Course Curriculum

(Course Structure and Syllabi)

for

Bachelor Programmes

(B.Tech./Dual Degree)

First Year

राष्ट्रीय प्रौद्योगिकी संस्थान हमीरपुर

हमीरपुर – 177 005 (भारत)

National Institute of Technology Hamirpur

Hamirpur – 177 005 (India)

http://www.nith.ac.in

Preface

Located in Hamirpur district of Himachal Pradesh, NIT Hamirpur enjoys a really scenic environment and pleasant weather. The Institute was established in the year 1986, as REC Hamirpur, converted as NIT Hamirpur in 2002 and declared as the Institute of National Importance in 2007. The Institute awards Bachelor, Master and Doctoral degrees in Engineering, Sciences, Humanities & Social Sciences, Architecture and Management; fostering the spirit of national integration amongst the students, a close interaction with industry and a strong emphasis on research. At present, the Institute offers four years B.Tech. degree in Civil Engineering, Computer Science & Engineering, Electrical Engineering, Electronics & Communication Engineering, Mechanical Engineering, Chemical Engineering and Material Science & Engineering, and a five years B.Arch. degree. The Institute has also introduced five years Dual Degree leading to Bachelor and Master of Technology in Computer Science & Engineering and Electronics & Communication Engineering. The Institute also offers M.Tech./M.Arch./M.Sc./MBA programmes with various specializations.

The Bachelor programmes of NIT Hamirpur are governed by the Ordinances for Bachelor Programmes which is available on the Institute website for the information of students and other stakeholders. First year students are advised to get fully familiar with the academic system of the Institute and provisions contained in these Ordinances. These provisions govern the policies and procedures on the admission of students, registration for courses, imparting instructions of courses, conducting examinations, evaluation, award of degree based upon performance of the students, etc. Further, students are advised to read few important points mentioned in the Ordinances like change of branch, evaluation and grading system of the Institute, minimum attendance requirement, etc. Moreover, NIT Hamirpur believes that duty, decorum and discipline are the trademarks of a good student, therefore, students are advised to read conduct and discipline rules in the Ordinances carefully and conduct themselves within and outside the precincts of the Institute in a manner befitting the students of an Institute of National Importance.

Students are also advised to go through the Academic Calendar available on the Institute website. The Academic Calendar mentions of the dates of all the important events, such as Admission, Registration, Commencement & End of the Classes, Examinations & Evaluation, Submissions of Grades, Mid-semester/Summer/Winter Breaks, etc., during the Academic Session of the Institute.

A number of Stipends, Scholarships, Endowment Scholarships/Fellowships, etc. are also awarded to the Bachelor students according to the rules and procedures laid down by the awarding agencies and/or Institute from time to time. Further, to promote and recognize academic excellence, constructive leadership and overall growth and development of students, the Senate may award a number of Prizes and Medals, established by the Institute on its own or through endowments/grants made by donors, with the approval of the Board of Governors.

It is in the interest of the student that he/she should be fully familiar with the course curriculum, academic system of the Institute and provisions contained in Bachelor Ordinances.

Director's Message

Greetings and a warm welcome to all the new entrants for joining us at National Institute of Technology Hamirpur. Congratulations for selecting National Institute of Technology Hamirpur, for your further studies and college experience. NIT Hamirpur is one of the premier autonomous Institution of National Importance in Northern India under the Act of Parliament-2007. It is a state of art Institution and a dream destination for those who wish to be leaders in Science and Technology. Besides being recognized nationally and internationally for excellent education at undergraduate level, we are also making wide strides in innovative research and other development activities. Being a National Level Institute, we have a unique group of outstanding young minds from almost all corners of the country.

Students from diverse backgrounds get to network with each other and get to identify and comprehend the wide spectrum of varied cultural and regional practices in our country. Students are not only given exposure to the latest technological advances in their chosen field but also trained to be responsible citizens of our country. The rich and unique learning environment at NIT Hamirpur develops the student physically, intellectually and emotionally. A series of activities such as cultural festival, technical festival, industry-focused seminars and extracurricular activities, open them to challenges of leadership. We not only enable our students to fulfill their dreams but also mentor them to think Big. During their tenure at the Institute, the students are given enriching and life-defining experience that enables them to reach new heights in their professional and personal lives.

The Institution has a team of highly qualified, learned and dedicated faculty with expertise in all major disciplines of engineering and technology, architecture, science and management, and is a constant source of inspiration for the students. They are actively involved in raising the standards of not only our Institute but also other institutions by collaborating with them and by sharing knowledge through faculty/student interaction programmes from time to time.

Once again, I wish all the students an outstanding, momentous and valuable stay at NIT Hamirpur and hope that you achieve your destinations/goals and emerge as top-notch engineers, technocrats, educationists or scientists.

With warm wishes

Prof. Lalit Kumar Awasthi
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National Institute of Technology Hamirpur
Hamirpur (H.P.) – 177 005
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उद्यमेन हि सिध्यन्ति कार्याणि न मनोरथै:

परिश्रम करने से ही सारे कार्य सिध हो सकते हैं केवल इच्छाओं से नहीं

Institute Vision

To build a vibrant multicultural learning environment founded on value based academic principles, wherein all involved shall contribute effectively, efficiently and responsibly to the national and global community.

Institute Mission

- To achieve academic excellence in engineering, technology, architecture and science by imparting quality and value based education.
- To inspire our students to become responsible citizens and competent professionals with high ethical values.
- To meet the expectations of technical human resource at national and international level.

Objectives of Bachelor and Dual Degree Programmes

The objectives of the Bachelor/Dual Degree Programmes at the National Institute of Technology Hamirpur are as follows:

- To cultivate high standards of performance in teaching and research
- To develop the scientific, engineering and managerial manpower of the highest quality to cater to the needs of the industry, R&D organizations and academia
- To provide opportunity to students to do research in cutting edge areas
- To be a role model and leader of educational institutions in the country
- To provide a broad grasp of the fundamental principles of the scientific, technological and managerial methods through its curriculum
- To provide a deep understanding of the specific areas of specialization
- To provide an innovative ability to solve new and open problems
- To provide a capacity to learn continually and interact with multi-disciplinary groups
- To develop the students with a capability for free and objective enquiry, courage and integrity, awareness and sensitivity to the needs and aspirations of society and doing independent research in their chosen areas

With above objectives in mind, the course curriculum of Bachelor/Dual Degree Programmes is designed to include components like theory and practical course works, seminars and projects, through which a student can develop his/her concepts and intellectual skills.

Bachelor Programmes

Bachelor of Technology (B.Tech.): 4 Years (8 Semesters)

Branch	Department
Chemical Engineering	Chemical Engineering
Civil Engineering	Civil Engineering
Computer Science & Engineering	Computer Science & Engineering
Electrical Engineering	Electrical Engineering
Electronics & Communication Engineering	Electronics & Communication Engineering
Materials Science & Engineering	Material Science & Engineering
Mechanical Engineering	Mechanical Engineering

Bachelor of Architecture (B.Arch.): 5 Years (10 Semesters)

Branch	Department
Architecture	Architecture

Dual Degree Progranmmes

Dual Degree (B.Tech. & M.Tech.): 5 Years (10 Semesters)

Branch	Department
Computer Science & Engineering	Computer Science & Engineering
Electronics & Communication Engineering	Electronics & Communication Engineering

