Scheme of Instruction & Examination
B.E. I – YEAR
(Common for CSE & AI&DS)

S. No	Course Code	Course Title	Semester - I						Credits
			Scheme of Instruction				Scheme of Examination		
			Hours Per week			Duration in Hrs	Maximum Marks		
			L	T	P/D		CIE	SEE	
Theory Courses									
1	BS101HS	Engineering Mathematics - 1	3	1	0	4	40	60	4
2	BS104HS	Applied Physics	3	1	0	4	40	60	4
3	ES101CS	Programming for Problem Solving	3	0	0	3	40	60	3
4	ES102EE	Elements of Electrical and Electronics Engineering	3	0	0	3	40	60	3
5	MC101CE	Environmental Science	2	0	0	2	40	60	0
Laboratories									
6	BS151HS	Applied Physics Lab	0	0	3	3	40	60	1.5
7	ES151CS	Programming for Problem Solving Lab	0	0	2	2	40	60	1
8	ES152EE	Elements of Electrical and Electronics Engineering Lab	0	0	2	2	40	60	1
9	ES152CE	Engineering Graphics Lab	1	0	4	5	40	60	3
		Total							20.5

S. No	Course Code	Course Title	Scheme of Instruction				Scheme of Examination		Credits
			Hours Per week			Duration in Hrs	Maximum Marks		
			L	T	P/D		CIE	SEE	
Semester - II									
Theory Courses									
1	BS202HS	Engineering Mathematics – II	3	1	0	4	40	60	4
2	BS206HS	Chemistry	3	1	0	4	40	60	4
3	HS201HS	English	2	0	0	2	40	60	2
4	ES202CS	Data Structures	3	0	0	3	40	60	3
Laboratories									
5	BS253HS	Chemistry Lab	0	0	3	3	40	60	1.5
6	HS251HS	English Lab	0	0	2	2	40	60	1
7	ES252CS	Data Structures lab	0	0	2	2	40	60	1
8	ES252ME	Engineering Workshop Practice	0	0	1	4	40	60	2
9	MC251SP	Yoga/NSS/Sports	0	0	2	2	50	-	0
		Total Credits							18.5

BS: Basic Sciences ES: Engineering Sciences
HS: Humanities and Sciences

MC: Mandatory Courses

CIE: Continuous Internal Evaluation SEE: Semester End Examination

L: Lectures T : Tutorials P: Practicals D : Drawing

Note: 1). Each Contact Hour is a Clock hour

Course code	Course Title	Core/ Elective					
BS101HS	Engineering Mathematics – 1 (Common for CSE, AI&DS)	Core					
		L	T	P/D	Credits	CIE	SEE
		3	1	0	4	40	60

Prerequisite: Basics of Matrices, Differentiation, Integration and Trigonometric results

Course Objectives: The objective of this course is to make the student

- Study matrix algebra and its use in solving system of linear equations and solving eigen value problems.
- study mean value theorems and their application to mathematical problems.
- introduce the concepts of functions of several variables and multiple integrals
- introduce the concepts of Multiple Integrals
- study vector differential and integral calculus.

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

- Find the rank of matrix and its use to find solution of linear equations, eigen value problem, Quadratic forms.
- Explain the concepts of derivatives using mean value theorems and their generalization. Concepts of curvature, evolutes, involutes, envelopes of family cf curves
- Find Partial derivatives of functions of two variables using concept of limits and continuity and study the concepts of maximum and minimum of functions of two variables.
- Identify the key concepts, theories and mathematical fundamentals to derive mathematical relations involved in evaluation of double integrals and triple integrals and solving Engineering problems.
- Evaluate gradient of a scalar field, divergence, curl of a vector field to find the values of line, surface and volume integrals and establish their relation using Green, Gauss and Stokes theorems.

Unit-I (10Hrs)

Matrices: Rank of a matrix, Echelon form, System of linear equations, Linear dependence, independence of vectors, Linear transformation, Orthogonal transformation, Eigen values, Eigen vectors, Properties of eigen values, Cayley-Hamilton theorem, Quadratic forms, Reduction of quadratic form to canonical form by orthogonal transformation, Nature of quadratic form.

Unit-II (10Hrs)

Calculus of one variable: Rolle's theorem, Lagrange's, Cauchy's Mean value theorems, Taylor's series, Curvature, Radius of curvature, Circle of Curvature, Envelope of family of curves, Evolutes and Involutes.

Unit-III (10Hrs)

Multivariable Calculus (Differentiation): Functions of two variables, Limits and continuity, Partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions (Chain rule), Change of variables, Jacobian, Higher order partial derivatives, Taylor's series of functions of two variables, Maximum and minimum of values of functions of two variables, Lagrange's method of undetermined multipliers.

Unit-IV (8Hrs)

Multivariable Calculus (Integration): Double Integrals, Change of order of integration, Change of variables from cartesian to plane polar coordinates, Triple Integrals.

Unit-V (12Hrs)

Vector Calculus: Scalar and vector fields, Gradient of a scalar field, Directional derivative, Divergence and Curl of a vector field, Line, Surface and Volume integrals, green's theorem in a plane, Gauss's divergence theorem, Stoke's theorem (without proofs) and their verification.

TEXT BOOKS :

T1. Dr.B.S. Grewal, Higher. Engineering Mathematics, Khanna Publications, 43rd Edition,2014. (Unit 1-5)

T2. Advance Engineering Mathematics by Jain and Iyengar,5th Edition, Narosa Publications (Unit 1-5)

T3.B. V. Ramana, Higher Engineering Mathematics,3rd Edition 2015. (Unit 1-5)

REFERENCES/ SUGGESTED READING:

R1. M.D Raisinghania, Ordinary Differential Equations, 11th Revised Edition

R2. S.S. Sastry, Engineering mathematics, 3rd Edition, Paperback

R3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley, 9th Edition, 2012.

R4. Peter. V. O' Neil, Advance Engineering Mathematics,' Publisher, Global Engineering 7th Edition, 2012

Course code	Course Title	Core/ Elective					
BS104HS	APPLIED PHYSICS (Common for CSE, AI&DS)	Core					
		L	T	P/D	Credits	CIE	SEE
		3	1	0	4	40	60

Prerequisite: Basics of electron theory, Semiconductors, magnetic materials, basics of black body radiation.

Course Objectives: The objective of this course is to make the student

- Familiarize with classical and quantum electron theories and use band theory to classify solids.
  To explain various types of semiconductors and their applications.
- Understand the properties of dielectric and Magnetic materials.
- Understand the Superconductivity phenomena and explain the dual nature of the particles.
- Know the construction of lasers and optical fibers and apply their basic principles to various laser systems and optical fibers
- Acquire knowledge of preparation of thin films and basic concepts of Nano materials

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

- Classify solids based on their energy band structures. Identify semiconductors for engineering applications.
- Classify magnetic and dielectric materials
- Explain the fundamental concepts on superconductivity and Quantum behavior of matter waves.
- Explain the lasing action in lasers, propagation of light in optical fibers and compile their applications different fields.
- Knowledge about preparation they're of thin film and Nano material, this helps the students to prepare new materials.

