

NATIONAL INSTITUTE OF TECHNOLOGY SIKKIM

SEMESTER- I

Course Code: MA11101

Course Title: MATHEMATICS – I

L	T	P	C
3	1	0	4

Module I: Linear algebra

Algebra of Matrices, rank and inverse of a matrix, solution of algebraic equations-consistency, Hermitian, skew Hermitian and unitary matrices, eigenvalues and eigenvectors. Vector space-linear dependence of vectors, basis, dimension, linear transformations. **9**

Module II: Numerical Analysis

Numerical Analysis: finite difference, Newton's forward and backward interpolation formulae, Trapezoidal and Simpsons $1/3^{\text{rd}}$ rules for numerical integration, Solution of polynomial and transcendental equation-bisection, Newton-Raphso'n and regula-falsi methods. **11**

Module III: Differential equations

Introduction, formation of differential equation form a given n-parameters family of curve; solution using separation of variables, solution of homogeneous equation, First order differential equation-exact, integrating factor, linear and Bernoulli's equations, higher order differential equation with constant coefficients. **10**

Module IV: Partial Differential Equation

Partial differential equation-formulation and classification of PDE; linear partial differential equation of the first order (Lagrange's method) non-linear PDE of the first order (Charpit's method). **10**

Text Books:

1. S. L. Ross, Differential Equations, 3rd edition, Wiley India, 1984.
2. I.N. Sneddon, Elements of Partial Differential Equations, McGraw Hill, 1957.
3. G. Strang, Linear Algebra and Its Applications, 4th edn. Brooks/Cole India, 2006.
4. Conte and De Boor, Elementary numerical analysis: an algorithmic approach, McGraw- Hill, 1972.
5. K. Hoffman & R Kunze, Linear Algebra, 2th edn. Pearson Education India, 2003.
6. Numerical Methods By M. K. Jain, S. R. K. Iyengar & R. K. Jain

Reference Books:

NATIONAL INSTITUTE OF TECHNOLOGY SIKKIM

1. Hoffman K & Kunze R, Linear Algebra, Prentice Hall of India, New Delhi (1971).
2. S.J. Farlow, Partial Differential Equations for Scientists and Engineers, Dover Publications, 1993.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9th edn., Wiley India, 2009.
- 4.

CY11101 / CY12101: ENGINEERING CHEMISTRY

L	T	P	C
3	0	0	3

Module 1: Energy and Fuels (14 hours)

Sources of Energy, Fuels- classification, examples, relative merits, types of coal, determination of calorific value of solid fuels, Bomb calorimeter, theoretical oxygen requirement for combustion, proximate & ultimate analysis of coal, manufacture of metallurgical coke, flue gas analysis, problems. Lubricants - Definition, theories of lubrication, characteristics of lubricants, viscosity, viscosity index, oiliness, pour point, cloud point, flash point, fire point, additives to lubricants, Solid lubricants. Renewable sources of Energy (Solar Energy): Photovoltaic Cells and how it converts Light into Electricity.

Module 2: Electrochemistry and Corrosion: (8 hours)

Basic idea about Electrode Potentials and Cells, Galvanic vs. Electrolytic Cell, Nernst Equation, Battery, Fuel Cells. Corrosion-types, Electrochemical theory, Different forms of wet corrosion, Galvanic (or Corrosion) series, Corrosion control, Techniques of metal Coating (Organic, Inorganic), Cathodic protection, Corrosion inhibitors.

Module 3: Solid State (12 hours)

The solid state, Structures of Simple ionic compounds, Close packing in solids, bcc, fcc, structures of rock salt - cesium chloride- spinel - normal and inverse spinels, Stoichiometric Defect, controlled valency & Chalcogen semiconductors, Non-elemental semiconducting Materials, Preparation of Semiconductors-steps followed during the preparation of highly pure materials and further treatments. Semiconductor Devices-p-n junction diode. Steel and important alloys.

Module 4: Nanoscience & Nanotechnology (8 hours)

Introduction, scope of Nanoscience & Technology, Types of nanomaterials, Categories of nanomaterials, Nanotechnology, Quantum dots, Organic nanoparticles, Inorganic-organic Hybrid nanoparticles, Nano-intermediates, Nanocomposite materials.

Text Books

T1: Wiley Engineering Chemistry, 2nd Edition, Wiley (India)

T2: Engineering Chemistry, 2nd Edition, O.G. Palanna, McGraw Hill Education (India) Pvt. Ltd., Chennai, 2017

Reference Books

R1: Engineering Chemistry, P.C. Jain, M. Jain, Dhanpat Rai Publishing Company, New Delhi, 2005.