First Year													
1st(*)/2nd(**) Semester							**2nd(*)/1st(**) Semester**						
SN	**Code**	**Subject**	**L**	**T**	**P**	**Credits**	**SN**	**Code**	**Subject**	**L**	**T**	**P**	**Credits**
1	MA-111/ MA-121	Engineering Mathematics-I / Engineering Mathematics-II	3	1	0	4	1	MA-111/ MA-121	Engineering Mathematics-I / Engineering Mathematics-II	3	1	0	4
2	CS-101	Computer Programming	3	0	0	3	2	HS-101	Communication Skills	2	1	0	3
3	ME-101	Engineering Graphics	1	0	3	3	3	ME-102	Engineering Workshop	1	0	3	3
4	PH-101	Engineering Physics	3	1	0	4	4	CY-101	Engineering Chemistry	3	1	0	4
5	CE-101	Applied Mechanics	3	1	0	4	5	MS-101	Materials Science & Engineering	3	0	0	3
6	EC-101	Basic Electronics Engineering	3	0	0	3	6	EE-101	Basic Electrical Engineering	3	1	0	4
7	CS-102	Computer Programming Lab	0	0	2	1	7	HS-102	Communication Skills Lab	0	0	2	1
8	PH-102	Engineering Physics Lab	0	0	2	1	8	CY-102	Engineering Chemistry Lab	0	0	2	1
9	EC-102	Electronics Engineering Lab	0	0	2	1	9	EE-102	Electrical Engineering Lab	0	0	2	1
		Total	**Hours = 28**			**24**			**Total**	**Hours = 28**			**24**

*Applicable for (a) B.Tech. in (i) Civil Engineering (ii) Computer Science & Engineering (iii) Electrical Engineering, and (b) Dual Degree in Computer Science & Engineering

**Applicable for (a) B.Tech. in (i) Chemical Engineering (ii) Electronics & Communication Engineering (iii) Mechanical Engineering (iv) Material Science & Engineering, and (b) Dual Degree in Electronics & Communication Engineering

Course Name: **Engineering Mathematics-I**
Course Code: **MA-111**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

- To understand matrix algebra and its applicability in different engineering fields
- To incorporate the knowledge of calculus to support their concurrent and subsequent engineering studies
- To have the idea of vector calculus, fundamental theorems & its physical interpretation and applications
- To introduce the fundamental concept of Fourier series and its interpretation

Unit Number	Course Content	Lectures
UNIT-01	**Matrix Algebra** Matrices, Related matrices, Complex matrices (Hermitian and skew-Hermitian matrices, Unitary matrix), Rank of a matrix, Gauss-Jordan method, Normal form of a matrix, Linear dependence and independence of vectors, Consistency of linear system of equations, Solution of linear system of equations, Characteristic equation, Eigen values, Eigen vectors, Properties of eigen values, Cayley-Hamilton theorem and its applications, Reduction to diagonal form, Quadratic form and their reduction to canonical form.	**06 L**
UNIT-02	**Differential Calculus** Review of Limits, Continuity and Differentiability, Mean Value Theorem, Partial Differentiation and its geometrical interpretation, Homogeneous functions, Euler's theorem and its extension, Total differentials, Composite function, Jacobian, Taylor's and Maclaurin's infinite series, Indeterminate forms, Errors and increments, Maxima and minima of functions of two variables, Method of undetermined multipliers. Curve tracing.	**09 L**
UNIT-03	**Integral Calculus** Double Integrals (Cartesian and Polar), Change of Order of Integration, Change of Variables, Applications of Double Integrals. Triple integrals, Change of Variables, Applications of Triple Integrals. Beta and Gamma functions.	**06 L**
UNIT-04	**Vector Calculus** Differentiation of vectors, Curves in space, Velocity and acceleration, Relative velocity and acceleration, Scalar and vector point functions, Vector Operator 'Del' - Del Applied to Scalar Point Functions (Gradient) and its Geometrical Interpretation - Directional Derivative, Del Applied to Vector Point Function (Divergence and Curl) and their Physical Interpretation, Del Applied Twice to Point Function, Del Applied to Products of Point Functions. Integration of Vector, Tangential Line Integral, Normal Surface Integral, Volume integrals, Theorems of Green, Stokes and Gauss (without proofs) and their verifications and applications, Irrotational Fields, Solenoidal Fields.	**09 L**
UNIT-05	**Fourier Series** Euler's formula, Dirichlet's Conditions, Functions Having Points of Discontinuity, Change of interval, Expansion of odd and even periodic functions, Half-range series, Typical wave-forms, Parseval's formula, Practical harmonic analysis.	**06 L**

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand and analyze the theoretical & practical aspects of matrices, Fourier series and calculus
CO2: Identify an appropriate technique to examine linear system of equations, behavior of series, extreme values of functions and interpret the line, surface and volume integrals
CO3: Learning the limitations, advantages and disadvantages of above mentioned topics. Formulate the problems on related topics and solve analytically
CO4: To apply the analytical techniques to express periodic functions as a Fourier series
CO5: Apply the concepts of matrices and calculus in various engineering problems
CO6: Demonstrate the concepts through examples and applications

Books and References

1. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons, NC, New York.
2. Thomas' Calculus by G.B. Thomas, M.D. Weir, J. Hass, Pearson Education India.
3. Advanced Engineering Mathematics by C.R. Wylie & L. C. Barrett, McGraw Hill.
4. Vector Calculus by C. E. Weatherburn, John Wiley and Sons, NC, New York.
5. Advanced Engineering Mathematics by R.K. Jain and S.R.K. Iyenger, Narosa Pub. House.
6. Differential & Integral Calculus by N. Piskunov, MIR Publications.

Course Name: **Engineering Mathematics-II**
Course Code: **MA-121**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

- To introduce the fundamental concepts relevant to Ordinary & Partial Differential Equations, Transform Theory and probability & Statistics
- To able to form and solve the ordinary & partial differential equation using different analytical techniques
- To have the idea of various transformations and their uses in engineering problems
- To incorporate the concept of probability to find the physical significance of various distribution phenomena

Unit Number	Course Content	Lectures
UNIT-01	**Ordinary Differential Equations** Brief review of ordinary differential equations, Exact equations, Equations reducible to exact equations, Equations of the first order and higher degrees, Clairaut's equation. Applications of ODEs in concerned engineering branch. Linear differential equations with constant co-efficient, Complimentary functions and particular integral, Method of variation of parameters, Equations reducible to linear equations with constant co-efficient (Cauchy's and Legendre's linear equations), Initial and Boundary value problems, Simultaneous linear equations with constant co-efficient, Applications of differential equations in concerned engineering branch.	**09 L**
UNIT-02	**Partial Differential Equations** Formulation of Partial Differential Equations (PDE), Solution of PDE, Linear PDE of First Order (Lagrange's Linear Equation), Non-linear Equation of First Order (Standard Forms), Charpit's Method, Homogeneous Linear Equations with Constant Coefficients, Non-homogeneous Linear Equations. Applications of PDE: Method of separation of variables, Solution of one dimensional wave and heat equation and two dimensional Laplace's equation.	**09 L**
UNIT-03	**Transforms Theory** Laplace Transform: Laplace Transforms of standard functions and their properties, Inverse Laplace Transforms, General Properties of inverse Laplace transforms and Convolution Theorem, Laplace Transforms of periodic functions, Dirac-delta Function, Heaviside's Unit Function, Solution of ODE and linear simultaneous differential equations using Laplace transforms. Fourier Transform: Fourier integral representation, Fourier sine, cosine and complex transform, Finite Fourier Transforms and their applications. Z – Transforms: Z–Transforms & its properties, inversion of Z – transform and applications of Z – transform.	**12 L**
UNIT-04	**Probability and Statistics** Review of probability, Conditional probability and sampling theorems, Discrete and Continuous Probability Distribution, Probability Mass & Probability Density Functions, Distribution function, Discrete and Continuous probability distributions, Binomial, Poisson and Normal distributions.	**06 L**

Course Outcomes

Upon successful completion of the course, the student will be able to

CO1: Understand and analysis the theoretical & practical aspects of Ordinary differential equations, PDE, Transform theory and Probability

CO2: Identify an appropriate technique to solve the ODE, PDE

CO3: Learning the limitations, advantages and disadvantages of ODE, PDE, various transforms and probability & Statistics

CO4: Apply the concepts of ODE, PDE, integral transform and probability theory in various engineering problems

CO5: Demonstrate the concepts through examples and applications

Books and References

1. Advanced Engineering Mathematics by E. Kreyszig, John Wiley and Sons, NC, New York.
2. Differential Equations by S. L. Ross, John Wiley & Sons, New York.
3. An Introduction to Probability Theory & its Applications by W. Feller, Wiley.
4. Probability and Statistics for Engineers and Scientists by R.E. Walpole, S. L. Myers and K. Ye, Pearson.
5. Integral Transforms and Their Applications by Lokenath Dennath and Dambaru Bhatta, Chapman and Hall/CRC Press.

