid	08
5.	Development of Surface	04
6.	Orthographic Projection	06
7.	Isometric Projections	06
8.	Overview of Computer Aided Drafting & 3D Modeling	08

Total hours (Theory): 45

Total hours (Lab): 60

Total hours: 105

C. Detailed Syllabus:

4 Fundamentals of Engineering Graphics:	05 hours	11%
4.1 Importance of Engineering Drawing, Drawing instruments and materials, B.I.S. and ISO.		½
4.2 Different types of lines used in Engineering Practice, Methods of dimensioning & Symbol for methods of projections as per SP 46-1988, Scales.		½
4.3 Engineering curves.		4
5 Projections of points and lines:	04 hours	9%
2.1 Introduction to methods of projections.		½
2.2 Projections of lines inclined to both the planes.		3½
6 Projections of planes:	04 hours	9%
3.1 Projection of plane		02
3.2 Auxiliary projection method.		02
7 Projections & section of Solid:	08 hours	18%
4.1 Projection of solids		03
4.2 Sectional view		02
4.3 True shape of sections.		02
4.4 AIP, AVP		01
8 Development of Surface:	04 hours	9%
5.1 Method of development.		½
5.2 Developments of cylinder, cone, prism, pyramid.		3 ½

9 Orthographic Projection:	06 hours	13%
6.1 Principle of first and third angle projection with examples / problems		06
10 Isometric Projections:	06 hours	13%
7.1 Terminology, isometric scale.		½
7.2 Isometric view and isometric projection with examples / problems.		5 ½
11 Overview of Computer Aided Drafting & 3D Modeling:	08 hours	18%

D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board or mix of both.
- Assignments based on above Course content. (one assignment per chapter)
- Quizzes and interactive sessions will also be carried out in lectures.
- Regular attendance is required in class room.
- Discipline and good behavior is required in class room.

E. Student Learning Outcomes / objectives:

- At the end of the semester students will be to able understand the drawing which is used in industries.
- In further subjects of Machine design very helpful to students.
- Student will be able to know the fundamental of Computer Aided Drafting & 3D Modeling.

F. Recommended Study Material:

a. Text Books:

- Engineering Drawing Vol. I & II by P. J. Shah; S. Chand & Co.
- Engineering Drawing by N. D. Bhatt; Charotar Publishing House

b. Reference Books:

1. Engineering Drawing : K.L. Gopal Krishna; Subhas Publications
2. Engineering Drawing made Easy : K. Venugopal; Wiley Eastern Ltd.
3. Engineering Drawing Vol –I : M.L. Agrawal, R.K. Garg; Dhanpatrai & Co.
4. Graphic Science and Design : T E French, C J Vierck & R J Foster; McGraw Hill
5. Fundamentals of Engg. Drawing : W J Luzadder and J M Duff; Prentice Hall.
6. Engg. Drawing and Graphics : K Venugopal; New Age International.

c. Software

- a. AutoCAD
- b. Pro/Engineer

d. Other materials

1. Sketch book
2. Drafter
3. Drawing sheet
4. Drawing instrument

ME102: FUNDAMENTALS OF MECHANICAL ENGINEERING

B TECH 1ST SEMESTER (CE/IT/EE) | B TECH 2ND SEMESTER (EC/ME/CL)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	4	2	6	5
Marks	100	50	150	

11.1.1 Objective of the Course:

The objectives of the course are to:

- To introduce the student to the fundamentals of Mechanical Engineering, so that they get a sound knowledge of the important aspects of Engineering.
- To share the knowledge related to Energy and its sources with emphasis on energy conversion and transmission to Mechanical Energy.
- To know about various applications of mechanical power which play an important role in industries as well as in our day-to-day life.

11.1.2 Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Conventional and non-conventional energy sources	04
2.	Properties of Steam	06
3.	Steam generators	11
4.	Properties of gases	07
5.	Internal Combustion Engines	10
6.	Refrigeration and air conditioning	04
7.	Air Compressors and Pumps	07
8.	Transmission of Motion and Power and its control	06
9.	Clutch, Couplings and Brakes.	05

Total hours (Theory): 60

Total hours (Lab): 30

Total hours: 90

11.1.3 Detailed Syllabus:

1.3.1 Conventional and non-conventional energy sources:	04 hours	07%
1.1 Types of fuels.		1 hr
1.2 Calorific value of fuels.		½ hr
1.3 Calculation of minimum air required for Complete Combustion of fuel.		2 ½ hr
1.3.2 Properties of Steam:	06 hours	10%
2.1 Introduction : Steam formation, Types of Steam		1 hr
2.2 Enthalpy Specific volume, dryness fraction and Internal energy of steam, Steam tables		½ hr
2.3 Non-flow process.		1 ½ hrs
2.4 Measurement of dryness fraction : Throttling calorimeter, Separating calorimeter, Combined calorimeter.		3 hrs
3. Steam Generators:	11 hours	18%
3.1 Definition, Classification.		1 hr
3.2 General study of Cochran, Babcock Wilcox, Lancashire and FBC technology		4 hrs
3.3 Boilers mountings and accessories.		2 hrs
3.4 Draught Classification, Calculation of Chimney height		2 hrs
3.5 Boiler efficiency and numerical.		2 hrs
4. Properties of gases:	07 hours	11%
4.1 Gas laws, Boyle's law, Charle's law, Combined gas law.		1 hr
4.2 Gas constant, Internal energy, Relation between Cp and Cv, Enthalpy		2 hrs
4.3 Non flow process.		2 hrs