Unit-I: (11 Hrs)

Band theory of solids: Classical free electron theory and its limitations, Band theory – Kronig penny model (qualitative treatment), Energy bands in solids, Classification of materials as conductors, semiconductors and insulators.

Semiconductors: Introduction, Intrinsic and extrinsic semiconductors, carrier concentration and conductivity in intrinsic semiconductors, formation of P-N junction diode and its I-V characteristics, Thermistor, Hall effect and its applications.

Unit-II: (11 Hrs)

Dielectric materials: Introduction, Types of dielectric polarizations – Expression for electronic polarizability, Frequency and temperature dependence of dielectric polarizations, Determination of dielectric constant by Capacitance bridge method, Ferro electricity – Structure of Barium Titanate – Applications of ferroelectrics.

Magnetic materials: Introduction, Magnetization, Magnetic Flux, Magnetic Susceptibility, Classification of magnetic materials – Dia, para, ferro, antiferro and ferri magnetic materials. Ferrites - properties and its applications, Domain theory of

Ferromagnetism, Hysteresis curve, Soft and hard magnetic materials and their applications.

Unit-III: (10 Hrs)

Superconductivity: Introduction, General properties of superconductors- persistent current, critical current, critical magnetic field, critical temperature, Meissner effect, Type I and Type II superconductors, Applications of superconductor, BCS theory (qualitative), High Temperature superconductors and its applications.

Quantum Mechanics: Introduction to Planck's Theory, de-Broglie's concept – wave nature of particles (de-Broglie wavelength), properties of wave function and its physical significance, Schrodinger's Time independent and Time dependent wave equations, Application of Schrodinger's Time independent - Particle in a 1D box.

Unit-IV: (9 Hrs)

Lasers: Characteristics of Lasers – monochromatic, directionality, coherence, divergence, Basic concepts of transitions - absorption, spontaneous and stimulated emissions, Einstein's theory of matter and radiation interaction (A & B coefficients), Concepts of meta stable states, population inversion and pumping, Components of lasers, Types of lasers- Ruby laser, He-Ne laser, Semiconductor laser and Applications of laser.

Fiber optics: Introduction to Optical fiber, structure of an optical fiber, Basic principle – total internal reflection, Concept of Numerical Aperture (NA) and acceptance angle, Derivation of Numerical Aperture, Types of optical fibers – Step Index and Graded Index fibers (w.r.t to refractive index and mode of propagation), Fiber drawing process (Double crucible method), Applications of optical fibers.

Unit-V: (9 Hrs)

Thin Films: Distinction between bulk and thin films – Thin films preparation Techniques- Thermal evaporation method, Electron beam evaporation method, Pulsed laser deposition, Solar cell- Construction, working – and its applications.

Nano materials: Introduction, Properties of materials at reduced size, Surface to volume ratio at Nano scale, Classification of Nano materials, Preparation of Nano materials – Bottom-up methods (sol-gel & CVD) and Top-down method (ball milling), Basic ideas of carbon nanotubes, Applications of Nano materials and their health hazards

Text Books:

T1. S.L.Gupta and Sanjeev Gupta, Modern Engineering Physics, Dhanpat Rai publications, 2011Edition, Reprint 2012.(Unit 1-4)

T2. B.K.Pandey and S.Chaturvedi, Engineering physics, Cengage Publications, 2012, 1st Edition. (Unit 1-5)

T3. M.N.Avadhanulu, P.G. Kshirsagar and TVS Arun Murthy, A Text Book Engineering Physics, 11th Edition, S.Chand, 2018.(Unit 1-4).

References/ Suggested Reading

R1. Charles Kittel, Introduction to Solid State Physics, Wiley India Edition Paperback – 1 January 2019

R2. V. Raghavan, Materials Science and Engineering, Prentice Hall India Learning Private Limited; 6th Revised Edition, 2015.

R3. K.L. Chopra, Thin film Phenomena, New York, McGraw – Hill, 1969.

Course code	Course Title	Core/ Elective					
ES101CS	Programming for Problem Solving (Common for CSE, AI&DS)	Core					
		L	T	P/D	Credits	SEE	CIE
		3	0	0	3	40	60

Prerequisite: Mathematical Knowledge, Logical and Analytical Thinking

Course Objectives: The objective of this course is to make the student

- To introduce the basic concepts of Computing environment, algorithms and flowcharts
- To acquire knowledge about the basic concept of writing a program
- To understand modular and structured programming constructs in C
- To learn the usage of structured data types, data handling and memory management using pointers

Course Outcomes:

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

1. Formulate algorithms and learn fundamental program methodologies of C programming.
2. Understand control statements and interpret derived data types with mathematical and engineering problems**.**
3. Develop modular programming techniques to solve searching, sorting and file system problems.
4. Recognize pre-processor directives and user defined usage.

Unit – I (11)

Introduction to Computers: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.). Algorithm, Flowchart / Pseudo code with examples

Introduction to C Language: History of C, Features, Structure of C program, Character set, Tokens, Variables, Data types, I/O statements, Type conversion Syntax and Logical Errors in compilation, object and executable code.

Unit – II (11)

Operators and Control Structures: Operators, Operator precedence, Arithmetic expressions, Conditional Branching and Loops, Writing and valuation of conditionals and consequent branching

Arrays: Arrays (1-D, 2-D), Strings and its library functions.

Unit – III (10)

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble and Selection).

Functions: Functions, storage classes, Parameter passing techniques Passing arrays to functions, Recursion Concept, Command line arguments.

Unit – IV (10)

Pointers: Idea of pointers, Defining pointers, array of pointers, pointer arithmetic, dynamic memory allocation,

Structure: Structures, Defining structures and Array of Structures, self – referential structures, Union's concept, Functions and structures, Enum, Bitfields.

Unit – V (8)

Pre-processor Directives: File Inclusion, Macros Substitutions, Conditional Compilation.

File Handling: Introduction to File Handling, Types of files, File operations, File input/output statements.

Text Books:

T1. Computer Science A structured programming approach using C, Behrouz Forouzan and Richard F. Gilberg , Cengage Learning , 2007 ,Third Edition (Unit 1-5)

T2. Schaum's Outline of Programming with C, Byron Gottfried, McGraw-Hill 2019, Fourth Edition (Unit 1-5)

T3. Data Structures and Program Design in C, Robert Kruse, Bruce Leung, Tondo, Pearson, II Edition

References/ Suggested Reading

R1. C Programming Language, Brian W Kenningham, Dennis M Ritchie, Pearson, II Edition

R2. How to solve it by Computer, R G Dromey, Pearson Edition

Course code	Course Title	Core/ Elective					
		Core					
		L	T	P/D	Credits	CIE	SEE
ES102EE	Elements of Electrical and Electronics Engineering	2	0	0	nil	40	60

Prerequisite: Basics of networks, circuits, and Semiconductor's materials.