Course Name: **Computer Programming**
Course Code: **CS-101**
Course Type: **Core**

Contact Hours/Week: **3L** Course Credits: **03**

Course Objectives

- To introduce the concept of computer fundamentals and computer programming
- To enable the student to design algorithms
- To enable the students to understand "C" language and its application in problem solving

Unit Number	Course Content	Lectures
UNIT-01	**Programming Fundamentals**: Introduction to computer, block diagram and organization of computer, number system and binary arithmetic, processing data, hardware, software, firmware, types of programming language-Machine language, Assembly level language, higher level language, source file, object file, translators-assembler, compiler, interpreter. Evolution and classification of programming languages.	**08L**
UNIT-02	**Programming Techniques:** Steps in program development, algorithm, flowchart, pseudo code.	**05L**
UNIT-03	**C Language:** 'C' character set, literals, keywords, identifiers, data types and size, variable declaration, expression, labels, statements, formatted input output statements, types of operators, data type conversion, mixed mode arithmetics, control structures.	**07L**
UNIT-04	**Data Structures**: Storage classes, scope rules and visibility, arrays, pointers, dynamic storage allocation, structures and unions, self-referential structures. Relationship between pointers and arrays, dynamic arrays: Introduction to dynamic datastructures-linked lists, stack, and binary trees.	**08L**
UNIT-05	**Functions and File Handling**: 'C' functions, library functions, parameter passing, recursion, 'C' files, function for file handling, 'C' pre-processors and command line arguments, macros and conditional compiler directives.	**08L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Know the basic components of the computer and working of each device
CO2: Design algorithms and flowcharts
CO3: Understand the fundamentals of C programming
CO4: Use suitable data structure for problem solving

Books and References

1. C Programming Language by Briain W. Kenigham and Dennis Ritchie, Prentice Hall of India.
2. Programming with C by Byron Gottfried, Tata McGraw Hill.
3. The Complete Reference C by Herbert Schildt, Tata McGraw Hill.
4. Let us C by Yashwant Kanetkar, BPB Publication.
5. A Structured Programming Approach in C by B.A. Forouzan and R.F. Gilberg, Cengage Learning.

Course Name: **Communication Skills**
Course Code: **HS-101**
Course Type: **Core**

Contact Hours/Week: **2L + 1T** Course Credits: **03**

Course Objectives

- To develop independent perspective through critical thinking
- To communicate their perspective in clear and correctly articulated language through LSRW skills
- To instill a lifelong habit of language learning

Unit Number	Course Content	Lectures
UNIT-01	**Introduction:** Role of Effective Communication Skills for an Engineer, Theories of acquiring and learning English as a Second language, Challenges in learning language and means to overcome these.	**02L**
UNIT-02	**Communication process**: Types and modes of communication, Formal and Informal Communication, Process, Channels and levels of communication in Organizations , Intrapersonal and interpersonal communication, Common frame of reference and Context for effective communication, Verbal and Non verbal communication, Interpreting non-verbal communication, Barriers to effective communication	**06L**
UNIT-03	**Effective Listening Skills:** What does listening mean? Types of listening, Strategies for effective listening, Listening for specific purposes, Listening process and barriers to listening, Leadership and role of effective listening, Problems in comprehension and retention, note taking, Exposure to recorded audio/visual text for listening	**02L**
UNIT-04	**Effective Speaking Skills** **Interviews and Group discussion:** Telephonic and personal interviews, Pre-Interview planning SWOT analysis, Building self-confidence, Developing Emotional intelligence, Preparing for current topics, Group Discussion as an interviewing tool **Public speaking**: Become aware of personal speech habits and characteristics. Improving non-verbal cues, voice, diction and other mechanics of speech. Speech preparation and presentation techniques, Audience awareness and self-awareness, Cultivating poise and self-confidence. Presenting a variety of speeches (informative, persuasive, demonstrative, special occasion, etc.)	**06L**
UNIT-05	**Reading Skills:** Need and process, Approach to different reading materials, Purposes of reading, Different reading strategies: Skimming, Scanning Predicting, Inferring from the context Reading, Comprehension, Vocabulary expansion through reading	**02L**
UNIT-06	**Writing Skills:** Need and strategy, Developing Style of Writing, Role of appropriateness, brevity and clarity in writing, Cohesion and Coherence, Paragraph writing, Vocabulary building (roots, prefixes, suffixes) SOP, Resume/CV, Job applications **Report writing**: Importance of Technical Report Writing, Types of Reports, Objectivity in Report Writing, Collection of Data for Report writing	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Identify the importance of Communication Skills
CO2: Apply Critical Thinking to what they read, listen to and observe
CO3: Apply principles of effective LSRW Skills in professional and Social Communication
CO4: Assess the verbal and non-verbal messages effectively

Books and References

1. Business Communication Today by Bovee, Courtland, L., John V. Thill and Barbara E. Schatzman: Pearson Education: Delhi.
2. The Definitive Book of Body Language by Allan Pease and Barbara Pease. Manjul Publishing House: New Delhi.
3. Communication for Business by Shirley Taylor. Longman: New Delhi.
4. Technical Communication: Principles and Practice by Meenakshi Raman and Sangeeta Sharma. Oxford University Press: New Delhi.

Course Name: **Engineering Graphics**

Course Code: **ME-101**

Contact Hours/Week: **1L + 3P** Course Credits: **03**

Course Objectives

- To equip engineering students with "Universal language of Engineers" for developing their engineering communication through drafting exercises of geometrical solids
- To prepare preliminary engineering drawings with geometric instruments as well as Drafting software with equal expertise

Unit Number	Contents of Theory Part	Lectures
UNIT-01	**Introduction:** Importance of Engineering Drawing, Engineering Drawing Instruments and uses, B.I.S and I.S.O. Conventions for drawings, Use of plane scales and Representative Fraction	**01L**
UNIT-02	**Projection of Points and Straight Lines:** Introduction to principal planes, Notation System, Projection of line parallel/ perpendicular to principal plane, Concept of true length of line.	**01L**
UNIT-03	**Projection of Planes:** Concept of different planes, Projections of planes with its inclination to one principal plane and with two principal planes. Concept of auxiliary plane method for projections of the plane.	**01L**
UNIT-04	**Projection of Solids and Sections of Solids:** Classifications of Solids, Projections of right and regular solids with their axis Parallel to two and Perpendicular to one of the principal planes, axis parallel to one and inclined to two principal planes, axis inclined to all the three principal planes. Section of solids.	**01L**
UNIT-05	**Orthographic Projections & Isometric Projection:** Principle of projection, Principal planes of projection, Projections from the pictorial view of the object on the principal planes using first angle projection method and third angle projection method, Full Sectional View, Isometric projection.	**02L**
UNIT-06	**Autocad's Workspaces And User Interface:** The Drawing Area, Accessing Autocad Commands, Starting, Saving, And Opening Drawings, Closed User Interface, User Interface And Startup Tutorial, Coordinates, World Coordinate System/User Coordinate System, Coordinate Systems Tutorial, Drawing Using Coordinates Tutorial, Drawing Commands, Text & Modifying Commands, Object Snap Commands.	**06L**

Practical No.	Contents of Practicals	Number of Drawing/ Graphics Sheets
	Conventional Engineering Drawing	
1.	Preparation of drawing sheet related to Scales and Representative Fraction.	01
2.	Preparation of drawing sheet related to Projection of Points and Straight Lines.	01
3.	Preparation of drawing sheet related to Projection of Planes.	01
4.	Preparation of drawing sheet related to Projection and Section of Solids.	01
5.	Preparation of drawing sheet related to Orthographic Projections.	01
6.	Preparation of drawing sheet related to Isometric Projections.	01
	Total Sheets	**06**
	Computer Aided Graphics	
7.	Learning of drawing software, utility of drawing commands, built in directory and tools.	01
8.	Learning of drawing units, sheet setting, practice of different drawing commands.	01
9.	Learning of text command layers block, insert blocks and dimensioning techniques.	01
	Total Sheets	**03**
	Computer Aided Modeling	
10.	Drawing of 2D and 3D models.	01
11.	Isometric drawings with different views.	01
12.	Complex solid models and wire frame models.	01
	Total Sheets	**03**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Visualization in context of Engineering
CO2: Read, Interpret drawing
CO3: Drawing using techniques like Orthographic and pictorial projections
CO4: Auxiliary and section views, Basic dimensioning
CO5: 2-D CAD drawing techniques 3-D CAD modeling techniques using AutoCAD.