4.4 Constant volume process, Constant pressure process, Isothermal process, Poly-tropic process, Adiabatic process.		2 hrs
5. Internal Combustion Engines:	10 hours	17%
5.1 Definition, Classification and Components, Various efficiencies.		2 hrs
5.2 Working of the two stroke and Four-stroke cycle engines, S.I. and C.I. Engines		4 hrs
5.3 Air standard cycles – Otto, diesel & dual cycle & numerical.		4 hrs
6. Refrigeration and air conditioning:	04 hours	07%
6.1 Definition refrigeration and air conditioning, Vapor Compressor system.		1 ½ hrs
6.2 Domestic refrigerator, Ice plant, Window air conditioner.		2 ½ hrs
7. Air Compressors and Pumps:	07 hours	12%
7.1 Introduction, Uses of Compressed air.		½ hr
7.2 Reciprocating compressors, Operation of a compressor, Work for compression, Power required, Reciprocating compressor efficiency, Multistage reciprocating compressors.		2 ½ hrs
7.3 Rotary compressors.		1 hr
7.4 Reciprocating pump, types and operation, Bucket pump, Air Chamber.		1 ½ hrs
7.5 Centrifugal pumps, Types and Priming, Rotary pumps.		1 ½ hrs
8. Transmission of Motion and Power and its control:	06 hours	10%
8.1 Introduction, Methods of drive, Power transmission elements, shaft and axle.		1 ½ hrs
8.2 Belt-drive, Pulleys, Power transmitted by a belt, Chain drive, Friction drive.		3 ½ hrs
8.3 Gear drive.		1 hr
9. Couplings, Clutches and Brakes:	05 hours	08%

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9.1 Introduction, Couplings, Clutches, Brakes	2 ½ hrs
9.2 Types of brakes, Difference between a brake and a clutch.	2 ½ hrs

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11.1.4 Instructional Method and Pedagogy:

- Lectures will be taken in class room with the aid of multi-media presentations / black board or mix of both.
- Assignments based on above course content will be given at the end of the chapter.
- Assignment should be submitted to the respective course teacher within the given time limit.
- There will be lecture for Quizzes and interaction at every 5 to 6 lecture hour.
- Attendance in the lectures and laboratory is must and which is first and foremost requirement.
- In the lectures and laboratory discipline and behavior will be observed strictly.

.1.5 Student Learning Outcomes / objectives:

- At the end of the course the students will be able to understand the Mechanical Engineering in general and Thermal science, Energy conversion in particular.
- Students will also be able to identify, solve and analyze problems related to Energy conversion, Energy transmission and Energy utilization.

11.1.6 Recommended Study Material:

a. Text Books:

Mechanical Engineering. K. Nag; Tata Mcgrraw-Hill publications.

b. Reference Books:

1. Thermal Engineering : R.K. Rajput; Laxmi Publications.
2. Basic Mechanical Engineering : T.S. Rajan; Wiley Eastern Ltd.
3. Elements of Mechanical Engineering: S.B. Mathur, S. Domkundwar; Dhanpat Rai & Sons.
4. Thermal Engineering Vol. I and II : H.R. Kapoor; Tata McGraw Hill Co. Ltd.
5. Fundamental of Mechanical Engineering : G.S. Sawhney; Prentice Hall of India Publication New Delhi.
6. Thermal Science and Engineering : Dr. D.S. Kumar; S.K. Kataria & sons Publication New Delhi

c. Reading Materials, web materials with full citations:

Steam Tables

Web site: www.howstuffworks.com

E Journals: ASME Journal of engineering for gas turbine and power

(<http://www.asmedl.org/GasTurbinesPower>)

ASME Journal of solar engineering (<http://www.asmedl.org/Solar>),

ASME Journal of turbo machinery(<http://www.asmedl.org/Turbomachinery>)

DEPARTMENT OF COMPUTER ENGINEERING

CE101: FUNDAMENTALS OF COMPUTING & PROGRAMMING

B TECH 1ST SEMESTER (CE/IT/EE) | B TECH 2ND SEMESTER (EC/ME/CL)

Credit Hours:

Teaching Scheme	Theory	Practical	Total
Hours/week	4	4	8
Marks	100	100	200

A. Objective of the Course:

- A student can solve various mathematical problems with algorithms.
- To study structural programming concepts using various conditional and looping statements .
- To study about different data structures available in C language.
- To develop logic through programming and implement basic mathematical and other problems.