Course Objectives: The objective of this course is to make the student

- Familiarize with electrical networks, circuits and different Laws used to solve electrical circuits.
- Understand various network reduction techniques to analyze electrical circuits.
- Understand the concept of network theorems for reducing complex networks.
- Understand the characteristics of diodes and transistor configurations.
- Understand the design concepts of biasing of BJT and FET.

Course Outcomes

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

- **CO.1** Understand the concepts of electrical circuits and Analyze complex electrical circuits with the help of different network theorems.
- **CO.2** Understand the basic concepts of Electrical DC Machines.
- **CO.3**Understand the basic concepts of transformers and three phase induction motors.
- **CO.4**Analyze the rectifiers and regulator circuits.
- **CO.5**Analyze the performance of BJTs, FETs on the basis of their operation and working.

Unit-I: (08 Hrs)

Introduction to Electrical Circuits: Circuit Concept, R-L-C Parameters, Voltage and Current Sources, Source Transformation, Voltage – Current relationship for Passive Elements, Ohm's Law, Kirchhoff's Laws, Series, Parallel, Series Parallel Combinations, Superposition, Thevenin's, Norton's theorems.

Unit-II: (08 Hrs)

DC Machines: Principle of operation of Generator and Motor-construction of DC machine- EMF equation-Torque equation- Armature circuit equation for motoring and generation, Types of field excitations. Open circuit characteristic of separately excited DC generator. Speed control methods, Losses and Efficiency.

Unit-III: (09 Hrs)

Introduction to AC fundamentals, Transformers: Principle of operation, construction and operation of single-phase transformers, ideal and practical transformers, equivalent circuit, phasor diagram, voltage regulation, losses and efficiency. Autotransformers - construction, principle of operation applications, Three-phase transformer - construction, types of connection and their comparative

features.

Three-phase induction motors: Three-phase induction motors–Construction, types, production of a rotating magnetic field-principle of operation. Losses and efficiency.

Unit-IV: (07 Hrs)

P-N Junction Diode: Characteristics, Half wave rectifier, Full wave rectifier, filters, ripple, regulation, TUF and efficiency, Zener diode and Zener diode regulators. CRT construction and CRO applications.

Unit-V: (07 Hrs)

Transistors: BJT construction and working, modes of operation, configurations of BJT (CB, CE, CC), small signal h-parameter model of CE, CE amplifier analysis. Construction and working of JFET, V-I characteristics of JFET.

Introduction to Oscillators: LC oscillators, RC oscillators (Qualitative Treatment only).

Text Books:

T1. Electrical Circuit Analysis, William H Hayt and Jack Kemmerly , 8th Edition, 2014 (Unit 1-3)

T2. Electronic Devices, Floyd, Pearson Publications, Seventh Edition, 2019. (Unit 4-5)

References/ Suggested Reading:

R1. "Basic Electrical Engineering", N. K. De, Universities Press, 2015.

R2. "Fundamentals of Electrical Engineering and Electronics", J.B. Gupta, S. K. Kataria & Sons Publications, 2002.

R3. "Electronic Devices and Circuits", Theodore F Bogart, Pearson Publications,2004.

R4. "Electronics Devices and Circuits", J B Gupta, Katson Educational Series, 6th Edition.

R5. Circuit Theory Analysis and Synthesis by Abhijit Chakrabarti, Dhanpat Raj & Co., 2018. (Unit 1-3).

Course code	Course Title	Core/ Elective					
MC101CE	Environmental Science	Core					
		L	T	P/D	Credits	CIE	SEE
		2	0	0	Nil	40	60

Prerequisite:

Course Objectives: The objective of this course is to make the student

- Describe various types of natural resources available on the earth surface.
- Explain the concepts of an ecosystem and the biotic and abiotic components of various aquatic ecosystems.
- Identify the values, threats of biodiversity, endangered and endemic species of India along with the conservation of biodiversity.
- Explain the causes, effects and control measures of various types of environmental pollutions.
- Describe the methods for water conservation, the causes, effects of global warming, climate change, acid rain, ozone layer depletion, population explosion.

Course Outcomes After completion of the course, the student will be able to

- CO.1.Describe the various types of natural resources.
- CO.2 Differentiate between various biotic and abiotic components of ecosystem.
- CO.3 Examine the values, threats of biodiversity, the methods of conservation, endangered and endemic species of India.
- CO.4 Illustrate causes, effects, control measures of various types of environmental pollutions.
- CO.5 Explain the methods of water conservation, causes, effects of climate change, global warming, acid rain and ozone layer depletion, population explosion.

Unit-I: (08 Hrs)

The Multidisciplinary Nature of Environmental Studies: Definition, scope and importance, need for public awareness.

Natural Resources: Water Resources – Use and over utilization of surface and ground water, flood, drought, conflicts over water, Dams: Benefits and Problems. Food Resources –World Food Problems, effects of modern agriculture, fertilizer-pesticides problems, water logging, salinity, Forest Resources –Use and over exploitation, deforestation & its effect on tribal people. Land Resources –Land Degradation, environmental effect of mining, man induced landslides, soil erosion and desertification**.** Energy Resources –Growing energy needs, Renewable and Non-renewable energy resources.

Unit-II: (06 Hrs)

Ecosystems: Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers, Energy flow in ecosystem, food chains, ecological pyramids, ecological succession, types of ecosystems (marine, pond, river,

forest, grassland, desert)

Unit-III: (06 Hrs)

Biodiversity: Levels of Biodiversity, Bio-geographical classification of India, Value of biodiversity, Threats to biodiversity, endangered and endemic species of India, Conservation of biodiversity, global and national efforts.

Unit-IV: (07 Hrs)

Environmental Pollution: Definition, Causes, effects and control measures of air pollution, water pollution, soil pollution, noise pollution, thermal pollution, solid waste management.

Environment Protection Act: Air, water, forest and wildlife Acts, issues in the enforcement of environmental legislation

Unit-V: (06 Hrs)

Social Issues and the Environment: Watershed management and environmental ethics. Climate change, global warming, acid rain, ozone layer depletion.

Environmental Disaster Management: Types of disasters, impact of disasters on environment, infrastructure, and development. Basic principles of disaster mitigation, disaster management, and methodology. Disaster management cycle and disaster management in India.

Field Work:

- Visit to a local area to document
- Visit to a local polluted area- market/slum area/Industrial area/traffic area

Text Books:

T1. Deswal S. and Deswal A., A Basic Course on Environmental studies, Dhanpat Rai & Co Pvt. Ltd. 2018. (Unit 1-5)

T2. Perspectives In Environmental Studies, Anubha Kaushik & C.P Kaushik, New Age International Publishers, 6th Edition 2018). (Unit 1–5).