Books and References

1. A text book of Engineering Drawing by P.S.Gill, S.K.Kataria & Sons, Delhi.
2. Engineering Drawing and Graphics by K. Venugopal, New Age International.
3. Engineering Drawing with an Introduction to AutoCAD by D.A. Jolhe, Tata McGraw-Hill Publishing Co. Ltd., New Delhi.
4. Engineering Drawing & Graphics using Auto CAD 2000 by T. Jeyapoovan, Vikas Publishing House Pvt. Ltd., New Delhi.

Course Name: **Engineering Workshop**
Course Code: **ME-102**

Contact Hours/Week: **1L + 3P** Course Credits: **03**

Course Objectives

- To study the fundamentals and have practical exposure of basic manufacturing processes.
- To learn the basics of metal machining, welding, fitting, smithy, carpentry and foundry related operations.
- To understand and apply basic concepts of civil engineering materials, construction and study the different plumbing fittings.
- To familiarize students with various types of electrical tools, wiring schemes, safety measures, soldering and de-soldering of electronic circuits.
- To learn about operation and maintenance of domestic electrical appliances.

S.No.	Contents of Theory Part	Lectures
	Department of Mechanical Engineering	
1.	Importance of Engineering Workshop and description about each shop.	**01L**
2.	Brief Introduction of Engineering materials like Metals, Ceramics, Polymers and Composites.	**01L**
3.	Brief description of machining operations and study about construction and working of Lathe Machine.	**01L**
4.	Brief description of various joining processes. Brief description about Arc Welding and Gas Welding processes and their common applications.	**01L**
5.	Brief description about tools used in foundry shop and methods of preparation of Green Sand mould. Brief description of tools used in carpentry shop and introduction to different joints used in carpentry shop.	**01L**
6.	Brief description of various fitting operations and related tools.	**01L**
	Department of Civil Engineering	
7.	Introduction of Joinery details of plumbing fixtures for sanitary and water supply system	**01L**
8.	Types, quality and strength characteristics of various building materials: cement, sand, aggregates, bricks. Introduction to non-destructive testing.	**01L**
9.	Concept and detailing of reinforcement of various structural elements: beam, column, slab and footings/Types of Truss and its connection details.	**01L**
	Department of Electrical Engineering	
10.	Introduction to electrical tools, wires used and safety measures.	**01L**
11.	Concept of soldering and design aspects of regulated power supply.	**01L**
12.	Operation and maintenance of domestic electrical appliances.	**01L**

Practical No.	Contents of Practical
Mechanical Engineering Workshop	
1.	Preparation of job as per given drawing using Lathe Machine.
2.	Preparation of job as per given drawing using Arc/Gas Welding Setup.
3.	Preparation of Green Sand Mould using tools of Foundry Shop.
4.	Preparation of job as per drawing related to Joints used in Carpentry Shop using Carpentry Tools.
5.	Preparation of job as per given drawing related to Fitting Shop.
6.	Preparation of job as per given drawing of Bolts and Nuts using tools of Smithy Shop.
Civil Engineering Workshop	
7.	Assembly of conduit fittings: Elbow joining, T joining, Tap and pipe, Union and reducer, trap and sanitary pipe fitting.
8.	Testing of samples: cement–lump formation, sand–sieve analysis, aggregates–sieve analysis, bricks-Compressive strength. Preparation of cubes for testing of concrete.
9.	Assembly of reinforcement of beam, column, slab and footings with binding wire. Assembly of truss element with bolts and nuts.
Electrical Engineering Workshop	
10.	Wiring of fluorescent tube lamp for staircase lighting system.
11.	To assemble adjustable voltage power supply by soldering electronic components.
12.	To open, disconnect and re-connect internal wiring system of domestic electrical appliances.

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Learn the basics of metal machining, welding, fitting, forging, carpentry and foundry related operations.
CO2: Learn the essential concepts of important pipe fitting operations.
CO3: Apply basic concepts related to plumbing, building materials and construction.
CO4: Execute the basic house hold wiring, electrical circuits and basic electronics appliances.
CO5: Identify and understand the functioning of common electrical appliances and their safe handling.
CO6: Develop the skill for soldering and de-soldering of electronic circuits.
CO7: Carry out repair and maintenance of electrical appliances.

Books and References

1. A Course in Workshop Technology by B.S. Raghuwanshi, DhanpatRai & Company(P) Limited.
2. Elements of Workshop Technology by Hajra Choudhary & Nirjhar Roy, Media Promoters and Publishers Pvt. Ltd.
3. Plumbing and Sanitary Engineering by J.B. Jindolia, Royal Publishers.
4. Building Materials by S.K. Duggal, New Age International. Publishers.
5. Electrical Wiring Estimating and Costing by S.L. Uppal & G.C. Garg Khanna Publication.
6. Basic Electronics by Mitchel Schultz McGraw Hill Education.
7. Electrical Appliances: The Complete Guide to the Maintenance and Repair of Domestic Electrical Appliances by Graham Dixon Haynes Publishing Group.

Course Name: **Engineering Physics**

Course Code: **PH-101**

Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

- To create and an ability to understand laser system, optical fibre in industries, laboratories and in communication
- To understand concepts of communication through electrodymanics
- The broad education necessary to understand behavior of semiconductor devices
- A knowledge of concepts / technologies like superconductivity

Unit Number	Course Content	Lectures
UNIT-01	**Semiconductor Device Physics**: Energy bands in solids, the E-k diagram, Density of states, Occupation probability, Fermi level and quasi Fermi levels, Fermi-Dirac Statistic, Effective mass, Conductivity as a function of temperature p-n junctions, Schottky junction and Ohmic contacts.	**06L**
UNIT-02	**Laser Physics**: Concepts of laser, spontaneous and stimulated emission, elementary idea about Lasers, basic principles involves in laser, three and four level laser system, coherence, characteristics of laser light; ruby, He-Ne, CO2 and semiconductor lasers, application of lasers.	**06L**
UNIT-03	**Fibers Optics and Photonics**: Optical Fiber, physical structure and basic theory, modes in optical fibers, step index and graded index fibers, losses in optical fibers, sources and sensors for optical fibers, applications of optical fibers in communication.	**06L**
UNIT-04	**Electrostatics and Electrodynamics:** Gauss's Law in dielectric medium, Equation of continuity, displacement current, Maxwell's equations, wave equation for electromagnetic radiation, electromagnetic wave propagation in free space and isotropic dielectric medium, Poynting theorem & Poynting vector.	**06L**
UNIT-05	**Quantum Mechanics:** Need of quantum mechanics, Compton effect, Born's concept of wave function, eigen function and eigen values, operators in quantum mechanics, expectation values, time independent,time dependant Schrodinger's wave equations and its applications viz., particle in one dimensional potential well.	**06L**
UNIT-06	**Superconductivity and Ultrasonics:** Introduction and discovery of superconductivity, superconducting materials, Meissner effect, critical magnetic field and critical current, type-1 and type-2 superconductors, isotope effect, theory of superconductivity, ultrasonics, generation, properties and applications.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: describe the optical devices and their applications

CO2: identify the applications of electrodynamics using Maxwell equations

CO3: apply conept of semiconductor physics to understand electronic systems

CO4: apply concepts of Quantum mechanics in solving physics problems at nanoscale

CO5: learn the working of equipment based on physical phenomenon

Books and References

1. Solid State Electronic Devices by B. G. Streetman, Prentice Hall of India, New Delhi 2006.
2. Introduction to Solid State Physics by Kittle C. John Wiley & Sons, 2005.
3. Lasers Fundamentals and Applications by Ghatak A. K. & Thyagarajan K, Springer, 2010.
4. Modern Engineering Physics; A.S. Vasudeva, S. Chand & Co. Ltd.
5. Introduction to Electrodynamics by Griffiths D. J, Pearson Education Pvt. Ltd., New Delhi, 2002
6. Quantum Mechanics by Ghatak A and Lokanathan S Mc Millan India Ltd.