B. Learning Outcome:

At the end of the course,

- Students will learn the fundamentals of programming.
- Students will develop efficient programs with their own logic & capabilities.
- Understand the syntax and semantics of the 'c' language.

C. Outline of the course:

Sr. No.	Title of the unit	Minimum number of hours
1.	Introduction To Computation	03
2.	Algorithms For Problem Solving	03
3.	Introduction To Programming	01
4.	Introduction To 'C'	01
5.	Constants, Variables & Data Types In 'C'	03
6.	Operators And Expression In 'C'	03
7.	Managing Input & Output Operations	03
8.	Conditional Statements & Branching	04
9.	Looping	05
10.	Arrays	06
11.	Character Arrays	05
12.	User-Defined Function In 'C'	07
13.	Structures	04
14.	Pointers	06
15.	File Management In 'C'	06

Total hours (Theory): 60

Total hours (Lab): 60

Total hours: 120

D. Detailed Syllabus:

1. Introduction To Computation:	03 hours	05%
1.1 Various number systems: Decimal, Binary, Octal, Hexadecimal, conversion from one number system to another.		1hrs
1.2 The basic model of Computation.		1 hrs
1.3 What is computer, Algorithms, Flow-charts.		1 hrs
2. Algorithms For Problem Solving:	03 hours	05%
2.1 Solve Various types of algorithms like Exchanging values of two variables, (using 3 variables & 2 variables), Arrange numbers in ascending order, Evaluate various series e.g.: $\sin x$, $12-22+32-\dots$, $1+2/2!+3/3!+\dots$		3 hrs
3. Introduction To Programming:	01 hours	02%
3.1 What is program & programming, programming languages, types of languages, compiler, and interpreter.		1 hrs
4. Introduction To 'C':	01 hours	02%
4.1 History of C, Characteristics of C, Basic structure, Compiling process of C a Program.		1 hrs
5. Constants, Variables & Data Types In 'C':	03 hours	05%
5.1 Character set, C tokens, Keyword, Constants, and Variables.		1 hrs
5.2 Data types – declaration & initialization, User-defined type declaration - typedef, enum, Basic input and output operations, Symbolic constant (#define).		2 hrs
6. Operators And Expression In 'C':	03 hours	05%
6.1 Classification of operators: arithmetic, relational, logical, assignment, increment / decrement, bitwise, special operators. Unary, binary and ternary operators.		2 hrs
6.2 Arithmetic expression, evaluation, type conversion: implicit & explicit, precedence and associativity, use of math.h.		1 hrs
7. Managing Input & Output Operations:	03 hours	05%
7.1 Input a character, introduction to ASCII code, various library functions from ctype.h,		1 hrs
7.2 Formatted input using scanf(), formatted output of integer and real data using printf().		2 hrs

8. Conditional Statements & Branching:	04 hours	07%
8.1 Decision making using if, if...else statement, nesting of if...else, else...if Ladder.		2 hrs
8.2 Switch, use of if...else instead of conditional operator, goto statement.		2 hrs
9. Looping:	05 hours	08%
9.1 Need of looping, entry-controlled loop: while, for, exit-controlled loop: do...while, difference.		3 hrs
9.2 Nesting of looping statements, use of break and continue, use of if, if...else in loop.		2 hrs
10. Arrays:	06 hours	10%
10.1 Need of array, declaration & initialization 1D array, various programs of 1D.		3 hrs
10.2 2D array and their memory allocation, 2D array basic programs and matrix operations		3 hrs
11. Character Arrays:	05 hours	08%
11.1 Difference of character array with numeric array and importance of NULL character		1 hrs
11.2 Declaration, initialization and various input and output methods of string, formatted output of string, arithmetic operations on characters.		3 hrs
11.3 Various functions of string.h: strlen, strcat, strcmp, strcpy, strrev, strstr, etc.		1 hrs
12 User-Defined Function In 'C':	07 hours	11%
12.1 Need of modularization, advantages, introduction to user-defined function, form of C functions, function prototype, function call, function body.		2 hrs
12.2 Call by value, actual & formal arguments, use of return, nesting of functions, recursion.		3 hrs
12.3 Array as function arguments, storage classes: scope, life of a variable in C.		2 hrs
13 Structures:	04 hours	07%
13.1 Need of user-defined data type, structure definition, declaration and initialization of variables, array of structure variables.		2 hrs
13.2 Array as structure member, structure within structure, unions.		2 hrs

14 Pointers:	06 hours	10%
14.1 Background of memory, variable, value, address of variable, introduction to pointer, declaration & initialization, access value using pointer, indirection (*) operator.		3 hrs
14.2 Pointers in expressions, scale factor, 1D-array and pointer relation, character pointer, pointer as arguments in function, call by address, pointer to pointer.		3 hrs
15 File Management In 'C':	06 hours	10%
15.1 Introduction, need, define & create and close file, modes of file, write & read single character and integer, use of fprintf and fscanf functions		3 hrs
15.2 Error handling functions, random access of files using ftell, rewind, fseek, command line argument.		3 hrs

E. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board work – mix of both.
- Assignments based on above Course content
- Quizzes and interactive period will also carry out in lecture.