References/ Suggested Reading

R1. Benny Joseph, ―Environmental Studies", Tata McGraw Hill (3rd Edition, 2017).

R2. Suresh K. Dhameja, Environmental Studies, S.K. Kataria & Sons, 2010.

R3. Rajagopalan R., Environmental Studies, Second Edition, Oxford University Press, 2013.

R4. V.K. Sharma, Disaster Management, National Centre for Disaster Management, IIPE, 1999.

R5. Environmental studies by Erach Bharucha 2005, University Grants Commission, University Press.

Course code	Course Title	Core/ Elective					
BS151HS	**Applied Physics Lab**	Core					
		L	T	P/D	Credits	CIE	SEE
		0	0	3	1.5	40	60

Prerequisite: Higher secondary level Physics

Course Objectives: The objective of this course is to make the student

- Apply the theoretical knowledge in doing practical experiments.
- Acquire skills to handle instruments.
- Understand the behavior of semiconductors and opto-electronic devices.
- Analyze errors in experimental data.
- Plot graphs between different physical parameters.

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

- **CO151.1**. Develop analytical/experimental skills and impart prerequisite hands-on experience for engineering laboratories.
- **CO151.2.** Understand the need for precise measurement practices for data recording.
- **CO151.3.** Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations.
- **CO151.4.** Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics
- **CO151.5** Acquire knowledge in communication skills through working in groups in performing the laboratory experiments and by interpreting the results

LIST OF EXPERIMENTS

1. Determination of wavelength of laser using diffraction grating.
2. Determination of Numerical Aperture (NA) and Acceptance angle of an optical fiber
3. To find the dielectric constant of a given material
4. To draw the I-V characteristics of solar cell and to calculate fill factor.
5. To draw the I-V characteristics of P-N junction diode and to evaluate series resistance in forward and reverse bias conditions.
6. To determine the rigidity modulus of the material of the given wire using Torsional Pendulum.
7. To study the Thermistor characteristics, determine the constants A and B.
8. To find the value of energy gap of a given semiconductor.
9. To draw the curve between the magnetic field and Intensity of magnetization for a given specimen and to find out Coercivity and Retentivity of the specimen.
10. Determination of carrier concentration, mobility and Hall co-efficient in a semiconductor using Hall Effect experiment.

Note: A minimum of eight experiments to be done.

References:

R1. S. L. Gupta and Dr. V. Kumar, “Practical physics with viva voice”, Pragati Prakashan Publishers, Revised Edition, 2009

R2. M.N. Avadhanulu, A. A. Dani and Pokely P.M, “Experiments in Engineering Physics”, S. Chand &Co,2008

Course code	Course Title	Core/ Elective					
ES151CS	Programming for Problem Solving Lab	Core					
		L	T	P/D	Credits	CIE	SEE
		0	0	2	1	40	60

Prerequisite: Mathematical Knowledge, Logical and Analytical Thinking

Course Objectives: The objective of this course is to make the student

- Understand the fundamentals of programming in C Language.
- Write, compile and debug programs in C.
- Formulate solution to problems and implement in C.
- Effectively choose programming components to solve computing problems
- Plot graphs between different physical parameters.

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

- Choose appropriate data type for implementing programs in C language
- Design and implement modular programs involving input output operations, decision making and looping constructs
- Apply derived data types and implement programs to store data in structures and files
- Develop confidence for self-education and ability towards lifelong learning need of computer languages

LIST OF EXPERIMENTS

1. Finding maximum and minimum of given set of numbers, finding roots of quadratic equation.
2. Sin x and Cos x values using series expansion.
3. Generating Pascal triangle, pyramid of numbers.
4. Factorial, Fibonacci, GCD recursive and non-recursive procedures
5. Linear search and binary search using recursive and non-recursive procedures.
6. Bubble sort and selection sort.
7. Matrix addition and multiplication using arrays,
8. Programs on pointers: pointer to arrays, pointer to functions.
9. Programs on structures, union, enum and string manipulations.
10. File handling programs (Reading, Writing, Copying files)
11. Program illustrating using Command Line Arguments

Course code	Course Title	Core/ Elective					
ES152EE	Elements of Electrical and Electronics Engineering Lab	Core					
		L	T	P/D	Credits	CIE	SEE
		0	0	2	1	40	60

Prerequisite: Basics of networks, circuits, and Semiconductors devices**.**

Course Objectives: The objective of this course is to make the student

- Apply the theoretical knowledge in doing practical experiments and acquire skills to handle instruments.
- Understand the behavior of semiconductors and electronic devices.
- Understand the performance of DC and AC machines.
- Understand the practical verification of different laws and theorems.

Course Outcomes:

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

- **CO.1**. Explain common electrical components and their ratings.
- **CO.2.**Analyze performance of DC and AC electrical circuits.
- **CO.3.**Analyze performance of electrical machines
- **CO.4.**Design diode circuit and understand application of zener diode.
- **CO.5**Analyze characteristics of BJTs and FETs.

LIST OF EXPERIMENTS

1. CRO- applications, measurements of R, L, C using LCR meter, color coding method.
2. Verification of KVL, KCL, Superposition Theorem.
3. Verification of Thevenin's and Norton's theorem.
4. Loading of transformer- measurement of primary and secondary voltages and currents and power.
5. Three phase transformers- star and delta connections. Voltage and current relations.
6. OCC characteristics of DC Generator.
7. Load test on DC shunt Motor.
8. Measurement of phase voltage/ current, line voltage/current and power in a balanced three phase circuit connected in star and delta.
9. V-I Characteristics of silicon and Germanium diodes and measurement of static and dynamic resistances.
10. V-I Characteristics of silicon and Germanium diodes of Zener diode and measurement of static and dynamic resistances.

11. Zener diode application as regulator.
12. Input and output Characteristics of BJT in CB configuration.
13. Input and output V-I Characteristics of BJT in CB configuration.
14. Transfer Characteristics of JFET in CS configuration**.**
15. Hartley and Collpits oscillator (LC Oscillator).
16. RC Phase shift oscillator (RC oscillator).

Note: A minimum of ten experiments to be done.

References:

R1. J.B. Gupta, ―Fundamentals of Electrical Engineering and Electronics‖ S.K. Kataria & Sons Publications, 2002.
R2. Satish Kumar Peddapelli, G. Sridhar, ―Electrical Machines – A Practical Approach‖, De Gruyter Publications, 2020.
R3. Hughes, ―Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995
R4. Maheshwari and Anand, Laboratory Experiments and PSPICE Simulations in Analog Electronics, 1st edition, Prentice Hall of India, 2006.
R5. David Bell A., Laboratory Manual for Electronic Devices and Circuits, Prentice Hall of India, 2001.