Course Name: **Engineering Chemistry**
Course Code: **CY-101**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

- Develop an understanding of environmental pollution and hazards due to engineering/technological activities and general measures to control them
- To enable the students to understand about the fundamentals of of characterization techniques of different materials
- To familiarize the students about nanomaterials, their characterization and applications
- To make the students understand the principles of corrosion and its control
- To introduce the fundamentals of lubrication, different types of lubricants and their application

Unit Number	Course Content	Lectures
UNIT-01	**Environmental Science** Specifications of domestic and industrial water, water treatment, water quality parameters, waste/sewage water treatment, BOD, COD, Air quality standard, air pollution and its control, smog formation, photochemical smog, green house effect and Global Warming, Chemical pollutants, Carbon credit, Climate Change, Introduction to Environmental impact assessment	**12L**
UNIT-02	**Characterisation Techniques** Introduction to spectroscopy, UV-Visible spectroscopy- Absorption laws, Instrumentation, formation of absorption bands, Chromophore and auxochrome concept, application of UV-Visible spectroscopy; IR spectroscopy - Principle, selection rules, spectral features of some classes of compounds, important features of IR spectroscopy and application; Introduction to Thermal methods, instrumentation and applications (TGA, DTA, DSC)	**07L**
UNIT-03	**Nanochemistry** Introduction to nanochemistry: dependence of optical, electrical and magnetic properties on size of materials, various nanostructures; spherical nanoparticles, nanotubes, nanofibers, nanorods, etc, synthesis, properties and applications of following nanomaterials - Carbon based nanostructures – CNTs and graphene, semiconductors nanoparticles- TiO_2. Characterization of nanomaterials: atomic force microscopy (AFM), scanning electron microscopy (SEM)	**06L**
UNIT-04	**Corrosion and its Control** Introduction, Types of corrosion-chemical and electrochemical, Mechanisms of corrosion, factors affecting corrosion and different protection methods for corrosion control.	**06L**
UNIT-05	**Lubricants** Introduction, Mechanisms of lubrication, Types of lubricants, properties and different methods for testing of lubricant oils and greases.	**05L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understand the various pollution control measures
CO2: Define and analyze engineering problems related to corrosion and metal finishing to achieve a practical solution
CO3: Identify instrumental techniques for analysis of different materials
CO4: Understand basic concepts of nanoscience and the applications of nanomaterials in various fields
CO5: Understand the mechanism of lubrication and choose a lubricant for a suitable application

Books and References

1. Spectrometric Identification of Organic Compounds by R. M. Silverstein, F. X. Webseter, and D. Kiemle, John Wiley & Sons
2. Organic Spectroscopy by W. L. Kemp, Palgrave.
3. Spectroscopy by D. L. Pavia, Cengage.
4. Engineering Chemistry by Jain & Jain, Dhanpat Rai Publishing Co.
5. A text Book of Engineering Chemistry by Shashi Chawla, Dhanpat Rai & Co.
6. Engineering Chemistry by S.Vairam and S. Ramesh, Wiley.
7. Nanotechnology, Principles and Practices by Sulabha K .Kulkarni, Capital Publishing Company.
8. Introduction to Environmental Engineering by M. Davis, D. Cornwell, Mcgraw-hill.

Course Name: **Applied Mechanics**
Course Code: **CE-101**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

- To impart knowledge about the force and moments and their vectorial and scalar representation
- To enable the students to understand equilibrium of two dimensional force system
- To enable the students to understand the Center of Gravity and Moment of Inertia
- To understand the concept of stress and strain, Pure Bending and Torsion
- To enable the students to comprehend the laws of motion, kinematics of motion
- To enable the students to understand the Friction on general plane motion
- To understand the concept of shear force and bending moments of beams and analysis of trusses

Unit Number	Course Content	Lectures
UNIT-01	**Introduction to Statics:** Particle and Rigid Body, Types of forces, Transmissibility of a force, vector algebra **Two dimensional force system:** Resolution of forces, Moment of forces, Couple, Resolution of a coplanar force by its equivalent force-couple system, Resultant of forces, free body diagram, equilibrium	**05L**
UNIT-02	**Centre of Gravity and Moments of inertia:** Centroid of plane, curve, area, volume and composite bodies MI with respect to different axis, Parallel axis theorem, Mass moment of inertia **Virtual work and Energy method:** Principle of virtual work; Applications of virtual work principle to machines; Mechanical efficiency; Work of a force/couple, Potential energy and equilibrium **Concept of Friction:** Laws of Coulomb friction, Angle of Repose, Coefficient of friction, large and small contact surfaces, Belt friction, Equilibrium of a belt, Bearing friction	**09L**
UNIT-03	**Kinematics of Rigid Body:** Introduction, Plane Motion of Rigid Body, Velocity and Acceleration under Translation and Rotational Motion, Relative Velocity, **Kinetics of Rigid Body:** Introduction, Force, Mass and Acceleration, Work and Energy, Impulse and Momentum, D'Alembert's Principles and Dynamic Equilibrium	**05L**
UNIT-04	**Impulse Momentum Principle:**. Impulsive force, Conservation of Linear momentum and Angular momentum. Impact between bodies	**03L**
UNIT-05	**Simple stresses and strains:** Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Factor of safety. **Bending stress of Beams**: Introduction, Simple Bending Theory, Stress in beams of different cross sections, shear stress, combined stresses.	**06L**
UNIT-06	**Torsion:** Introduction, Torsion of shafts of circular section, torque and twist, shear stress due to torque. **Analysis of Truss:** Method of joints, Method of Sections **Analysis of frames:** Shear force and bending moment diagram of determinate beams and frame.	**08L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Determine the resultant force and moment for a given system of forces
CO2: Determine the Centre of Gravity and Moment of Inertia of surfaces and solids
CO3: Determine the shear force, Bending moment of beams and analyze the trusses and problems related to frictions
CO4: Determine the stresses in beam for pure bending and effect of torsion in shafts
CO5: Calculate the motion characteristics of a body subjected to a given force system

Books and References

1. Introduction to Solid Mechanics by H. Shames & J. M. Pitarresi, PHI.
2. Mechanics of Materials by E.P. Popov, PHI.
3. Vector Mechanics for Engineers: Statics and Dynamics by F. P. Beer, R. Johnston , D. F. Mazure P. J. Cornwell , S. Sanghi, McGraw Hill Education.