F. Recommended Study Material:

11.2 Text Books:

- Programming in ANSI C : E.Balagurusamy

11.3 Reference Books:

11.3.1 Let us C: Yashwant Kanitkar

11.3.2 Computer programming and utilization: M.T.Savaliya (Atul Prakashan)

11.3.3 Computer programming and utilization: Mahajan Publications

11.4 Web Materials:

1. www.tutorials4u.com/c/
2. www.cprogramming.com/tutorial.html
3. www.howstuffworks.com/c.htm
4. <http://www.programmingtutorials.com/c.aspx>
5. http://www.physics.drexel.edu/courses/Comp_Phys/General/C_basics/

LB101: LIBRARY SCIENCES PART I

B TECH 1ST SEMESTER (CE/IT/EE) | B TECH 2ND SEMESTER (EC/ME/CL)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	1	0	1	
Marks				

A. Objective of the Course:

- * Students are introduced to the roles and functions of libraries in contemporary society.
- * Study the use of library and library resources.
- * Use the most relevant source/s to find your required information.
- * Find the source/s efficiently.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	INFORMATION AND COMMUNICATION	03
2.	INFORMATION MANAGEMENT	03
3.	KNOWLEDGE MANAGEMENT	03
4.	SYSTEM ANALYSIS AND DESIGN	03
5.	DIGITAL LIBRARIES	03

Total hours (Theory): 15

Total hours (Lab): 00

Total hours: 15

C. Detailed Syllabus:

10. INFORMATION AND COMMUNICATION:	03 hours	20%
1.6 Information: characteristics. Nature. Value & use of Information		½ hr
1.7 Conceptual difference between data, information & knowledge		1 hr
1.8 Communication of information: information generation		½ hr
1.9 Communication channels, models & barriers		½ hr
1.10 Trends in scientific communication		½ hr
11. INFORMATION MANAGEMENT:	03 hours	20%
2.1 Concept		3 hr
12. KNOWLEDGE MANAGEMENT:	03 hours	20%
3.1 Definition		1 hr
3.2 Need		1 hr
3.3 Information v/s knowledge management		1 hr
13. SYSTEM ANALYSIS AND DESIGN:	03 hours	20%
4.1 Introduction: SAD		1 hrs
4.2 Library as system		2 hrs
14. DIGITAL LIBRARIES:	03 hours	20%
5.1 Genesis, definition, objectives, scope of digitals libraries		1 hrs
5.2 Image formats, Audio formation		½ hr
5.3 Storage media formats		½ hr

5.4 Software and hardware for digital libraries	½ hr
5.5 Data warehousing, Data mining & Meta data	½ hr

D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board work – mix of both.

E. Recommended Study Material:

- a. Significance of Information & Communication Technology by Srivastava D.S, Shree Pub.
- b. Encyclopaedia of Digital library vol.1 &2 by Shobhi Ram, Anmol Pub.
- c. Model of Digital libraries by Sridevi K, Shree Pub.
- d. System analysis for librarian and information professional by Larry N. Osbore

LB102: LIBRARY SCIENCES PART II

B TECH 1ST SEMESTER (CE/IT/EE) | B TECH 2ND SEMESTER (EC/ME/CL)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	1	0	1	
Marks				

A. Objective of the Course:

Students become familiar with key policy issues and technological trends, and with how these issues and trends affect libraries and information centers of all kinds. Students learn to manage and evaluate collections, respond to the information needs of patrons, and to use technology to improve access to information

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	CREATION AND MAINTENANCE OF DATA BASES IN OUR LOCAL SOFTWARE	01
2.	USING OF LIBRARY SOFTWARE PACKAGES	02
3.	CD-ROM, ONLINE SEARCHING	01
4.	INTERNET SEARCHING	02
5.	INFORMATION RETRIVEAL	03
6.	ABSTRACT AND ABSTRACTING; CONCEPT & PURPOSE & USEFULLNES	03
7.	INTRODUCTION TO NATIONAL POLICY, NATIONAL NETWORKS & INFLIBNET, IPR	03

Total hours (Theory): 09

Total hours (Lab): 06

Total hours: 15

C. Detailed Syllabus:

1. CREATION AND MAINTENANCE OF DATA BASES IN OUR LOCAL SOFTWARE:	01 hour	07%
2. USING OF LIBRARY SOFTWARE PACKAGES:	02 hours	13%
3. CD-ROM, ONLINE SEARCHING:	01 hours	07%
4. INTERNET SEARCHING:	02 hours	13%
5. INFORMATION RETRIVEAL:	03 hours	20%
5.1 IR models (only theory)		3 hrs
6. ABSTRACT AND ABSTRACTING; CONCEPT & PURPOSE & USEFULLNES:	03 hours	20%
6.1 Characteristics of good abstract		½ hr
6.2 Types		1 hr
6.3 Abstracting procedure		½ hr
6.4 Standards guidelines in preparing abstract		½ hr
6.5 Automatic abstracting		½ hr
7. INTRODUCTION TO NATIONAL POLICY, NATIONAL NETWORKS & INFLIBNET, IPR	03 hours	20 %

D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board work – mix of both.