R2: A Text Book of Engineering Chemistry, Shashi Chawla, 3rd Edition, Dhanpat Rai & Co, New Delhi, 2007.

R3: Engineering Chemistry, B.K. Sharma, Krishna Prakashan Media (P) Ltd

L	T	P	C
2	0	0	2

Module 1: Basics of Environmental Studies

Multidisciplinary nature of environmental studies. Renewable and non-renewable resources and problems associated with overexploitation – forests, water, minerals, food, energy, land. Role of an individual in conservation of natural resources, equitable use of resources for sustainable lifestyles. Concept of an ecosystem, Structure and functions of an ecosystem, Producers, consumers and decomposers, Energy flow, Ecological succession, Food chains, food webs and ecological pyramids, Types, characteristic features, structure and functions of the following ecosystems – forests, grasslands, deserts, and aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries). Biodiversity – Definition, Genetic, species and ecosystem diversity. Conservation : general information, types and importance. Biogeochemical cycles: Carbon, Nitrogen, Sulfur etc.

Module 2: Environmental Pollution and Protection

Environmental pollution – Definition, causes, effects and control measures, Types of pollution: (general) for water, soil, marine, noise, nuclear and thermal pollution. Bioplastics and advantages, Air pollution and control – sources, pollutants and their health effects, particulate and gaseous pollution control devices (fundamentals). Solid waste management – Generation, on site handling and storage, transfer and transport, processing, resource recovery, treatment and disposal. Role of an individual in prevention of pollution. Case studies. Social Issues and the Environment - from unsustainable to sustainable development. Environmental ethics - Issues and possible solutions. Legislation in India - Environment Protection Act, Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Other acts, Issues involved in enforcement of environmental legislation, Public awareness.

Module 3: Human Population Health and Environment

Human population and the environment – Population growth and characteristics , commonly occurred diseases (air borne, water borne etc.), Family welfare programme, Environment and human health, Human rights, HIV/AIDS, techniques of water purification electro-dialysis, reverse osmosis, water conservation, rain water harvesting etc.

Module 4: Disaster Management

Basic objective of Disaster and safety management, floods, earthquakes, cyclone and landslides: Causes, Effects and Management, Rules and regulations of safety departments, Safety activities of the ILO (International Labour Organization). National Safety Rules and Practical applications.

CS11101	Computer Programming and Problem Solving	2-0-0	2
<p>Module 1[3L]: Problem Solving Skills, Identify the Problem, Analyze the problem, Identify Decision Criteria, Develop Multiple Solutions, Choose the Optimal Solution, Problem Implementing Solutions.</p>			
<p>Module 2 [3L]: Overview of C language, Basic Structure of C program, Constants, Variables and Data Types, User-defined Data Types, Operators and Expressions, Precedence and Associativity.</p>			
<p>Module 3[10L]: Input-Output Operations, Decision Making, Branching and Looping Statements, Arrays, Character Arrays and Strings.</p>			
<p>Module 4[12L]: User-defined Functions, Structures, Unions, Debugging Strategies.</p>			
<p>Module 5[12L]: Pointers, Dynamic Memory Allocations, File Management, Introduction to Preprocessor Commands and Macro Processing, argv, argc.</p>			
<p>Books:</p> <ol style="list-style-type: none"> 1. C Programming by Deital and Deital. 2. Programming in ANSI C, E. Balaguruswamy, 5th Edition McGraw Hill. 3. The C Programming Language, Brian W. Kernighan, Dennis M. Ritchie, Prentice Hall. 4. Programming With C, Byron Gottfried, McGraw Hill. 			

CS 11201	Computer Programming Laboratory	0-0-4	2
<ul style="list-style-type: none"> • Input and Output programs • Control Loop programs • Conditional Execution programs • Structure and Nesting programs • Functions and Prototype programs • Array programs • Pointer programs 			
<p>Books:</p> <ol style="list-style-type: none"> 1. C Programming by Deital and Deital. 2. Schaum's Outline of Programming with C by Byron Gottfried 3. Programming in ANSI C by E. Balagurusamy 			