Course code	Course Title	Core/ Elective					
ES152CE	Engineering Graphics Lab	Core					
		L	T	P/D	Credits	CIE	SEE
		1	0	4	3	40	60

Prerequisite:

Course Objectives: The objective of this course is to make the student

- To inculcate a good understanding of engineering drawing conventions & their significance.
- To impart skills to make technical drawings.
- To impart capability to identify and draw engineering curves to scale.
- To develop skills of drafting projections of standard geometric entities (points, lines, planes, solids with section).
- To develop 3D visualization skills to understand 2D drawings in 3D space & vice versa

Course Outcomes:

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

- **CO-1**. Use appropriate instruments and apply the engineering conventions to draw engineering objects to scale on a drawing sheet.
- **CO-2.** Make use of AutoCAD software to draft engineering curves like conics, involutes & cycloids.
- **CO-3.** Make use of AutoCAD software to draft projections of lines, planes, solids and determine unknown lengths & angles in lines
- **CO-4.** Make use of AutoCAD software to draft sections of solids and development of surfaces.
- **CO-5.** Convert isometric views to orthographic & vice versa.

Sheet No	Description of the Topic	Contact Hours	
		Lecture	Drawing
1.	Principles of Engineering Graphics and their significance, Usage of drawing instruments. Lettering	1	2
2.	Conic Sections – I Construction of ellipse, parabola and hyperbola given focus and eccentricity.	1	2
3.	Conic Sections – II Construction of ellipse (given major and minor axis), parabola (given base and height),	1	2

	rectangular hyperbola.		
4.	Cycloids (cycloid & epicycloid) and Involutes (involute of triangle, square & circle)	1	2
5.	Scales (plain & diagonal scales)	1	2
6.	Introduction to AutoCAD Basic commands and simple drawings.	1	2 + 2
7.	Orthographic Projections - Projections of points placed in different quadrants.	1	2
8.	Projections of straight lines. Lines parallel to both the planes, line perpendicular to or inclined to one reference plane, Line inclined to both the reference planes.	1	2+2
9.	Projections of planes – I: Orthographic projection of planes in different positions	1	2+2
10.	Projections of solids – I: Regular Prism/Pyramids, cylinders & cones, Projections of solids in simple positions.	1	2
11.	Projection of solids – II: Projections of solids when the axes inclined to one or both the reference planes.	1	2
12.	Section of solids – I: When the sectional plane is parallel or perpendicular to one reference plane.	1	2
13.	Section of solids – II: When the sectional plane is inclined to one reference plane.	1	2
14.	Development of surfaces-I Prism and Cylinders	1	2
15.	Development of Surfaces-II Pyramids and Cones	1	2
16.	Isometric projection – I: Conversion of 3D Isometric/oblique views of compound solids to 2D Orthographic views	1	2

17.	Isometric projection – II: Isometric projection of Stacked regular solids" regular solids being prisms, pyramids, spheres & their frustum	1	2

Note: A minimum of Fourteen Drawing Work Sheets to be completed.

Text Books:

T1. Engineering Drawing, ND Bhatt, Charotar Publication, 53 rd Edition, 2014 (All sheets)

T2. Engineering Drawing, KL Narayana & P Kannaya, Scitech publications, 3rd Edition, 2013 (All sheets)

References:

R1 Engineering Drawing and Graphic Technology, T.E French et al, McGraw Hill International, 14 th Edition, 2012

R2. Engineering Drawing Graphics & AutoCAD, K Venugopal, New Age International, 5 th Edition, 2009

R3. Engineering Drawing with a primer on AutoCAD, AN Siddique et al, Prentice Hall of India Ltd., Eastern Economy Edition, 2004

R4: Engineering Drawing, Basant Agrawal & C M Agrawal, McGraw Hill Publications, Third edition 2019

Course code	Course Title	Core/ Elective					
BS202HS	Engineering Mathematics – II	Core					
		L	T	P/D	Credits	CIE	SEE
		3	1	0	4	40	60

Prerequisite: Basics of Differentiation, Integration and Trigonometric results.

Course Objectives: The objective of this course is to make the student

- Study the concepts of sequences, series, and their properties.
- Provide the over view of ordinary differential equations of first order and their application to mathematical problems.
- Solving higher order ordinary differentiation by various mathematical methods.
- Evaluate improper integrals using Beta and Gamma functions
- Study Laplace transforms and its applications to differential equations.

Course Outcomes:

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

- **CO.1**. To Test for the convergence and divergence of infinite series using the comparison test, Ratio test, Cauchy's nth root test, Leibnitz's test, and also analyzing the nature of series.
- **CO.2.** Solve the ordinary differential equations of first order and their physical and geometrical applications.
- **CO.3** Solve the ordinary differential equations of second and higher with constant and variable coefficient by different methods. Solution of non-homogeneous equations, Euler-Cauchy equation. Method of variation of parameters.
- **CO.4** Evaluate the improper integrals using beta and gamma functions. Solution of Legendre polynomials.
- **CO.5** Evaluate Laplace Transforms, Inverse Laplace Transforms of functions and their applications to ordinary differential equations.

Unit-I (10Hrs)

Sequence and series: Sequences—General properties of series, Series of positive terms, Comparison test, tests of convergence-D'Alembert's Ratio test, Cauchy's nth root test, Raabe's test, Logarithmic test, Alternating series, Series of positive and negative terms, Absolute convergence, and Conditional convergence.

Unit-II (10Hrs)

Differential Equations of First Order: Exact Differential Equations, Integrating Factors, Linear differential Equations, Bernoulli's Equation, Riccati's and Clairaut's differential equations, Orthogonal Trajectories of a Given Family of Curves, Applications of differential equations-L-C,L-R

circuit.

Unit-III (12Hrs)

Differential Equations of Higher Order: Solutions of second and higher order linear Homogenous Equations with Constant Coefficients, Solutions of non-homogeneous linear differential equations, Method of Variation of Parameters, solution of Euler-Cauchy Equation, Applications of differential equations-L-CR circuit.

Unit-IV (8Hrs)

Special functions: Gamma Function, Beta Function, Relation between Gamma and Beta Functions, Error Function, Power Series Method, Legendre's Differential Equations and Legendre's Polynomial Pn(x), Orthogonal property of Legendre's Polynomial Rodrigue's Formula (with proof).

Unit-V (10Hrs)

Laplace Transforms: Laplace Transforms, Inverse Laplace Transforms, Properties of Laplace Transforms and inverse Laplace Transforms, Convolution Theorem (without proof). Solution of ordinary differential Equations using Laplace Transforms**.**

TEXT BOOKS:

T1. Dr.B.S. Grewal, Higher. Engineering Mathematics, Khanna Publications, 43rd Edition,2014. (Unit 1-5)

T2. Advance Engineering Mathematics by Jain and Iyengar,5th Edition, Narosa Publications (Unit 1-5)

T3.B. V. Ramana, Higher Engineering Mathematics,3rd Edition 2015. (Unit 1-5)

REFERENCES/ SUGGESTED READING:

R1. M.D Raisinghania, Ordinary Differential Equations, 11th Revised Edition

R2. S.S. Sastry, Engineering mathematics, 3rd Edition, Paperback

R3. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley, 9th Edition, 2012.