E. Recommended Study Material:

11.5 Reference Books:

5.Information science by D.C.Vikri

6.Bharat Ma Granthalaya Network by Dr.U.A.Thakar, S.P.University

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DEPARTMENT OF MATHEMATICS
MA101: APPLIED MATHEMATICS –I
B TECH 1ST SEMESTER

Credit Hours:

Teaching Scheme	Theory	Practical	Total
Hours/week	4	-	4
Marks	100	-	100

A. Objective of the Course:

The main objective of the course is to make Mathematics as an interesting and application oriented subject.

B. Out line of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Infinite Series	07
2.	Algebra of Complex numbers	08
3.	Matrix Algebra	09
4.	Higher order derivatives and applications	08
5.	Partial differentiation	08
6.	Applications of Partial differentiation	08

Total hours: 48

C. Detailed Syllabus:

SECTION-I			
1.	Infinite Series	07 hrs	14%
1.1	convergence and divergence of infinite series		½ hr
1.2	necessary condition for convergence		1 hr
1.3	geometric series		½ hr
1.4	Tests of convergence viz., comparison test, p-series test, ratio test, n th root test, integral test and power series		5 hr
2.	Algebra of Complex numbers:	08 hrs	16%
2.1	Complex numbers & their geometric representation		½ hr
2.2	complex numbers in polar and exponential forms		½ hr
2.3	Demoivre's theorem and its applications		3 hr
2.4	exponential, logarithmic, trigonometric & hyperbolic functions.		4 hr
3.	Matrix Algebra:	09 hrs	18%
3.1	Rank and nullity of a matrix		½ hr
3.2	Determination of rank by row operation		2½ hrs
3.3	Triangular matrices and triangularization of matrices by Gauss-elimination process		1 hr
3.4	Gauss-Jordan method for computing inverse		2 hrs
3.5	Consistency of system of linear equations		2 hrs

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3.6	Existence and uniqueness solutions of system of linear equations	1 hrs
SECTION-II		
4	Higher order derivatives and applications: 08 hrs	18%
4.1	Real world problems involving concepts of first and higher order derivatives	½ hr
4.2	successive differentiation	½ hr
4.3	n^{th} derivative of elementary functions viz., rational, logarithmic, trigonometric, exponential and hyperbolic	1½ hrs
4.4	Leibnitz rule for the n^{th} order derivatives of product of two functions	1½ hrs
4.5	Lagrange's and Cauchy mean value theorems	1 hr
4.6	expansion of functions: Maclaurin's & Taylor's series expansion and their convergence	2 hrs
4.7	L'Hospital's rule and related applications, Indeterminate forms	1 hrs
5	Partial differentiation: 08 hrs	16%
5.1	Partial derivative and geometrical interpretation	1½ hrs
5.2	Euler's theorem with corollaries and their applications	2 hrs
5.3	Implicit differentiation	1½ hrs
5.4	Chain rule	2 hrs
5.5	Total differentials	1 hrs
6.	Applications of Partial differentiation: 08 hrs	16%

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6.1	Errors and approximations	1½ hrs
6.2	Lagrange's method of multiplier	2 hrs
6.3	Tangent plane and normal line to a surface	1½ hrs
6.4	Maxima and Minima	2 hrs
6.5	Jacobian	1 hrs

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D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board work – mix of both.
- Assignments based on above Course content
- Quizzes and interactive period will also carry out in lecture.

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E. Recommended Study Material:

a. Text Books:

1. Erwin Kreyszig: Advanced Engineering Mathematics, 8th Ed., Jhon Wiley & Sons, India, 1999.

b. Reference Books:

1. Thomas G. B. and R. L. Finney: Calculus and Analytical Geometry, 9th Ed., Addison Wesley, 1996.
2. Stewart James: Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. Wylie & Barrett: Advanced Engineering Mathematics, Mc graw Hill pub.
4. Greenberg M D: Advanced Engineering Mathematics, 2nd ed., Pearson

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DEPARTMENT OF MATHEMATICS

MA101: APPLIED MATHEMATICS –II

B TECH 2ND SEMESTER

Credit Hours:

Teaching Scheme	Theory	Practical	Total
Hours/week	4	-	4
Marks	100	-	100

A. Objective of the Course:

The main objective of the course is to make Mathematics as an interesting and application oriented subject.