CS11102	Introduction to Computer Systems	2-0-0	2
<p>Module 1 [6L]: Number System and Codes: Data Representation, Concept of Radix and Representation of Numbers in Radix r with Special Case of r=2, 8, 10 and 16; Conversion from Radix r1 to Radix r2; General Concept of r's and (r-1)'s Complements; Signed and Unsigned Representation of Integer, 1's, 2's Complement and Floating Point and their Machine Representation. Binary Arithmetic; Character Representation-ASCII, EBDIC, UNICODE.</p>			
<p>Module 2 [6L]: Programming Languages and Translators – Concept of High-Level, Assembly and Low Level Languages, Relative Merits & Demerits, Working of Assembler, Interpreter and Compiler. Problem Solving through Algorithm, Flow-chart, Pseudo Code.</p>			
<p>Module 3 [6L]: Introduction: Stored Program Architecture of Computers and Block Diagram, Evolution of Processors (In terms of word Length & Speed, Instructions per Second), Hardware and Software, Classification of Computer System, Computer Architecture- RISC vs CISC, Concept of Primary & Secondary Memory, Storage Devices Classification, Hierarchy, Working Principle, Access Methods, Structure of Hard Disk System & Organization of Data; Cache Memory.</p>			
<p>Module 4 [6L]: Introduction to Multiprogramming: Multitasking, Multiprocessor, Time-sharing, Batch-processing, Interactive Computing; Distributed, Client-Server, Peer-to-Peer Systems. Introduction to Operating System: Need for Operating System, Functions of Operating System (Functions of Process Management, Memory Management, File Management and Device Management), An Introduction to Linux OS and Commands. Classification of Software's: System Software, Application Software. Open Source Software.</p>			
<p>Books:</p> <ol style="list-style-type: none"> 1. Computer Fundamentals by P. K. Sinha & Priti Sinha, BPB Publications, 1992. 2. Introduction to Computers by Norton Peter, 4th Ed., TMH, 2001 3. Fundamentals of Computers by Reema Thareja, Oxford University Press, 2014. 4. Introduction to Computers by V. Raja Raman, PHI, 5. Introduction to Computers by Alex Leon & Mathews Leon, Vikas Publishing House, 1999. 6. Comdex Computer Kit by Vikas Gupta, Wiley Dreamtech, Delhi, 2004 			

HS11101 - English Language & Literature – 3-0-0-3

Module 1: Basics of English Grammar and Phonetics 12

Synonyms, Antonyms, One word substitution, Idioms and Phrases, Article and Preposition, Subject Verb Agreement, Basics of phonetics

Module 2: Language through Literature 13

Essays: 1. *Of Studies* by Francis Bacon, 2. *On Doing Nothing* by J.B Priestley, 3. *English in India* by R. K. Narayan

Poems: 1. *Ode to the West wind* by P. B. Shelley 2. *Where the Mind is Without Fear* by Rabindranath Tagore 3. *The Tyger* by William Blake 4. *Marriage of True Mind* by William Shakespeare

Module 3: Writing for practical purposes 10

Film Appreciation, Poetry Appreciation, Letter Writing, Paragraph Writing, Essay Writing,

Module 4: Non-detail Study

Wings of Fire: A.P.J. Abdul Kalam

Or

Malgudi Days: R.K. Narayan

Reference Book

1. Swan, Michael. Practical English Usages. Oxford University Press.
2. Wood, F.T. A Remedial English Grammar for Foreign Students. Macmillan.
3. Pleasures of Reading: An Anthology of Poems, Orient Longman.
4. Selected Essays and Short Stories, Oxford University Press.
5. Selected Poems, Oxford University Press.

**CIVIL WORKSHOP
(CE11201)**

L	T	P	C
0	0	2	1

List of Experiments:

1. Introduction to Civil Engineering.
2. Ranging.
3. Introduction to measuring instrument of Civil Engineering.
4. Specific Gravity of aggregate.
5. Measurements of bricks and introduction to different types of bonds.
6. Grading of Course aggregates.
7. Grading of fine aggregates.
8. Fineness of cement.
9. Moisture content of Soil.
10. Plumbing and sanitary fitting.

CY11201 / CY12201: ENGINEERING CHEMISTRY LABORATORY

L	T	P	C
0	0	2	1

Programme – B.Tech (Common to All)

Subject Credit – 1.0

1. Determination of the alkalinity in a given water sample
2. Determination of available chlorine in the given sample of bleaching powder
3. Alkaline Hydrolysis of Benzamide to Benzoic Acid
4. Estimation of Fe(II) in Mohr's Salt solution using standard $K_2Cr_2O_7$ solution.
5. Conductometric titration of an unknown acid solution using a standard base solution.
6. Determination of total hardness of water
7. Estimation of sodium carbonate and sodium bicarbonate in a given mixture
8. Calculation of viscosity coefficient of sucrose solution using Ostwald's Viscometer
9. Standardization of $KMnO_4$ by oxalic acid
10. Estimation of Fe(II) in Mohr's Salt solution using standard $KMnO_4$ solution.
11. Standardization of $Na_2S_2O_3$ solution with standard $K_2Cr_2O_7$