Course Name: **Materials Science and Engineering**
Course Code: **MS-101**
Course Type: **Core**

Contact Hours/Week: **3L** Course Credits: **03**

Course Objectives

- To impart knowledge about the structure of materials
- To introduce fundamental concepts relevant to phase diagrams, phase transformations and heat treatment of metals and alloys
- To enable the students to understand properties of engineering materials

Unit Number	Course Content	Lectures
UNIT-01	**Introduction:** Why study materials science and engineering? Review of basic types of interatomic bonds, Classification of materials, Processing/structure/properties/ performance correlations	**03L**
UNIT-02	**Structure and Imperfections:** Lattices, Unit cells,Miller indices of directions and planes for cubic and hexagonal systems, Closepacking in solids, Common metallic structures,Voidsin close-packed structures, Common ceramics structures – NaCl, CsCl, Diamond Cubic, Zinc Blende, Wurtzite, Rutile, Fluorite, Fullerenes, Spinel, Perovskite, etc., Polycrystalline materials, X-Ray diffraction for determination of crystal structures,Solid state diffusion – Ficks laws of diffusion, Diffusion mechanisms, Temperature dependendence of diffusivity, Defects in crystals - Point defects, Dislocations, Grain boundaries and Surfaces, Noncrystalline solids, Polymeric materials	**09L**
UNIT-03	**Phase Diagrams:** Phase rule, Solid solutions, Hume-Rothery rules, Intermediate phases and compounds, Unary and binary phase diagrams, Isomorphous and eutectic systems, Lever rule, Typical phasediagrams: Fe-C, Cu-Ni, Cu-Zn, Al-Cu, Al-Si and Pb-Sn.	**03L**
UNIT-04	**Phase Transformations and Heat Treatment:** Classification of phase transformations, Liquid to solid transformation, Homogeneous and heterogeneous Nucleation, Kinetic considerations in solid state transformations, Microstructure and property changes in iron-carbon alloys, Isothermal transformation diagrams, Continuous cooling diagrams, Annealing, normalizing, hardening andtempering of steels and their effect on properties, Hardness andhardenability. Quenching media, Martempering and austempering, Surface hardening— carburizing, nitriding, carbonitriding, flame and induction hardening, Precipitation and age hardening	**09L**
UNIT-05	**Properties of Materials:** *Mechanical Properties***:** Stress-strain response of metallic, ceramic and polymermaterials, yield strength, tensile strength and modulus of elasticity, toughness, plastic deformation, fatigue, creep and fracture; *Electronic Properties***:** Free electron theory, Fermi energy, density of states, elementsof band theory, semiconductors, Hall effect, dielectric behaviour, piezo, ferro,pyroelectricmaterials; *Magnetic Properties***:** Origin of magnetism in metallic and ceramic materials, paramagnetism, diamagnetism, ferro andferrimagnetism; *Thermal Properties:* Specific heat, thermal conductivity and thermal expansion,thermoelectricity; *Optical Properties:* Refractive index, absorption and transmission of electromagnetic radiation in solids, electrooptic and magnetoopticmaterials, spontaneous and stimulated emission, gas and solid state lasers	**12L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Classify various engineering materials and explain their structure and imperfections
CO2: Draw some typical phase diagrams and discuss their distinctive features
CO3: Explain Isothermal transformation and continuous cooling diagrams of steels
CO4: Describe various heat treatment processes
CO5: Briefly discuss properties of engineering materials and correlate them to their internal structures

Books and References

1. Materials Science and Engineering, An Introduction by William D. Callister, Jr. and David G. Rethwisch,John Wiley and Sons, Inc.
2. Materials Science and Engineering by William F. Smith, McGraw Hill Education.
3. Modern Physical Metallurgy by R. E. Smallman, Butterwort- Heinemann.
4. Physical Metallurgy: Principles and Practice by V. Raghvan, PHI Learning Private Ltd.

Course Name: **Basic Electronics Engineering**
Course Code: **EC-101**
Course Type: **Core**

Contact Hours/Week: **3L** Course Credits: **03**

Course Objectives

- To understand the fundamentals of semiconductor Physics.
- To introduce the concepts of semiconductor devices with applications.
- To enable the students to understand the working and applications of transistor.
- To understand the basics of JFET and MOSFET.
- To understand the basics of communication systems.

Unit Number	Course Content	Lectures
UNIT-01	**Semi-Conductors and Diodes:** Introduction, Insulators, Semiconductors and Metals, Mobility and Conductivity, Intrinsic and Extrinsic Semiconductors, Charge Density, Current Components in Semiconductors, Continuity Equation, PN Junction Diode- Characteristics and Analysis; Types of Diodes- Zener Diode, Photodiodes, LED, Varactor Diode, Tunnel Diodes.	**06L**
UNIT-02	**Diode Applications:** Rectifiers and Filter Circuit: Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier and their Analysis, L,C and Pi Filters; Series and Shunt Diode Clippers, Clipping at Two Independent Levels, Clamping Operation, Clamping Circuit; Practical Clamping Circuits, Basic Regulator Supply using Zener Diode.	**07L**
UNIT-03	**Bipolar Junction Transistors:** Construction and Characteristics of BJT, Transistor Configuration: CB, CE, CC Configuration; Transistor at Low Frequency, Small Signal Low Frequency Transistor Model (H-Parameters), Analysis of Transistor Amplifier using H-Parameters.	**06L**
UNIT-04	**Transistor Biasing:** Transistor Biasing and Bias Stabilization: Operating Point, Stability Factor, Analysis of Fixed Bias, Collector to Base Bias, Emitter Resistance Bias Circuit and Self Bias Circuit, Bias Compensation Techniques Transistor Switch and Transistor amplifier.	**05L**
UNIT-05	**Field Effect Transistor:** Construction and Characteristics of JFET, JFET Biasing Circuit, JFET Amplifier, MOSFET Construction and Characteristics.	**06L**
UNIT-06	**Basics of Communication System:** Introduction to Analog and Digital Communication Systems, Block Diagram Representation of Communication System, Basic idea of Transmitter and Receiver used for radio communication, Various Frequency bands used for Communication, Need of Modulation and Introduction to Cellular Communication.	**06L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Acquire basic knowledge on the working of various semiconductor devices

CO2: Know about the working principles of transistor with its different configurations which are helpful to design analog and digital applications

CO3: Understand the biasing requirements and circuits in BJT and FET

CO4: Develop analytical capability in designing of BJT and FET based circuits

CO5: Understand the idea of information transmission through analog and digital communication systems

Books and References

1. Integrated Electronics by J. Millman and C.C. Halkias, McGraw Hill Education, India.
2. Electronics Devices and Circuit Theory by R. Boylestad and L. Nashelsky, Pearson India.
3. Electronics Devices and Circuits-II by U. A. Bakshi and A. P. Godse, Technical Publications.
4. Electronic principles by L. Malvino, Tata McGraw Hill Education.
5. Semiconductor Devices by K. Kano, Prentice Hall Publication.
6. Electronic Communication Systems by G. Kennedy, McGraw Hill Education, India.

Course Name: **Basic Electrical Engineering**
Course Code: **EE-101**
Course Type: **Core**

Contact Hours/Week: **3L + 1T** Course Credits: **04**

Course Objectives

- To impart knowledge about the electrical quantities and to understand the impact of electricity in a global and societal context.
- To introduce the fundamental concepts relevant to DC and AC circuits and network theorems.
- Highlight the importance of electromagnetism and transformers in transmission and distribution of electric power.
- To explain the working principle, construction, applications of DC machines, AC machines & measuring instruments.

Unit Number	Course Content	Lectures
UNIT-01	**Analysis of DC Circuits:** Linear and non-linear circuits, circuit elements, various sources and source transformation, star delta transformation, solution of DC circuits using Kirchoff's laws, signal wave forms and passive elements specifications, Network theorems, response of first order circuits for DC excitation.	**07L**
UNIT-02	**AC Circuits, Domestic Electric Wiring & Storage Batteries:** Generation of AC sinusoidal voltage and currents, average and r.m.s. values, Form factor and peak factor, phasor representation in polar, rectangular and exponential forms, terminal relationship for pure passive elements and their combination in series and parallel, analysis of single phase series, parallel and series-parallel circuits, active and reactive power, power factor and volt-amperes, frequency response and Q-factor, analysis of balanced three phase AC circuits, concept of voltage, current and power in three phase balanced circuits, Basics of Domestic Electric Wiring and Storage Batteries.	**11L**
UNIT-03	**Electromagnetic Circuits and Transformer:** Magnetic circuit concept, B-H curves characteristics of magnetic materials, practical magnetic circuits, magnetic circuits with DC and AC excitation, hysteresis and eddy current losses, Magnetic force, self and mutual inductances, Faraday's laws, Lenz's Law, statically and dynamically induced emfs, energy stored in magnetic fields, Principle of Transformer operation, construction and equivalent circuit of transformer.	**09L**
UNIT-04	**Measuring Instruments:** Introduction to galvanometer (Moving coil and moving iron), ammeter, voltmeter, wattmeter, energy meter, use of shunt and multiplier.	**05L**
UNIT-05	**Electrical Machines:** Fundamentals of DC and AC machines.	**04L**

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Identify and predict the behavior of any electrical and magnetic circuit
CO2: Formulate and solve complex AC and DC circuits
CO3: Realize the requirement of transformers in transmission and distribution of electric power and other applications
CO4: Identify the type of electrical machines used for that particular application

Books and References

1. Fundamental of Electric Circuits by Charles K Alexander and Matthew N. O. Sadiku, TMH Publication.
2. Electrical Engineering Fundamentals by Vincent Del Toro, PHI Publication.
3. Basic Electrical Engineering by V N Mittal & Arvind Mittal, TMH Publication.
4. Basic Electrical Technology by A.E. Fitzgerald, McGraw Hill Publication.
5. Electrical Estimating and Costing by N Alagappan and B Ekambaram, TMH Publication.