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B. Out line of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Ordinary Differential Equations	07
2.	Linear Differential Equations	08
3.	Partial Differential Equations	09
4.	Matrix Algebra	08
5.	Multiple Integrals	08
6.	Special Functions:	08

Total hours: 48

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C. Detailed Syllabus:

SECTION-I		
1.	Ordinary Differential Equations	07 hrs
1.1	Modelling of real world problems in terms of first order ODE	1 hr
1.2	Initial Value problems	½ hr
1.3	Concept of general and particular solutions	½ hr
1.4	Existence and Uniqueness solutions by illustrations	½ hr
1.5	linear, Bernoulli and Exact differential equations	3 hrs
1.6	Solutions of above Mathematical Model	1½ hrs
2.	Linear Differential Equations:	09 hrs
2.1	Model of real world problems of higher order LDE	1 hr
2.2	Complementary function and particular integral and LDE of higher order with constant coefficients	½ hr
2.3	Methods for finding particular integrals viz. variation of parameters and undetermined coefficients	3 hr
2.5	LDE of higher order with variable coefficients viz Cauchy's ,Legendre's and Bessel's homogeneous linear differential equations and their solutions in terms of infinite series	3½ hrs
2.7	system of two first order linear differential equations	1 hr
3	Partial Differential Equations	08 hrs
3.1	Modeling of real world problem in terms of first order PDE	1½ hr
3.2	Initial and Boundary valued conditions	½ hr

3.3	Methods of solutions of first order PDE viz.	1 hr
3.4	Langrange's Equations	3 hrs
3.5	Special types of Nonlinear PDE of the first order	2 hrs
SECTION-II		
4	Matrix Algebra:	08 hrs
		18%
4.1	Determinant and their properties	½ hr
4.2	Cofactor expansion of $n \times n$ determinant	½ hr
4.3	Eigen values and eigen vector of matrices	2½ hr
4.4	Cayley - Hamilton theorem	2 hr
4.5	special matrices viz Symmetric, Skew-symmetric, Hermitian, skew Hermitian	1 hr
4.6	Orthogonal and Unitary matrices and their properties	1½ hr
5	Multiple Integrals:	08 hrs
		16%
5.1	Evaluation of double and triple integrals	2 hrs
5.2	Change of order of integration	2 hrs
5.3	Transformation to polar	1 hr
5.4	spherical and cylindrical coordinates	1 hr
5.5	applications of double and triple integrals: area, volume and mass	2 hrs
6.	Special Functions:	08 hrs
		16%

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6.1	Improper integrals and their convergence	1 hr
6.2	Definitions, properties and examples of Beta, Gamma and error functions	3 hrs
6.3	Bessel functions and their Properties	2 hrs
6.4	Legendre's polynomials and their Properties	2 hrs

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D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board work – mix of both.
- Assignments based on above Course content
- Quizzes and interactive period will also carry out in lecture.

E. Recommended Study Material:

a. Text Books:

1. Erwin Kreyszig: Advanced Engineering Mathematics, 8th Ed., Jhon Wiley & Sons, India, 1999.

b. Reference Books:

1. Thomas G. B. and R. L. Finney: Calculus and Analytical Geometry, 9th Ed., Addison Wesley, 1996.
2. Stewart James: Calculus Early Transcendental, 5th Ed., Thomson India, 2007
3. Wylie & Barrett: Advanced Engineering Mathematics, Mc graw Hill pub.
4. Greenberg M D: Advanced Engineering Mathematics, 2nd ed., Pearson

DEPARTMENT OF PHYSICS

PY101: ENGINEERING PHYSICS

B TECH 1ST SEMESTER (EC/ME/CL) | B TECH 2ND SEMESTER (CE/IT/EE)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	3	2	5	4
Marks	100	50	150	

A. Objective of the Course:

The main objective to give the course of Engineering Physics is

- To study the basic concepts of physics and engineering applications of physics.
- To develop an ability to identify, formulate and solve physics and engineering problems.

B. Outline of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Error Analysis	04
2.	Wave motion and sound	08
3.	Modern Optics	09
4.	Solid State Physics	10
5.	Structure of Materials	07
6.	Nanoscience	07

Total hours (Theory): 45

Total hours (Lab): 30

Total hours: 75

C. Detailed Syllabus:

15. Error Analysis:	04 hours	09%
1.11 Introduction and Basic definitions		1 hr
1.12 Average error, r.m.s error, probable error and error propagation		1 hr
1.13 significant digit and figures		1 hr
1.14 Numericals		1 hr
16. Wave motion and Sound:	08 hours	18%
2.1 Propagation of waves, longitudinal and transverse waves, mechanical and non mechanical waves		1 hr
2.2 sound waves, Architectural Acoustics, Classification of Sound		1 hr
2.3 Loudness, Weber-Fechner law, Bel and Decibel		1 hr
2.4 Absorption Coefficient, Reverberation, Sabine's formula		1 hr
2.5 Factors affecting acoustics of buildings and their remedies		1 hr
2.6 Ultrasonics, properties, Production, piezoelectric and magnetostriction method, applications		2 hrs
2.7 Numericals		1 hr
17. Modern Optics:	09 hours	20%
3.1 Lasers and its properties, spontaneous and stimulated emission, population Inversion		1 hr
3.2 Einstein coefficients		1 hr
3.3 Gas laser (He-Ne Laser), Solid (Nd – YaG) Laser		1 hr
3.4 Hologram- Introduction, construction and reconstruction process		2 hrs