Course Code: ENGINEERING GRAPHICS
Course Title: ME11202
Pre-requisite: Nil

L-T-P-C
0-0-3-2

Course Content

- 1. Introduction:** Overview of the Course
- 2. Lines Lettering and Dimensioning:** Types of lines, Lettering, Dimensioning, Geometrical Constructions, Polygons, Scales, and Curves.
- 3. Orthographic Projection:** Principles of Orthographic Projection, Projections of Points, Straight Lines and traces, Projections of Laminas, Projections of Solids.
- 4. Section of Solids:** Sectional planes, Sectional views - Prism, pyramid, cylinder and cone, true shape of the section. Development of truncated objects.
- 5. Development of Surfaces:** Draw the development of surfaces for Prisms, Cylinders, Pyramid and Cones.
- 6. Isometric views:** Isometric axis, Isometric Planes, Isometric View, Isometric projection, Isometric views.

Text Books/References

1. Bhatt N. D, Elementary Engineering Drawing, Charotar Publishing House, Anand, 2002.
2. Dhawan, R. K., A Textbook of Engineering Drawing, S. Chand Publishing, 2012.
3. Narayana K L & Kannaiah P, Engineering Graphics, Tata McGraw Hill, New Delhi, 1992.
4. Luzadder W J, Fundamentals of Engineering Drawing, Prentice Hall of India, New Delhi, 2001.
5. Venugopal K, Engineering Drawing & Graphics, New Age International Pvt. Ltd., New Delhi, 1994.

Course Code: MECHANICAL WORKSHOP
Course Title: ME11203
Pre-requisite: Nil

L-T-P-C
0-0-2-1

Course Content

1. **Lathe Practice:** Study the different types lathe operations, Exercise- step turning, taper turning, facing, roove making, thread cutting, and knurling operation
2. **Grinding:** Study of grinding wheel, Surface grinding, up grinding and down grinding, Spark out, Exercise- Making a flat surface by using surface grinder.
3. **Smithy/Foundry:** Study of tools, forging of square or hexagonal prism/ chisel/bolt/ Study of tools, sand preparation, moulding practice, Casting and Pattern making.
4. **Milling:** Milling job, groove cutting, key channel cutting, up milling and down milling.
5. **Drilling:** Study of drilling accessories and instruments.

Text Books/References

1. Hajra Choudhury. Workshop Technology Vol 1 & 2, Media Promoters & Publishers Pvt. Ltd, Bombay, 2004
2. Chapman W.A.J., Workshop Technology. Parts 1 & 2, 4th Edition, Viva Books P. Ltd., New Delhi, 2002
3. Welding Handbook. Miami, American Welding Society, 2000
4. Metals Handbook. Vol 6, Welding, Brazing & Soldering. Metals Park, Ohio, American Society of Metals, 1998

**CIVIL WORKSHOP
(CE11201)**

L	T	P	C
0	0	2	1

List of Experiments:

1. Introduction to Civil Engineering.
2. Ranging.
3. Introduction to measuring instrument of Civil Engineering.
4. Specific Gravity of aggregate.
5. Measurements of bricks and introduction to different types of bonds.
6. Grading of Course aggregates.
7. Grading of fine aggregates.
8. Fineness of cement.
9. Moisture content of Soil.
10. Plumbing and sanitary fitting.

NATIONAL INSTITUTE OF TECHNOLOGY SIKKIM

SEMESTER- II

Course Code: MA12101

Course Title: Mathematics-II

L	T	P	C
3	1	0	4

Module I: Laplace and Fourier Transform

Laplace and inverse Laplace Transform, Existence of Laplace Transform, Linear property, Convolution Theorem, Solution of ordinary differential equation by Laplace Transform.

Fourier series, Fourier transforms, properties of Fourier Transform, sine and cosine transforms
Inverse Fourier Transform. **13**

Module I: Vector Calculus

Vector Calculus: Scalar and vector fields, level surfaces, directional derivative, Gradient, Curl, divergence, Laplacian, line and surface integrals, theorems of Green, Gauss and Stokes(statement only).

