The **SCHEME OF INSTRUCTION& EXAMINATION** of **AICTE Model Curriculum for the Academic Year 2018-2019 will be followed** for **BE semester - I & Semester –II for Group- A Batch students** and BE **semester - I & Semester –II for Group- B Batch Students.**

EEE & EIE branches comes under Group – B

(Syllabus of Group – A & Group – B remain same)

SCHEME OF INSTRUCTION FOR EIGHT SEMESTERS

BE. I - Semester

(Group – A)

S. No.	Course Code	Course Title	CIE	SEE	Credits
Theory Courses					
1	Three Week Induction Programme				
2	BS101MT	MATHEMATICS-I	30	70	4
3	BS102PH	PHYSICS	30	70	4
4	ES102EE	BASIC ELECTRICAL ENGINEERING	30	70	4
Practical/ Laboratory Courses					
5	BS151PH	PHYSICS LAB	25	50	1.5
6	ES152EE	BASIC ELECTRICAL ENGINEERING LAB	25	50	1
7	ES153CE	ENGINEERING GRAPHICS & DESIGN	50	50	3
Total			**190**	**360**	**17.5**

(Group –B)

S. No.	Course Code	Course Title	CIE	SEE	Credits
Theory Courses					
1	**Three Week Induction Programme**				
2	BS101MT	MATHEMATICS-I	30	70	4
3	BS103CH	CHEMISTRY	30	70	4
4	ES101CS	PROGRAMMING FOR PROBLEM SOLVING	30	70	3
Practical/ Laboratory Courses					
5	BS152CH	CHEMISTRY LAB	25	50	1.5
6	ES151CS	PROGRAMMING FOR PROBLEM SOLVING LAB	25	50	2
7	ES154ME	WORKSHOP/ MANUFACTURING PROCESS	50	50	3
		Total	**190**	**360**	**17.5**

SCHEME OF INSTRUCTION FOR EIGHT SEMESTERS

BE. II - Semester

(GROUP-A)

S. No.	Course Code	Course Title	CIE	SEE	Credits
Theory Courses					
1	HS201EG	ENGLISH	30	70	2
2	BS201MT	MATHEMATICS-II	30	70	4
3	BS202CH	CHEMISTRY	30	70	4
4	ES201CS	PROGRAMMING FOR PROBLEM SOLVING	30	70	3
Practical/ Laboratory Courses					
5	HS251EG	ENGLISH LAB	25	50	1
6	BS252CH	CHEMISTRY LAB	25	50	1.5
7	ES251CS	PROGRAMMING FOR PROBLEM SOLVING	25	50	2
8	ES254ME	WORKSHOP/ MANUFACTURING PROCESS	50	50	3
		Total	**245**	**480**	**20.5**

(GROUP -B)

S. No.	Course Code	Course Title	CIE	SEE	Credits
Theory Courses					
1	HS201EG	ENGLISH	30	70	2
2	BS202PH	PHYSICS	30	70	4
3	BS201MT	MATHEMATICS-II	30	70	4
4	ES202EE	BASIC ELECTRICAL ENGINEERING	30	70	4
Practical/ Laboratory Courses					
5	HS251EG	ENGLISH LAB	25	50	1
6	BS251PH	PHYSICS LAB	25	50	1.5
7	ES252EE	BASIC ELECTRICAL ENGINEERING LAB	25	50	1
8	ES253CE	ENGINEERING GRAPHICS & DESIGN	50	50	3
		Total	**245**	**480**	**20.5**

SCHEME OF INSTRUCTION& EXAMINATION
(AICTE Model Curriculum for the Academic Year 2018-2019)

B.E. I – Semester (Group - B)

S. No.	Course Code	Course Title	Scheme of Instructions				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hours/ Week	CIE	SEE	Duration in Hours	
Theory Course										
1	**Three Week Induction Programme**						-	-	-	-
2	BS101MT	Mathematics-I	3	1	-	4	30	70	3	4
3	BS104CH	Chemistry	3	1	-	4	30	70	3	4
4	ES102CS	Programming for Problem Solving	3	-	-	3	30	70	3	3
Practical/ Laboratory Course										
5	BS154CH	Chemistry Lab	-	-	3	3	25	50	3	1.5
6	ES152CS	Programming for Problem Solving Lab	-	-	4	4	25	50	3	2
7	ES154ME	Workshop/ Manufacturing Process	1	-	4	5	50	50	3	3
Total			**10**	**02**	**09**	**23**	**190**	**360**		**17.5**

SCHEME OF INSTRUCTION& EXAMINATION
(AICTE Model Curriculum for the Academic Year 2018-2019)

B.E.II- Semester (Group – B)

S. No.	Course Code	Course Title	Scheme of Instructions				Scheme of Examination			Credits
			L	T	Pr/ Drg	Contact Hours/Week	CIE	SEE	Duration in Hours	
Theory Course										
1	HS101EG	English	2		-	2	30	70	3	2
2	BS102MT	Mathematics-II	3	1	-	4	30	70	3	4
3	ES103PH	Physics	3	1	-	4	30	70	3	4
4	ES101EE	Basic Electrical Engineering	3	1	-	-	30	70	3	4
Practical/ Laboratory Course										
5	HS151CH	English Lab	-	-	2	3	25	50	3	1
6	BS153PH	Physics Lab	-	-	3	3	25	50	3	1.5
7	ES151 EE	Basic Electrical Engineering Lab	-	-	2	3	50	50	3	1
8	ES153CE	Engineering Graphics & Design	1	-	4	5	25	50	3	3
		Total	**12**	**03**	**11**	**24**	**245**	**480**		**20.5**