R4. Peter. V. O' Neil, Advance Engineering Mathematics,' Publisher, Global Engineering 7th Edition, 2012

Course code	Course Title	Core/ Elective					
BS206HS	Chemistry	Core					
		L	T	P/D	Credits	CIE	SEE
		3	1	0	4	40	60

Prerequisite: Electrochemistry &Batteries, Water & Corrosion, Polymers, Energy Sources, Inorganic Engineering Materials

Course Objectives: The objective of this course is to make the student

- Apply the principals of electrochemistry in storage of electrical energy in batteries.
- Rationalize bulk properties and processes using thermodynamic considerations.
- Gains knowledge in causes of corrosion and its prevention. Attains knowledge about the disadvantages of hard water and treatment of water for drinking purpose.
- Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
- Exposed to qualitative and quantitative parameters of chemical fuels.

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

- **CO203.1**. Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries
- **CO203.2.** Identify the mechanism of corrosion of materials on basis of electrochemical approach and devise corrosion control methods. Estimate the physical & chemical parameters of quality of water and explain the process of water treatment.
- **CO203.3** Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
- **CO203.4** Classify chemical fuels and grade them through qualitative analysis.
- **CO203. 5** Relate the concept of green chemistry to modify engineering processes and materials. Understand the function of drugs.

Unit-I: (10 Hrs)

Electrochemistry and Batteries :

Electrochemistry: Electrochemical cells, Electrolytic and Galvanic cells-notation, cell notation, cell reaction and cell potentials. Electrodes: Electrode potential and Standard Electrode Potential (SEP). Construction and function of Calomel Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode. Thermodynamics of emf , Nernst equation and its derivation. Applications of Nernst equation to electrode potential and emf of cells. Numerical problems.

Batteries: Primary batteries: Zn - Carbon battery. Secondary batteries: Pb-

Acid cell & battery and Li-Ion cell battery, Applications. Flow batteries (Fuel cells): Hydrogen-Oxygen fuel cells& functioning. Applications of batteries.

Unit-II: (10 Hrs)

Water Chemistry--its treatment and corrosion:

Water Chemistry: Hardness of Water-Types and units of hardness, estimation of temporary and permanent hardness of water by EDTA method. Alkalinity of water and its determination. Water softening by Ion exchange process and desalination of water by reverse osmosis method. Numerical problems. Specifications of potable water--Steps involved in treatment of water – Sterilization by Chlorination -Disinfection of water by chlorination and ozonization. Break Point Chlorination – advantages.

Corrosion: Causes and effects of corrosion. Types of Corrosion-Dry corrosion – its types or Chemical corrosion and Wet or Electrochemical corrosion and their mechanism.

Concentration cell corrosion. Waterline, Pitting and galvanic corrosion. Factors effecting rate of corrosion.

Unit-III: (10 Hrs)

Polymers: Basics of terms polymers: Monomer functionality, degree of polymerization. Types of Polymerization (i) Addition--Mechanism of free radical polymerization (ii) Condensation (iii) Co-Polymerization with examples.

Classification of polymers - Thermoplastics & Thermosetting resins.

Plastics, Fibres and Elastomers and their characteristics. Preparation, Properties & Uses of the following polymers: Plastics - PVC and Bakelite, Fibres - Nylon 6:6, and Dacron. Elastomers - Buna-S, Butyl Rubbers.

Conducting polymers: Concept, Classification and Mechanism of conduction in Trans Poly-acetylene, Doped Conducting Polymers. Applications of conducting polymers.

Biodegradable polymers: Concept. preparation, properties and applications of polylactic acid

Unit-IV: (10 Hrs)

Chemical Fuels: Concept, definition and classification of fuels- Primary and secondary fuels. Solid, liquid and gaseous fuels. Characteristics of a good fuel. Calorific Value – High Calorific Value(HCV) and Low Calorific Value (LCV). Numerical problems.

Solid Fuels: Coal and its types. Analysis of coal - Proximate and Ultimate analysis. Numerical Problems.

Liquid Fuels: Petroleum. Composition of Gasoline, Diesel and Kerosene. Cracking & its Significance- Catalytic cracking by moving bed method,

Knocking. Fuel rating – Octane and Cetane numbers.
Gaseous Fuels: LPG, CNG –Composition, characteristics and applications.

Unit-V: (10 Hrs)

Green Chemistry, Green Engineering Principles: Concept, Principles of green chemistry –.
Principles of Green Engineering.
Biodiesel: Sources, Concept of Trans esterification. Properties and significance

Text Books:

T1. PC Jain, M Jain Engineering Chemistry, Dhanpat Rai &sons, 16th edition, 2015, New Delhi. (Unit: 1,4,5)
T2. B.R. Puri, L.R. Sharma and M.S. Pathania, "Principles of Physical Chemistry", S. S. Chand & Company Ltd., Revised edition (2013). (Unit 2)
T3. Sashi Chawla,—Engineering Chemistry, Dhanpat Rai & Sons, New Delhi, 2017 (1St January 2017) (Unit 3)
T4. O G Palanna, —Engineering Chemistry‖, Tata Mc Graw Hill, New Delhi, First Edition 2009.(Unit 2&4)

Reference Books :

R1. J D Lee, Concise inorganic chemistry, Blackwell science ltd, USA, Fifth edition
R2. P.W. Atkins,Physical Chemistry .
R3. T.W. Graham Solomons, C.B. Fryhle and S.A. Snyder, "Organic Chemistry", Wiley, 12th edition (2017).

Course code	Course Title	Core/ Elective					
HS201HS	English	Core					
		L	T	P/D	Credits	CIE	SEE
		2	0	0	1	40	60

Prerequisite: Know the basic functions of the Language

Course Objectives: The following are the Objectives of the Course:

To enable and enhance the English language abilities of engineering students, especially in reading and writing, by –

- Using authentic material for language learning and gaining proficiency in it (Knowledge) (Comprehension)
- Exposing them to a variety of content-rich text.
- Strengthening their grammar and vocabulary.
- Improving their reading and comprehension skill.
- Honing their writing skills.
- Encouraging them to think creatively and critically.

Course Outcomes:

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

- **CO.1**. Read, understand, interpret and comprehend a variety of written texts and develop positive attitude and commitment towards their (students') goal and society.
- **CO.2** Remember and recognize the significance of vocabulary (roots and affixes, homonyms, one- word substitutes, etc.) and use language accurately for effective communication.
- **CO.3** Apply appropriate grammatical concepts (tenses, articles, prepositions, etc.) to spoken and written English in informal and formal ambience.
- **CO.4** Compile information of various aspects of English diction – Develop creativity in writing skills by framing Paragraphs, Essays, Letters, Emails and SOPs.
- **CO.5** Analyze different ways of life through reading prose and poetry, each symbolizing a particular virtue and the learners develop the ability to be creative.