8

Module III: Probability

Random experiments, sample space, events, probability and conditional probability, Baye's theorem, Probability space, random variables, probability distribution and density functions, expectation (mean and variance). Standard distributions: Binomial distribution, Poisson. Continuous distributions: uniform, normal and exponential. **10**

Module IV: Single variable calculus

Rolle's Theorem, Mean Value Theorem, Maxima and Minima, Sequences, Limits of a sequence and its properties, Series of positive terms, Necessary condition for convergence, Comparison test, D Alembert's ratio test, Cauchy's root test, Taylor Series. **9**

Text Books:

1. G. B. Thomas Jr. and R. L. Finney, Calculus and Analytic Geometry, 9th edition, Pearson Education, India, 1996.
2. Robert Bartle & Donald Sherbert, Introduction to Real Analysis, John Wiley & Sons(2014).
3. T. M. Apostol, Calculus- Vol 2, 2nd Edition, Wiley India, 2003.

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4. D. Bhatta and L. Debnath, Integral Transforms and their applications, 3rd edn.,CRC, 2014.

References:

1. Johnson, R. A., Miller and Freund's Probability and Statistics for Engineers, 6th edition. PHI, 2004.
2. S. R. Ghorpade and B.V. Limaye, An Introduction to Calculus and Real Analysis, Springer India, 2006.
3. Levin R. I. & Rubin D. S., Statistics for Management, 7th edition, PHI, New Delhi, 2000.
4. S.M. Ross, Introduction to Probability and statistics for Engineers, 3rd edition, Academic Press, Delhi, 2005.

Subject- Engineering Physics

<i>L</i>	<i>T</i>	<i>P</i>
3	0	0

Module 1 (Theory of Relativity)

[9]

Special theory relativity: Frames of reference, Galilean Relativity, Michelson-Morley experiment, postulates of Special Theory of Relativity, simultaneity, length contraction, time dilation, velocity addition, mass energy relation.

Module 2 (Quantum Mechanics)

[16]

Introduction to Quantum mechanics, Wave nature of Particles, Time-dependent and time-independent Schrodinger equation for wavefunction, Born interpretation, probability current, Expectation values, Free-particle wavefunction and wave-packets, Uncertainty principle.

Solution of stationary-state Schrodinger equation for one dimensional problems– particle in a box, particle in attractive delta-function potential, square-well potential, linear harmonic oscillator.

Numerical solution of stationary-state Schrodinger equation for one dimensional problems for different potentials. Scattering from a potential barrier and tunneling. Three-dimensional problems: Particle in three dimensional box and related examples.

Module 3 (Laser)

[7]

Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne), solid-state lasers (ruby), properties of laser beams: monochromaticity, coherence, directionality and brightness, applications of lasers in science, engineering and medicine.

Module 4 (Fibre Optics)

[10]

Optical fibre, physical structure and basic theory, modes in optical fibres, step index and graded index fibres, losses in optical fibres, sources, applications of optical fibres in communication.

Reference Books:

1. Engineering Physics, HK Malik and AK Singh
2. Engineering Physics, DK Bhattacharya and Poonam Tandon
3. D. J. Griffiths, Introduction to Quantum Mechanics
4. Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles by Eisberg and Resnick
5. Optical Electronics, Ajoy Kumar Ghatak and K. Thyagarajan

Course Title: ENGINEERING MECHANICS
Course Code: ME12101
Pre-requisite: Nil

L-T-P-C
3-0-0-3

Course Content

MODULE 1 (12 hours)

Introduction: Concept of force, force system, Fundamental laws and principles, principle of transmissibility, particle, rigid body, accuracy limit and approximations.

Coplanar Concurrent Force System: Resultant of a force system, graphical principles parallelogram law, triangle law, polygon rule, analytical method, conditions of equilibrium, space diagram and free body diagrams, Lami's theorem.

Coplanar Non-Concurrent Force System: Moment of a force, Varignon's theorem, couple, properties of couples, resultant of non-concurrent force system, conditions of equilibrium, equilibrant, equilibrium of two-force system and three-force system, types of supports, types of loads.

Concept of Friction: Laws of dry friction, angle of friction, coefficient of friction, belt friction. Problems related to equilibrium of coplanar force system with friction, ladder problems, belt friction problems.

MODULE 2 (10 hours)

Centroids and Second Moment of Areas:

(a) *Centroid:* Definition of centre of gravity, centroid of area, centroid of line, concept of line of symmetry, location of centroid by direct integration of rectangular, triangular, semi-circular and quarter circular areas, centroid of composite areas.

(b) *Second Moment of Area:* Definition, parallel axis theorem, polar moment of area, radius of gyration, second moment of area by direct integration of a rectangular, triangular, circular, semi-circular and quarter-circular area. Second moment of composite area.