3.5 applications of Lasers		1 hr
3.6 General ideas of optical fibre		1 hr
3.7 NA of fibre, step index and graded index fibre		1 hr
3.8 multi mode and single mode fibre – applications of optical fibre		1 hr
18. Solid State Physics:	10 hours	22%
4.1 Introduction: Conductors and Semiconductors: Band theory of Solids		1 hr
4.2 Energy gap, Fermi energy. Electrical conductivity and mobility.		1 hr
4.3 Hall effect		1 hr
4.4 X – Ray: properties		1 hr
4.5 Applications of X – Rays		1 hr
4.6 Super conducting materials: Properties		1 hr
4.7 Types of Super conductors		1 hr
4.8 Josephson effects		1 hr
4.9 Applications of Super conductors		1 hr
4.10 Numericals		1 hr
19. Structure of Material:	07 hours	16%
5.1 Introduction: Atomic and molecular structure		1 hr
5.2 Crystal structure, Crystalline and non-crystalline materials		1 hr
5.3 space lattices and Miller indices		2 hrs
5.4 Relation between Interplanar Distance and cubic Edge		1 hr

5.5 Numericals		2 hrs
20. Nanoscience:	07 hours	15%
6.1 Introduction		1 hr
6.2 Structure of nanomaterials, Quantum wells, Quantum wires, Quantum dots, examples of nanomaterials		3 hrs
6.3 Synthesis		1 hr
6.4 properties and applications nanostructured materials		2 hr

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D. Instructional Method and Pedagogy:

- Lectures will be taken in class room with the use of multi-media presentations / black board work – mix of both.
- Assignments based on above course content will be given to the students at the end of each chapter. Each assignment contains minimum 10 questions.
- Quizzes and interactive period will also carry out in lecture.

E. Student Learning Outcome:

On the successful completion of the course:

- The student would be able to apply the concepts of physics in various branches of engineering
- The student would be able to use the techniques, skills, and modern tools necessary for physics and engineering careers.

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F. Recommended Study Material:

a. Text Books:

1. Engg. Physics by G. Vijayakumari, Vikas Publishing house Pvt. Ltd.
2. Engg. Physics by K. Rajagopal, Prentice Hall of India Pvt. Ltd.
3. A text book of Engg. Physics by M. N. Avadhulala and P. G. Kshirsagar, S. Chand Pub.

b. Reference Books:

1. Engg. Physics by Abhijit Nayak, S. K. Kataria and sons Pub.
2. Errors of Observations and their treatment, J. Topping, 3rd Ed. Chapman and Hall Ltd. London
3. Solid State Physics by C. Kittel
4. Resnick and Haliday, Physics Part-I and II, Wiley Eastern publication
5. Concept of Modern Physics by Arthur Beiser
6. A. Ghatak Optics 3rd Edition. Tata McGraw Hill
7. Solid State Physics: S. O. Pillai, Wiley Eastern Ltd.

❖ **Reference Links/ e-material:**

- 11.6 http://www.nptel.iitm.ac.in/courses/Webcourse-contents/IIT%20Guwahati/engg_physics/index_cont.htm
- 11.7 http://ncert.nic.in/html/learning_basket.htm
- 11.8 <http://science.howstuffworks.com/laser1.htm>
- 11.9 <http://physics-animations.com/Physics/English/optics.htm>
- 11.10 <http://physics-animations.com/Physics/English/waves.htm>
- 11.11 <http://www.epsrc.ac.uk>
- 11.12 <http://www.pitt.edu/~poole/physics.html#light>
- 11.13 <http://de.physnet.net/PhysNet/optics.html>

SS101: SEMINAR

B. TECH 1ST SEMESTER (CE/IT/EE) | B. TECH 2ND SEMESTER (EC/ME/CL)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	2	-	2	1
Marks	50	-	50	

A. Objectives of the Course:

- 7) To make students familiar about the latest topics of the respective branch.
- 8) To expose them to the modern modes of communication/presentation.
- 9) To prepare the students for taking up any unknown task allotted to them.

B. Outline of the course:

- Advance Topics related to the branch.

C. Instructional Method and Pedagogy:

- Advance Topics related to the branch will be allotted to the students in groups of two.
- Presentation will be made by students in regular lectures.
- Faculty can suggest modifications to improve the technical subject matter and presentation skills.
- Students will also be engaged in attending the presentations made by other students.
- Evaluation of the presentation will be made by the faculty member and marking will be made out of 20.
- Final presentation made by the students will be evaluated by the concerned faculty member and marking will be done out of 30.