Unit – I : (6 Hrs)

Reading : Amitav Ghosh "Coming Home"

Vocabulary : Word Formation – Prefixes, Suffixes , Root words

Grammar : Articles, Prepositions, Determiners

Writing : Types of Sentences; Guided Writing (Expanding the Outline / Writing from verbal cues)

Unit – II : (6 Hrs)
Reading : Rudyard Kipling, "If"
Vocabulary : Word Formation – Compounding and Blending, Contractions
Grammar : Transitions, Connectives, Question Tags
Writing : Précis & Paragraph Writing

Unit – III : (6 Hrs)
Reading : Martin Luther King Jr. "I have a Dream"
Vocabulary : Synonyms, Antonyms, One-Word Substitutes
Grammar : Voice
Writing : Letter Writing

Unit – IV : (6 Hrs)
Reading : Robert Frost, "Road Not Taken"
Vocabulary : Homophones, Homonyms, Homographs
Grammar : Narration (Direct – Indirect Speech)
Writing : Reporting Events (Swearing in, Poll-Address, News Events, Visit to Book Exhibition, Annual /Farewell Day)

Unit – V : (6 Hrs)
Reading : George Orwell' " The Sporting Spirit" (Excerpt)
Vocabulary : Inclusive Language, Euphemism
Grammar : Tense
Writing : SOP

Text Books :

T1. E. Suresh Kumar, *Engineering English*, Orient Black Swan, 2014.

References / Suggested Reading:

R1. Modern English Grammar
R2. "Grammar in Use" Raymond Murpphy
R2. Sudharshana, NP and C Savitha, English for Engineers. Cambridge University Press 2018.

Course code	Course Title	Core/ Elective					
ES202CS	Data Structures	Core					
		L	T	P/D	Credits	CIE	SEE
		3	0	0	3	40	60

Prerequisite: Programming for Problem Solving

Course Objectives: The objective of this course is to make the student

- To study the importance of structuring the data for easy access and storage.
- To know the implementation of various data structures.
- To acquire skills in using generic principles for data representation and manipulation with a view for efficiency, maintainability and code reuse.
- To understand the basic concepts of advanced data structures

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

1. Understand the concept of Dynamic memory management, data types, algorithms, Asymptotic notation.
2. Describe how arrays, records, linked structures, stacks, Queue, and Graphs are represented in memory
3. Develop applications using Linear and Non-linear data structures.
4. Apply the suitable data structure for a real world problem and think critically for improvement in solutions.

UNIT-I

Introduction to Algorithms: Introduction, Algorithm Specifications, Recursive Algorithms, Performance Analysis of an algorithm- Time and Space Complexity, Asymptotic Notations, Amortized Analysis

UNIT-II

Linked Lists ADT: Singly linked lists: Representation in memory, Algorithms of several operations: Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue

Doubly linked list: Operations like traversing, searching, insertion, deletion, Circular Linked Lists: operations like traversing, searching, insertion, deletion.

UNIT-III

Stacks and Queues: ADT Stack, operations and its applications like Expression Conversion and evaluation, Queue ADT and its operations: Linear Queue, Circular Queue, Dequeue

UNIT-IV

Trees: Basic Tree Terminologies, Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree and their operations, Heaps.

UNIT-V

Sorting and Searching: Objective and properties of different sorting algorithms:

Selection Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort, Linear and Binary Search algorithms, Hashing (linear probing, random probing, quadratic probing, rehashing, double hashing), Dictionaries

Graph: Basic Terminologies and Representations, Graph traversal techniques.

Suggested Readings:

T1. "Fundamentals of data structure in C" Horowitz, Sahani & Freed, Computer Science Press.

T2. Gilberg and Forouzan: "Data Structure- A Pseudo code approach with C" by Thomson publication

T3. "Data structure in C" by Tanenbaum, PHI publication / Pearson publication.

Reference Books:

R1. Introduction to Data Structures with Applications, Jean-Paul Tremblay, Paul G Sorenson, II Edition,

R2. Data structures and Algorithm Analysis in C, 2nd edition, M.A.Weiss, Pearson.

R3. Data Structures & Algorithms; Concepts, Techniques & Algorithms", Pai, Tata McGraw Hill.

R4. Aho, Hopcroft and Ullman, ―Data Structures and Algorithms‖, Pearson Education,1983.

Course code	Course Title	Core/ Elective					
BS253HS	Chemistry Lab	Core					
		L	T	P/D	Credits	CIE	SEE
		0	0	3	1.5	40	60

Prerequisite: Higher secondary level Chemistry

Course Objectives: The objective of this course is to make the student

- Conduct experiments, take measurements and analyze the data though hands-on experience in order to demonstrate understanding of the theoretical concepts of quantitative Analysis while working in small group.
- Interpret the electro analytical principles with experimental results graphically
- Demonstrate writing skills through clear laboratory reports

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

- CO1. Apply the principles of volumetric analysis in quantitative estimations.
- CO2. Analyse the parameters of water by titration method.
- CO3. Understand the principle, concept, working and applications of Conductivity Meter to determine the concentration of chemicals.
- CO4. Understand the principle, concept, working and applications of Potentiometer to determine the concentration of chemicals.
- CO5. To apply the law for determining the concentration of a given chemical.

List of Experiments

1. Introduction to Chemical Analysis and Techniques of Weighing.

VolumetricAnalysis:

2. Preparation of Standard Mohr's salt solution, Standardization of $KMnO_4$ and estimation ferrous ion.
3. Preparation of Standard $K_2Cr_2O_7$ solution, Standardization of Mohr's Salt Solution and estimation of dichromate ion. ($Cr_2O_7^{2--}$)

Complexometry

4. Preparation of Standard Magnesium sulphate solution, standardization of EDTA and estimation of Total Hardness of water.Preparation of Standard Sodium Carbonate Solution, Standardization of HCl and Estimation of Carbonate and Bicarbonate Alkalinity of water sample.

Conductometry:

5. Estimation of HCl by conductometry.

Potentiometry

6. Estimation of HCl by potentiometry (acid base titration)

7. Estimation of Fe^{2+} by potentiometry(redox titration)
   P^H metry
8. Estimation of HCl by P^H Metry.
9. Colorimetry
10. Verification of Beers Law using potassium permanganate and estimation of amount $KMnO_4$ in the given sample solution.