MODULE 3 (10 hours)

Kinematics: Definition of kinematics, kinetics, displacement, velocity, acceleration, relationship between them, problems involving variable acceleration, equations of motion under constant acceleration, motion under gravity, projectile motion.

Application of Newton's Second Law: Newton's second law, definition of unit force, problems of rectilinear motion, motion of connected bodies.

MODULE 4 (10 hours)

Application of Work-Energy Principle: Definition of work, energy, power, efficiency, derivation of work-energy equation, problems of rectilinear motion, motion of connected bodies.

Application of Impulse-Momentum Equation: Definition of linear momentum, impulse, derivation of impulse-momentum equation, conservation of linear momentum, problems related to rectilinear motion, motion of connected bodies, conservation of momentum.

Text Books/ References

1. . H. Shames, Engineering Mechanics—Statics and Dynamics, 4th Edition, Prentice Hall of India, 1996.
2. F.P. Beer and E.R. Johnston, Vector Mechanics for Engineers – Statics, McGraw Hill Book Company, 2000.
3. J.L. Meriam and L.G. Kraige, Engineering Mechanics – Statics , John Wiley & Sons, 2002.

Second Semester

CS12101	Foundation of Computing	3-0-0	3
<p>Module 1 [12L]:Linear Data Structure Introduction of Data Structure; Need and Applications; Abstract Data Type; Dynamic Memory Allocation; Array; Linked List; Stack and Queues; Priority Queues - Implementation and Applications.</p>			
<p>Module 2 [6L]: Sorting, Searching; Sorting techniques- need; Types of Sorting, selection sort, Quick Sort; Searching techniques: need; Linear Search, Binary Search; Implementation and Applications of all.</p>			
<p>Module 3[6L]: Introduction to Logic: Propositional Logic, Predicate Logic.</p>			
<p>Module 4[8L]:Computer Networks and Internet Basics Computer Networks and Internet, Categories of Networks: Wired, Wireless, Sensor, LAN, WAN, PAN; network topologies need, and type, network switching: Packet and Circuit Switching, Protocol Layers and their functions (example protocol on each layer), Application Layer Protocols, E-mail, FTP, WWW and HTTP. Introduction to Cyber Security and Forensics with needs.</p>			
<p>Module 5[8L]: Introduction to Machine Learning, Artificial Intelligence and Fuzzy logic, Internet of Things, Natural Language Processing, Big Data, Mobile Computing, Cloud Computing.</p>			
<p>Books:</p> <ol style="list-style-type: none">1. Data structures in C by H. Sahani2. Computer Networking: A Top-Down Approach Featuring Internet by J. F. Kurose and K. W. Ross, 3/e, Pearson Education, 2005.3. Machine Learning by Tom Mitchel, TMH			
<p>Reference:</p> <ol style="list-style-type: none">4. Data Structures by Tanenbum5. Data Communications and Networking by Forouzan			

NATIONAL INSTITUTE OF TECHNOLOGY SIKKIM

Course Code: EE 11201

L-T-P-C

Course Title: ELECTRICAL WORKSHOP

0-0-2-1

Suggestive list of experiments:

1. Familiarization with Electrical and Electronic components
 - a. Different types of cables/wires and switches and usage of those
 - b. Wiring tools, lighting and wiring accessories, various types of wiring
2. Assembling of a given Electrical circuit
 - a. On a bread board
 - b. Soldering components, solders, tools, heat sink
 - c. Complete one given circuit using PCB; e.g. doorbell
 - d. Wiring of a multi-pin extension board
3. Wiring for light (e.g. fluorescent lamp/CFL/LED light) or Fan
 - a. controlled by one switch
 - b. controlled by two SPDT switch
4. Electric shock phenomenon and preventions
 - a. Earthing and its construction
 - b. Usage of different types of fuses e.g. MCB, ELCB
 - c. Wiring of fluorescent lamp controlled by one switch from panel with MCB
5. Working with measuring devices
 - a. Ammeter, voltmeter, wattmeter and multi-meter
 - b. Single phase and three phase energy meters
6. Exploration of domestic appliances and components e.g. mixer machine, electric iron, fan motor, pump motor, battery
7. Wiring of backup power supply e.g. inverter for domestic installations
8. Hands on with Microcontroller and IoT devices e.g. PIC, ATmega, Arduino, Raspberry Pi and peripheral components
9. Hands on with sensors and development of applications as a short term project e.g.
 - a. Inertial sensors; applications - drone, control, navigation
 - b. Hall effect sensors, applications – current measurement, magnetic field intensity measurement
 - c. Piezoelectric sensors; applications – pressure measurement, force measurement, weight measurement
 - d. Ultrasonic sensors; applications – distance measurement, water level measurement
 - e. Infrared PIR motion sensor; applications – thermal imaging, military applications
 - f. Tactile and Pressure; applications – touch sensitive applications, pressure measurement
 - g. Gas sensors; application – smoke detection.