Course Name: **Computer Programming Lab**
Course Code: **CS-102**

Contact Hours/Week: **2P** Course Credits: **01**

Course Objectives

- To provide skills for designing flowcharts and writing algorithms
- To provide skills for writing C programs
- To enable the students to debug programs

List of Experiments

1. Familiarity with Windows utilities and basic Linux commands
2. Programs related to operators and evaluation of expressions
3. Programs to illustrate use of arrays
4. Programs on operations over strings
5. Programs related to use of functions
6. Using pointers in programs
7. Programs on logical operators
8. Programs making use of structures and unions
9. Programs to perform operations over various data structures viz, linked lists, stacks, trees, etc.
10. Programs that read/write data from/to files
11. Programs using preprocessor directives
12. Use of command line arguments in program
13. Programs using graphics tools

Note: *The concerned Course Coordinator will prepare the actual list of experiments/problems at the start of semester based on above generic list.*

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Identify and abstract the programming task involved for a given problem
CO2: Design and develop modular programming skills
CO3: Trace and debug a program

Course Name: **Communication Skills Lab**

Course Code: **HS-102**

Contact Hours/Week: **2P** Course Credits: **01**

Course Objectives

- To provide skills for listening with understanding and speaking
- To provide skills 'correct' pronunciation of English language
- To enable the students to make oral and technically aided presentations

List of Experiments

Activities based on language software Sky Pronunciation/others:

1. Sky Pronunciation: Introduction to the Speech Sounds of English
2. Sky Pronunciation: Syllable and Organs of Speech
3. Sky Pronunciation: Vowel and Consonant Sounds
4. Sky Pronunciation: Similar sounds and test
5. Word Stress and Intonation using available software
6. Listening and Comprehension using available software
7. Listening to Native speakers of English language
8. Watching short talks for learning effective presentation skills
9. Presentation skills using technology enabled slides
10. Just a Minute (JAM) Sessions
11. Describing Objects/Situations/People
12. Interview skills using available software/interview videos

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Speak coherently

CO2: Make effective Presentations

CO3: Listen and comprehend English language

Course Name: **Engineering Physics Lab**

Course Code: **PH-102**

Contact Hours/ Week: **2P** Course Credits: **01**

Course Objectives

- To gain practical knowledge by applying the experimental methods to correlate with the theory
- To learn the usage of electrical and optical systems for various measurements
- Apply the analytical techniques and graphical analysis to the experimental data
- To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group

List of Experiments

1. To determine the specific resistance of a material wire using a post office box.
2. To find the area of a rectangle (or height of an inaccessible object) using a sextant.
3. Conversion of a galvanometer into Ammeter and Voltmeter of given range.
4. To verify the inverse square law of magnetism.
5. Study the variation of magnetic field with distance along the axis of a circular coil carrying current and to find the radius of the coil.
6. To determine the refractive index of a glass/ liquid (water) using Spectrometer.
7. To determine the wavelength of light using Newton's ring apperatus.
8. To verify the inverse square law for the intensity of radiation from a source of light.
9. To determine the wavelength of the Laser light using diffraction method.
10. To find magnifying power of a telescope by linear method.
11. To measure Young's modulus by bending of beam method.
12. Study of the attenuation and propagation characteristics of an optical fiber cable.
13. Other experiments as and when made available time to time.

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Handle equipments and take measurements and record data techniques for the experiments

CO2: Experimentally realize the physical phenomenon/ effects

CO3: Use different systems and instruments to measuring parameters with precision

CO4: Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

Course Name: **Engineering Chemistry Lab**

Course Code: **CY-102**

Contact Hours/Week: **2P** Course Credits: **01**

Course Objectives

- To analyse water samples for different parameters like amount of chloride ions, residual chlorine, alkalinity and hardness
- To measure physical properties of liquids
- To estimate the percentage of a particular metal in its ore or alloy
- To familiarize students about the characterization method like absorption spectroscopy

List of Experiments

1. Estimation of residual Chlorine in a given sample of water
2. Estimation of chloride content in a given sample of water by Mohr's method (Argentometrically)
3. Estimation of concentration of hydroxyl, carbonate, bicarbonate and total alkalinity in a given sample of water
4. Estimation of Hardness (Temporary and Permanent) in a given sample of water
5. Determination of quantity of Ferrous ions in a sample of water by $KMnO_4$ titration
6. Estimation of concentration of iron in an iron ore by dichrometry.
7. Estimation of Cu in a given sample of brass
8. Determination of Viscosity of unknown liquid by Ostwald's viscometer
9. Determination of surface tension of unknown liquid by drop number method.
10. Estimation of calcium in Limestone or Dolomite
11. Verification of the absorption laws by using Colorimetric method
12. Determination of the concentration of nickel using Absorption technique

Note: *The concerned Course Coordinator will prepare the actual list of experiments/problems at the start of semester based on above generic list.*

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Quantify different pollutants in water samples

CO2: Identify the unknown liquid from their surface tension and viscosity measurement.

CO3: Analytically measure the composition of alloy and ores

Course Name: **Electronics Engineering Lab**

Course Code: **EC-102**

Contact Hours/Week: **2P** Course Credits: **01**

Course Objectives

- Familiarization with electronic components and equipments
- Validate and verify the characteristics of various electronic devices
- Implementation of electronic circuits using different electronic components

List of Experiments

1. Familiarization of electronic components and equipments like CRO, function generator and power supplies etc.
2. To study the V-I characteristics of p-n junction diode and determine its static and dynamic resistance.
3. To study the characteristics of Zener diode and hence, calculate the dynamic resistance.
4. To study voltage regulator circuit using Zener diode.
5. To study and plot the waveform of half wave and full wave rectifier with and without capacitor filter.
6. To study and plot the input and output characteristics of CE (Common Emitter) transistor configuration and calculate its input and output resistance.
7. To study and plot the input and output characteristics of CB (Common Base) transistor configuration and calculate its input and output resistance.
8. To study and plot the input and output characteristics of CC (Common Collector) transistor configuration and calculate its input and output resistance.
9. To study the characteristics of FET (Field Effect Transistor) and calculate its dynamic resistance (r_d), mutual conductance (g_m) and amplification factor (μ).
10. To study the frequency response of single stage CE amplifier circuit using BJT and calculate the bandwidth (3 dB).
11. To study the frequency response of single stage amplifier circuit using FET and calculate the bandwidth (3 dB).
12. To study self bias circuit and calculate zero signal value of current and voltage.

Note: *The concerned Course Coordinator will prepare the actual list of experiments/problems at the start of semester based on above generic list.*

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Understanding of different meters and instruments for measurement of electronic quantities

CO2: Develop skills for designing electronics circuits and its practical implementation on breadboard

CO3: Understanding the characteristics of different electronic devices like diodes, BJT and FET

Course Name**: Electrical Engineering Lab**

Course Code: **EE-102**

Contact Hours/Week: **2P** Course Credits: **01**

Course Objectives

- To impart basic knowledge of electrical quantities such as current, voltage, power, energy etc.
- To familiarize students with basic circuit components and their connections.
- To explain working principle of electrical measuring instruments such as ammeter, voltmeter, wattmeter, energy meter, etc.