List of Additional Experiments

1. Estimation of CH_3COOH by conductometry

References :

1. B.D. Khosla, A. Gulati and V. Garg , ―Senior Practical Physical Chemistry‖, R. Chand & Co., Delhi, 2011.

2. K. K. Sharma and D.S. Sharma , ―An Introduction to Practical Chemistry‖, Vikas publishers, New Delhi, 1982.

Course code	Course Title	Core/ Elective					
HS251HS	English Lab	Core					
		L	T	P/D	Credits	CIE	SEE
			0	2	1	40	60

Prerequisite: Understanding of the English Alphabet and the Corresponding Sounds

Course Objectives: The objective of this course is to enable the student to :

- Learn the Sound Systems, Word Stress, Intonation of English
- Gain the knowledge of the appropriate use of Language and Body Language
- Acquire the Techniques to Participate in Group Discussions
- Hone their Participation and Presentation Skills
- Comprehend how Interviews are conducted and faced

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

- Enhance Pronunciation, Stress, Intonation and Articulation Skills
- Speak the Language coherently, with a lesser MTI
- Employ Language and Body Language intelligibly
- Engage in Group Discussions efficiently
- Prepare and Produce Decent Presentations to Fare, Well in Interviews

LIST OF EXPERIMENTS

1. **Ice-Breaking Session**
2. **Introduction to English Phonetics :** Organs of Speech **:** Speech Mechanism
3. **Sounds of English :** Introduction to International Phonetic Alphabet, Classification and Description of English Phonetic Sounds – Vowel Sounds & Consonant Sounds; Minimal Pairs; The Syllable
4. **Word Stress :** Primary Stress, Secondary Stress, Functional Stress, Rules of Word Stress
5. **Intonation :** Major Patterns of Intonation in English
6. **Speaking Activity: JAM** : an impromptu speech where the speaker is supposed to express the idea (s) on the given topic, within the duration of a **minute**.
7. **Role Play:** Use of dialogues in a variety of situations and settings
8. **Group Discussion:** Initiating, continuing and concluding a GD, Components and Types of GDs,
9. **Power-Point Presentation: (General Topics)** Making effective presentations, Expressions which can be used in presentations, Use of non-verbal communication, Coping with stage fright, Handling questions and answer session

10. **Interview Skills:** Facing interviews confidently, Use of suitable expressions during interviews; Mock interviews

Text Books:

T1. E. Suresh Kumar. *A Handbook for English Language Laboratories (with CD).* Revised edition, Cambridge University Press India Pvt. Ltd. 2014

Reference / Suggested Reading:

R1. T. Balasubramanian. *A Text book of English Phonetics for Indian Students.* Macmillan, 2008.
R2. Edgar Thorpe. *Winning at Interviews*. Pearson Education, 2006.
R3. J. Sethi et al., A *Practical Course in English*
R4. Pronunciation (with CD). PrenticeHall of India,2005.
R5.Hari Mohan Prasad. *How to Prepare for Group Discussions and Interviews.* TataMcGraw Hill,2006.

Course code	Course Title	Core/ Elective					
ES252CS	Data Structures lab	Core					
		L	T	P/D	Credits	CIE	SEE
		0	0	2	1	40	60

Prerequisite: Programming and Problem Solving

Course Objectives: The objective of this course is to make the student

- Design and construct simple programs by using the concepts of structures as abstract data type.
- To have a broad idea about how to use pointers to implement of data structures.
- To enhance programming skills while improving their practical knowledge in data structures.
- To strengthen the practical ability to apply suitable data structure for real time application

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

- Implement linear data structures such as single Linked list, double linked list, stacks, queues using array
- Understand and implements non-linear data structures such as trees, graphs.
- Understanding and implementing hashing techniques.
- Implement various kinds of searching, sorting and traversal techniques and know when to choose which technique

Programming Exercise:

1. Implementation of Stacks, Queues ADT using arrays
2. Implementation of Stacks, Queues ADT using linked lists.
3. Implementation of Singly Linked List, Doubly Linked List and Circular List ADT.
4. Implementation of stack and use it to convert infix to postfix expression and postfix evaluation
5. Implementation of Binary search tree and its operations (creation, traversal, min & max, search)
6. Implementation of operations on AVL trees ADT
7. Implementation of Linear search and Binary Search
8. Implementation of Hashing collision resolution techniques.
9. Implementation of Insertion Sort, Selection Sort
10. Implementation of Merge Sort, Quick Sort
11. Implementation of Heap Sort.
12. Implementation of DFS and BFS

Course code	Course Title	Core/ Elective					
ES252ME	Engineering Workshop Practice	Core					
		L	T	P/D	Credits	CIE	SEE
		0	0	4	2	40	60

Prerequisite: Practical skill

Course Objectives: The objective of this course is to make the student

- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.
- To provide hands on experience about use of different engineering materials, tools, equipments and processes those are common in the engineering field.
- To gain basic knowledge on various manufacturing processes used for the production of various engineering products.
- To gain hands on exposure on computer hardware and working knowledge on computers and software.

Adopt safety practices while working with various tools.

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

- **CO.1**. Identify and demonstrate the usage of different tools to be used in various manufacturing trades with safety measures.
- **CO.2.** Apply the skills developed to undertake the jobs connected to various engineering workshop trades including fitting, carpentry, sheet metal, house wiring, welding, and foundry.
- **CO.3.** Demonstrate the knowledge of various machine tools and their operations such as machining, injection moulding, casting and 3D printing and basic electronics lab instruments.
- **CO.4.** Illustrate the advanced machining processes like CNC, rapid prototyping.
- **CO.5** Apply the basic knowledge of computers to assemble and disassemble various components of computer and able to install various operating systems such as windows or Linux.

LIST OF EXPERIMENTS

A. TRADES FOR EXERCISES:

At least two exercises to be done from each trade.

1. **CARPENTRY:** Sawing and Grooving, T-lap joint, Dove-tail Joint.

2. **FITTING:** Step Cutting & Filing, Drilling & Tapping, V-Fitting
3. **HOUSE WIRING**: Parallel & Series, Two-Way Switch, Tube light Connections.
4. **SHEET METAL WORKING:** Open Scoop, Funnel, Rectangle Tray.
5. **BLACK SMITHY:** Upsetting, Fullering, S-Hook
6. **WELDING:** Lap joint, Single V-butt joint, Corner joint
7. **PLUMBING:** Practice of Internal & External Pipe Threading, Pipe Fitting, Tap and Shower connections.

B. TRADES FOR DEMONSTRATION AND EXPOSURE:

1. Machines (lathe and drilling)
2. Injection Molding
3. Mould making and Casting
4. Basic Electronics Lab Instruments
5. 3D Printing

C. PRESENTATIONS AND VIDEOS LECTURES:

1. Manufacturing Methods
2. Glass Cutting
3. 3D Printing
4. CNC Lathe

D. IT-WORKSHOP: Computer hardware, Identification of parts, disassembling and assembling of computer to working condition. Operating System Installation

Text Book:

1. P. Kannaiah, K.L.Narayana "Workshop Manual" Scitech Publications; 2nd Edition.

References:

1. Venugopal,K, "Workshop Manual", Anuradha Publications; 2012th edition.
2. K.C.John, "Mechanical Workshop" 2nd Edition, PHI, 2010.
3. Hajra Choudhury, "Elements of Workshop Technology" Vol.1, Asian Publishers, Edu., 2010.