HS12101 - Human Values and Effective Communication – 3-0-0-3

Module1:Human Values through Literature **10**

Source Material: Any one of the prescribed novels:

1.**Kanthapura** by Raja Rao

2.**The Guide** by R.K. Narayan

Value of self, others and society, culture – Indian and Western, gender empowerment, nationalism, humanism, professionalism, honesty, happiness, integrity, reliability, spirituality, compliance with law and social norms.

Module 2: Communication **12**

Communication: definition, process of communication, types and forms of communication, barriers to communication, role and importance in the corporate world, tools of communication and group discussion.

Module 3: Communication for practical purposes **13**

Developing reading, writing, listening and speaking skills, Importance & barriers to them.

Interview: definition, types, forms, plan and preparation.

Presentation: definition, types and forms.

Proposal: definition, types and forms.

Public speaking: types and forms.

Visual communication: types and forms

Reference Book:

1. Raman, M & S. Sharma. *Technical Communication: Principles and Practice*. OUP, New Delhi, 2015.
2. Kumar, S & Lata, P. *Communication Skills*. OUP, New Delhi, 2015
3. Rao, Raja. *Kanthapura*. Orient Paper Back, New Delhi, 1970.
4. Narayan, R.K. *The Guide*. Penguin Classics, New Delhi, 2006.

Engineering Physics Laboratory (PH11201)

L	T	P	C
0	0	2	1

1. FOUR PROBE:

To determine the band gap energy and the resistivity of semiconductor by Four Probe Method.

2. LASER DIODE:

- i) To study the shape of the laser beam cross section and to evaluate beam spot size.
- ii) To find the divergence angle of laser beam.
- iii) To study the polarizing nature of laser.

3. MAGNETIC FIELD:

- i) To study the variation of magnetic field with distance along the axis of a circular current carrying coil and to calculate diameter of the coil.
- ii) To study the principle of superposition of magnetic field and in particular to study the axial variation of the magnetic field due to both the coils when the distance between them is a) Less than the radius of the coils. b) Equal to it. c) More than it.

4. HALL EFFECT:

To calculate the Hall Coefficient, Carrier Density, Carrier Mobility of the sample material.

5. NEWTON'S RING:

Determination of the radius of curvature of the lower surface of a plano-convex lens by using Newton's Ring apparatus.

6. QUINCKE'S METHOD:

Measurement of Susceptibility of a liquid or a solution by Quincke's Method.

7. PLANCK'S CONSTANT:

Determination of Planck's Constant by using LED.

8. MAGNETORESISTANCE:

Measurement of Magnetoresistance of Semiconductors.

9. To study the forward and reverse characteristics of a p-n junction and Zener Diode.

10. To calculate the Coercivity, Saturation Magnetization, Retentivity of a sample by using Hysteresis Loop Tracer.

CS12201	Computing Laboratory	0-0-2	1
<p>1) You are required to write the programs in c on the integer array for following operations</p> <ol style="list-style-type: none"> To insert the elements in the integer array and to display the number of negative elements of the array and also to display the prime elements of the array. Write function that can find the largest element in the array. Array must be used as parameter. Write a program that invokes the above function (b) to find the largest element and print it out. Write function that can find the largest element in the integer array using pointer arithmetic. Write a program that invokes the above (d) function to find the largest element and displays the result out. <p>2) You are required to write the program in C to:</p> <ol style="list-style-type: none"> Define a structure with two fields: width and height for rectangle. Input an array of rectangle, then display each area and perimeter of each rectangle in array. Use the pointer to loop around the array for the same (a). <p>3) Write a program in c that receives a number n and return a pointer to the character string containing the name of the corresponding month.</p> <p>4) You are required to define a structure named UP with the following three members:</p> <ul style="list-style-type: none"> • A character array city[] to store names. • A long integer to store the population of the city. • A float member to store the literacy level. <p>Then write a program to do the following:</p> <ol style="list-style-type: none"> To read the details of 5 cities randomly using an array variable. To sort the list alphabetically. To sort the list based on literacy level. To sort the list based on population. To display the sorted lists. <p>5) As you have studied structure and pointer in the last semester. You are required to write programs using structure containing a pointer member name to represent the information about a person.</p> <ol style="list-style-type: none"> To read the information about a person and to print it on the screen. To initialize data of several employees and print it in tabular format. Use the function emp_print() the data of a single employee. To create and print a list of persons and their mobile number. Use nested structure and pointer members. <p>6. Write a program to implement a single link list to perform the following operations</p> <ol style="list-style-type: none"> Insertion at the beginning, at end and at any position of the list. Deletion at the beginning, at end and at any position of the list. Traverse the single link list <p>7. Write a program to implement stack using static and dynamic representation and perform Insertion and Deletion.</p> <p>8. Write a program to implement queue using static and dynamic representation and perform Insertion and Deletion.</p> <p>9. Write a program to implement binary tree using link list.</p> <p>10. Write a program to implement linear and binary search.</p> <p>11. Write a program to sort a list of elements using bubble sort and selection sort.</p>			