List of Experiments

1. To verify Ohm's law for BPLL (Bilateral Passive Linear Lumped) element.
2. To find for a filament lamp:
   i. Variation of resistance with voltage.
   ii. Variation of power with voltage.
3. To find minimum fusing current and fuse constant of a given fuse wire.
4. To calibrate a given voltmeter with the help of standard ammeter and resistance.
5. To calibrate a given ammeter with the help of standard voltmeter and resistance.
6. To find voltage current relationship in R-L series circuit and to determine power factor of the circuit.
7. To calibrate given wattmeter by direct loading.
8. To calibrate single phase energy meter by direct loading.
9. Verification of Kirchhoff's Laws:
   i. KVL (Kirchhoff's Voltage Law)
   ii. KCL (Kirchhoff's Current Law)
10. Determination of inductance of a coil using voltmeter, ammeter methods.
11. To verify total resistance R of the series connected resistances $R = R_1 + R_2 + R_3$

Course Outcomes

Upon successful completion of the course, the students will be able to

CO1: Verify fundamental laws like Ohm's Law, KCL, KVL, etc.

CO2: Use different meters and instruments for the measurement of common electrical quantities

CO3: Understand the importance of fuse as a safety device and study the parameters related with the selection of fuse wire

Evaluation System for Theory and Laboratory/Practical Courses

B.Tech./B.Arch./Dual Degree Programmes

A. Theory Courses [Having Lecture (L)/Tutorial (T) Contact Hours]

SN	Component	Weightage
1.	Continuous Assessment (Based on performance in assignments/quizzes/ tests/tutorials, etc.)	20%
2.	Mid Semester Examination	30% (1½ Hours)
3.	End Semester Examination	50% (03 Hours)

B. Practical Courses [Having Practical (P)/Drawing (D) Contact Hours]

SN	Component	Weightage
1.	Continuous Assessment (Based on quantity and quality of experiments/jobs, skills in handling equipment, performance in viva/tests, accuracy of outcomes/features, etc.)	60%
2.	End Semester Evaluation (Performance in practical/job/test/quiz/viva, etc.)	40%

C. Theory and Practical Courses (Engineering Workshop/Architectural Workshop/ Engineering Graphics)

SN	Component	Weightage
Continuous Evaluation		
1.	Continuous Assessment (Based on quantity and quality of experiments/jobs/drawings, skills in handling equipment, performance in viva/tests, accuracy of outcomes/features, etc.)	60%
End Semester Evaluation		
2.	Minor Practice Test (Written)	20% (01 Hour)
3.	End Semester Evaluation (Based on quality of job/drawing/project)	20% (03 Hours)

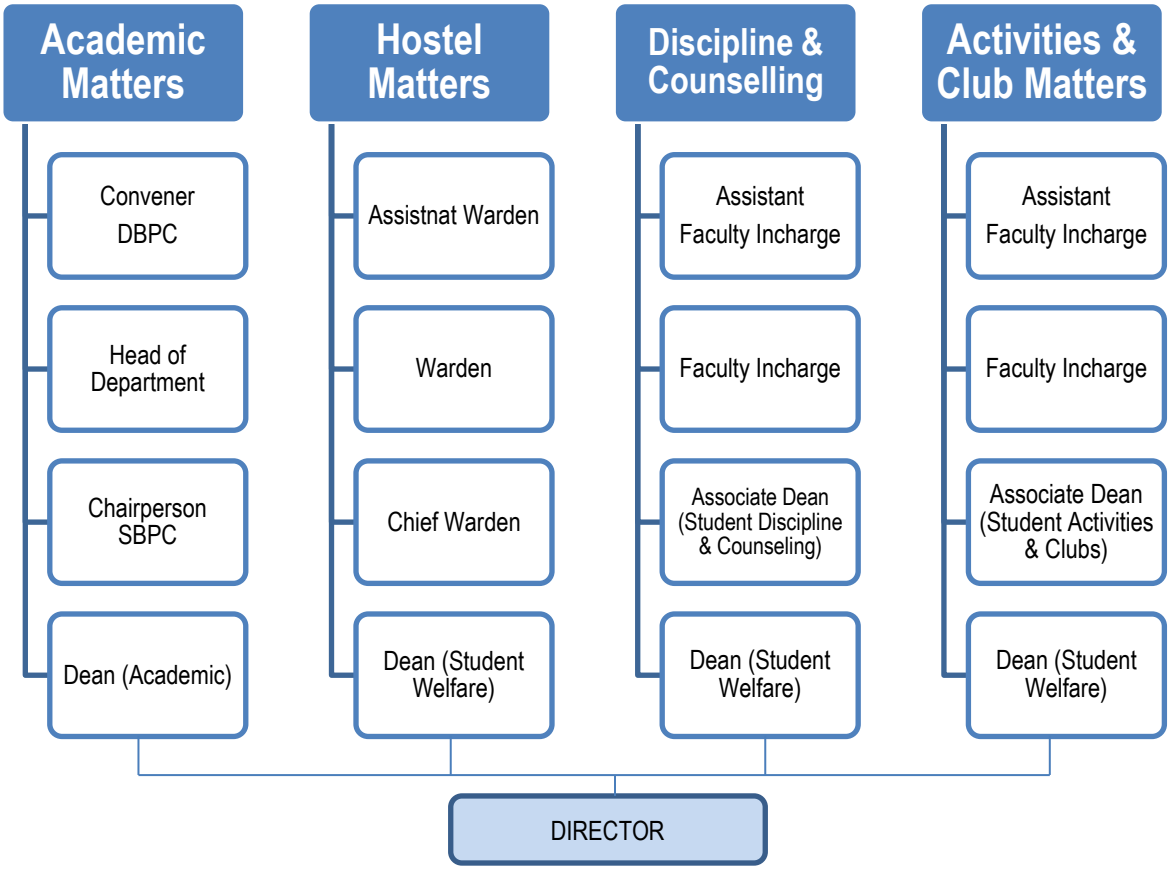
D. Theory and Practical Courses [Having Lecture (L)/Tutorial (T) and Practical (P)/Drawing (D) Contact Hours]

SN	Theory Component (Overall Weightage: 80%)		Practical Component (Overall Weightage: 20%)	
1.	Continuous Assessment (Based on performance in assignments/quizzes/ tests/tutorials, etc.)	20%	Continuous Assessment (Based on quantity and quality of experiments/jobs, skills in handling equipment, performance in viva/tests, accuracy of outcomes/features, etc.)	60%
2.	Mid Semester Examination	30% (1½ Hours)	End Semester Evaluation (Performance in practical/job/test/quiz/viva, etc.)	40%
3.	End Semester Examination	50% (03 Hours)		

E. Studio Courses [Having Lecture (L) and Drawing (D) Contact Hours in B.Arch. Courses]

SN	Component	Weightage
1.	Continuous Assessment (Based on quantity and quality of experiments/jobs, skills in handling equipment, performance in viva/tests, accuracy of outcomes/features/design problems, etc.)	80%
2.	End Semester Evaluation (Performance in practical/job/test/quiz/viva, etc.)	20%

Student Related Authorities for Various Matters



Institute Central Facilities

Computer Center	Computer Centre is a central facility related to computing, communication and networking services
Central Workshop	As part of Department of Mechanical Engineering, the Central Workshop imparts practical training to students of all departments in the shop floor
Health Center	Provides treatment for different diseases and also provide first aid to the injured. Institute ambulance is available for serious cases
Central Library	Home of almost 90000+ books and journals and can accommodate more than 500 students
Auditorium	Used to organize various Institute events
Open Air Theater	Used to organize students functions
SBI Branch	Ground Floor, Estate Office Building
Post Office	First Floor, Estate Office Building (Above SBI Bank)
Eateries	Amul, Verka, Juice Bar, HPMC and 4H
Book Shops	One near Estate Office and one at Main Gate
Other Shops	Photostat and Printing Shop (Near Estate Office), Two Confectionaries Shops (one near Estate Office and one at Main Gate), One Vegetable and Fruits Shop (Main Gate), One Daily Need Shop (Main Gate), Patanjali Store (Gate II)
Laundry Shops	One near SBI Bank and one near Gate II


प्रशासनिक भवन
ADMINISTRATIVE BLOCK