D. Recommended Study Material:

a. Reference Reading:

Topic related books, magazines & Journals

b. Additional Reading:

Use of Internet for the advanced topic related search

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DEPARTMENT OF MECHANICAL ENGINEERING

ME103: WORKSHOP PRACTICES

B TECH 1ST SEMESTER (CE/IT/EE) | B TECH 2ND SEMESTER (EC/ME/CL)

Credit Hours:

Teaching Scheme	Theory	Practical	Total	Credit
Hours/week	-	4	4	3
Marks	-	100	100	

A. Objective of the Course:

The objectives of the course are:

- To introduce the students to the various mechanical tools.
- To make them understand the how different objects can be made out of the given raw material by using different mechanical tools.
- To acquire general skills of manufacturing.

B. Out line of the course:

Sr No.	Title of the unit	Minimum number of hours
1.	Introduction to workshop facility.	01
2.	Carpentry shop	05
3.	Fitting shop.	08
4.	Welding shop.	04
5.	Smithy shop.	10
6.	Sheet metal working.	04
7.	Plumbing shop.	04
8.	Introduction to machine tools.	14
9.	Different metal joining processes.	08
10.	Injection molding process.	02

Total hours (Theory): 00

Total hours (Lab): 60

Total hours: 60

C. Detailed Syllabus:

21. Introduction to workshop facility:	01 hours	07%
1.1 Familiarization with work shop facility.		½ hr
1.2 Introduction to different shops of the workshop.		½ hr
22. Carpentry Shop:	05 hours	10%
2.1 Introduction to different tools of carpentry shop.		½ hr
2.2 Making of drawing of the job to be made.		½ hr
2.3 Making of finished job as per drawing out of the given raw material of wood. Identification on the job for traceability.		4 hrs
23. Fitting Shop:	08 hours	13%
3.1 Introduction to different tools of fitting shop.		½ hr
3.2 Making of drawing of the job to be made.		½ hr
3.3 Making of finished job as per drawing out of the given raw material. Identification on the job for traceability.		7 hrs
24. Welding Shop:	04 hours	07%
4.1 Introduction to different tools of welding shop.		½ hr
4.2 Making of drawing of the job to be made.		½ hr
4.3 Making or demonstration of finished job as per drawing.		3 hrs
25. Smithy Shop:	10 hours	17%
5.1 Introduction to different tools of smithy shop.		½ hr
5.2 Making of drawing of the job to be made for Cold smithy.		½ hrs
5.3 Making or demonstration of finished job as per drawing.		3 hrs.

5.4 Making of drawing of the job to be made for Hot smithy.		1 hrs
5.5 Making or demonstration of finished job as per drawing.		5 hrs.
26. Sheet Metal Working:	04 hours	03%
6.1 Introduction to different tools of sheet metal working shop.		½ hr
6.2 Making of drawing of the job to be made from sheet metal.		½ hr
6.3 Making or demonstration of finished job as per drawing.		3 hr
27. Plumbing Shop:	04 hours	03%
7.1 Introduction to all plumbing tools.		1 hr
7.2 Demonstration of plumbing on the piping model.		3 hr
28. Introduction to Machine Tools:	14 hours	23%
8.1 Detailed introduction to Lathe machine, Shaping machine, Drilling machine, Grinding machine, Milling machine, Bending machine, Mechanical press.		14 hr
29. Different Metal Joining Processes:	08 hours	13%
9.1 Introduction to Soldering and brazing of metal joining process.		2 hrs
9.2 Joining of to metal sheet or plate by Riveting.		2 hrs
9.3 Making of drawing of the job to be made by riveting.		2 hrs
9.4 Making or demonstration of finished job as per drawing.		2 hrs
30. Injection molding process.	02 hours	03%
10.1 Introduction and demonstration to Injection Molding Process for making job out of plastic material.		2 hrs

D. Instructional Method and Pedagogy:

- Journal writing based on above course content and practical work performed at the workshop floor.
- Journal should be submitted to the respective course teacher within the given time limit.
- Attendance in the laboratory is must and which is first and foremost requirement.
- In the laboratory discipline and behavior will be observed strictly.

E. Student Learning Outcomes / objectives:

- At the end of the course the students will be able to understand the different manufacturing technique for production out of the given raw material.
- The Students of any branch of engineering may come across problems related to manufacturing during their career and their day to day life too, so the course will provide such information.

F. Recommended Study Material:

a. Text Books:

1. Workshop Technology : H.S. Bava; Tata McGraw Hill Publishing Co. Ltd.
2. Elements of Workshop Technology Vol. I : S.K. Hajra Chaudhary; Asia Publishing House
3. Workshop Technology Vol. I, II : Gupta K.N. & Kaushish J.P.; New Delhi Heights Pub., 4. Course in Workshop Technology : Raghuwanshi B.S.; Dhanpat Rai & Sons, New Delhi.

b. Reference Books:

1. Workshop Technology : . W.A.J. Chapman; ELBS Low Price Text, Edward Donald Pub. Ltd.
2. Basic Machine Shop Practic e Vol. I, II : Tejwani V.K.; Tata McGraw Hill Pub. Co.
3. Workshop Technology Vol. I, II : Arora B.D.; Satya Prakashan, New Delhi.

c. Other materials:

Workshop book and manuals.

Web site: www.howstuffworks.com