Course Title: WORKSHOP PRACTICE
Course Title: ME12201
Pre-requisite: Nil

L-T-P-C
0-0-3-2

Course Content

Introduction to Mechanical Workshop: Study of Workshop rules and safety considerations indifferent machinery usages and machine tools.

Carpentry: Study of tools and joints – planning, chiselling, marking and sawing practice, one typical joint- Tee halving/Mortise and Tenon/ Dovetail

Fitting: Study of tools- chipping, filing, cutting, drilling, tapping and threading about male and female joints, stepped joints- one simple exercise of single V joint for welding exercise.

Sheet Metal work: Study of tools, selection of different gauge sheets, types of joints, fabrication of a tray or a funnel

Lathe Exercise: Study of the basic lathe operations, a simple step turning exercise.

Welding Practice: Study and practice of manual metal arc welding (MMAW). Exercise of Butt joint/Lap Joint/Corner Joint/Tee Joints.

Text Books/References

1. Chapman W.A.J., Workshop Technology. Parts 1 & 2, 4th Edition, Viva Books P. Ltd., New Delhi, 2002
2. Hajra Choudhury, Workshop Technology Vol 1 & 2, Media Promoters & Publishers Pvt. Ltd, Bombay, 2004
3. Welding Handbook. Miami, American Welding Society, 2000
4. Metals Handbook. Vol 6, Welding, Brazing & Soldering. Metals Park, Ohio, American Society of Metals, 1998

NATIONAL INSTITUTE OF TECHNOLOGY SIKKIM

Course Code: EE 11201

L-T-P-C

Course Title: ELECTRICAL WORKSHOP

0-0-2-1

Suggestive list of experiments:

1. Familiarization with Electrical and Electronic components
 - a. Different types of cables/wires and switches and usage of those
 - b. Wiring tools, lighting and wiring accessories, various types of wiring
2. Assembling of a given Electrical circuit
 - a. On a bread board
 - b. Soldering components, solders, tools, heat sink
 - c. Complete one given circuit using PCB; e.g. doorbell
 - d. Wiring of a multi-pin extension board
3. Wiring for light (e.g. fluorescent lamp/CFL/LED light) or Fan
 - a. controlled by one switch
 - b. controlled by two SPDT switch
4. Electric shock phenomenon and preventions
 - a. Earthing and its construction
 - b. Usage of different types of fuses e.g. MCB, ELCB
 - c. Wiring of fluorescent lamp controlled by one switch from panel with MCB
5. Working with measuring devices
 - a. Ammeter, voltmeter, wattmeter and multi-meter
 - b. Single phase and three phase energy meters
6. Exploration of domestic appliances and components e.g. mixer machine, electric iron, fan motor, pump motor, battery
7. Wiring of backup power supply e.g. inverter for domestic installations
8. Hands on with Microcontroller and IoT devices e.g. PIC, ATmega, Arduino, Raspberry Pi and peripheral components
9. Hands on with sensors and development of applications as a short term project e.g.
 - a. Inertial sensors; applications - drone, control, navigation
 - b. Hall effect sensors, applications – current measurement, magnetic field intensity measurement
 - c. Piezoelectric sensors; applications – pressure measurement, force measurement, weight measurement
 - d. Ultrasonic sensors; applications – distance measurement, water level measurement
 - e. Infrared PIR motion sensor; applications – thermal imaging, military applications
 - f. Tactile and Pressure; applications – touch sensitive applications, pressure measurement
 - g. Gas sensors; application – smoke detection.