FACULTY OF ENGINEERING

Scheme of Instruction & Examination

(AICTE Model Curriculum for the Academic Year 2018-2019)

and

Syllabi

B.E. I and II Semesters (Group-B)

of

Four Year Degree Programme

in

B.E. (Common to All Branches)

(With effect from the Academic Year 2018– 2019)
(As approved in the Faculty Meeting held on 26th June 2018)

Issued by

Dean, Faculty of Engineering

Osmania University, Hyderabad

2018

SCHEME OF INSTRUCTION & EXAMINATION
B.E. (All Branches) I - Semester
(Group - B)

S. No.	Course Code	Course Title	Scheme of Instructions				Scheme of Examination			Credits
			L	T	P/ D	Contact Hours/Week	CIE	SEE	Duration in Hours	
Three Week Induction Programme										
Theory Course										
1	BS102MT	Mathematics-I	3	1	-	4	30	70	3	4
2	BS105CH	Chemistry	3	1	-	4	30	70	3	4
3	ES107CS	Programming for Problem Solving	3	-	-	3	30	70	3	3
Practical/ Laboratory Course										
4	BS153CH	Chemistry Lab	-	-	3	3	25	50	3	1.5
5	ES155CS	Programming for Problem Solving Lab	-	-	4	4	25	50	3	2
6	ES157ME	Workshop/ Manufacturing Process	1	-	4	5	50	50	3	3
Total			**10**	**02**	**09**	**23**	**190**	**360**		**17.5**

BS: Basic Science **ES**: Engineering Science
L: Lecture **T**: Tutorial **P**: Practical **D**: Drawing
CIE: Continuous Internal Evaluation **SEE**: Semester End Examination (Univ. Exam)

Note: Each contact hour is a Clock Hour.

Course Code	Course Title						Core / Elective
BS102MT	**Mathematics - I (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	1	-	-	**30**	**70**	4

Course Objectives

- To introduce the concepts of sequences, series and their properties
- To introduce the concepts of functions of several variables and multiple integrals
- To study vector differential and integral calculus

Course Outcomes

The students will able to

- Find the nature of sequences and series
- Evaluate multiple integrals
- Apply this knowledge to solve the curriculum problems

Unit-I

Sequences and Series: Sequences, Series, General properties of series, Series of positive terms, Comparison tests, tests of Convergence D'Alembert's ratio test, Cauchy's n^{th} root test, Raabe's test, Logarithmic test, Alternating series, Series of positive and negative terms, Absolute convergence and Conditional convergence.

Unit-II:

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 a family of curves, Evolutes and Involutes.

Unit-III

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 values of functions of two variables, Lagrange's method of undetermined multipliers.

Unit-IV

Multivariable Calculus (Integration): Double integrals, Change of order of integration, Change of Variables from Cartesian to plane polar coordinates, Triple integrals.

Unit-V

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.

Suggested Readings:

1. R.K.Jain & S.R.K Iyengar, *Advanced Engineering Mathematics*, Narosa Publications, 2014.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, , 2012.
3. B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition, 2014.
4. G.B.Thomas , Maurice Weir and Joel Hass, *Thomas' Calculus* , Peterson, 12th Edition,2010.
5. B.V. Ramana, Higher Engineering Mathematics, 23rd reprint, 2015.

Course Code	Course Title						Core / Elective
BS105CH	**Chemistry (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	1	-	-	**30**	**70**	4

Course Objectives

- Correlate the properties of materials with their internal structure and use the for Engineering applications
- Apply the principals of electrochemistry in storage of electrical energy in batteries.
- Gains knowledge in causes of corrosion and its prevention.
- Attains knowledge about the disadvantages of hard water for domestic and industrial purposes. Also learns the techniques of softening of hard water and treatment of water for drinking purpose.
- Exposed to qualitative and quantitative parameters of chemical fuels.
- Aware eco friendly materials and processes.

Course Outcomes

On successful completion of this course, students will be able to:

- Apply concept of electrode potential in identifying feasibility of electrochemical reaction; illustrate electro analytical techniques and working of batteries.
- 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.
- Explain the influence of chemical structure on properties of materials and their choice in engineering applications.
- Classify chemical fuels and grade them through qualitative analysis.
- Relate the concept of green chemistry to modify engineering processes and materials.

UNIT-I

Electrochemistry and Battery Chemistry: Electrochemistry: Electrochemical cells, Electrolytic and Galvanic cells-notation, cell reaction and cell potentials. Types of electrodes, Calomel Quinhydrone and Glass electrodes. Determination of pH of a solution by using Quinhydrone electrode. Thermodynamics of emf of cells, 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 battery and Li-Ion battery, Applications. **Flow batteries (Fuel cells):** Methanol-Oxygen fuel cells, Construction, Applications.

UNIT-II

Water Chemistry 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 and Reverse Osmosis methods. Numerical problems. Specifications of potable water. Sterilization by Chlorination. Break Point Chlorination.

Corrosion: Causes and its effects. Types of corrosion-Dry or Chemical corrosion and Wet or Electrochemical corrosion and their mechanism. Electrochemical corrosion –Waterline and Pitting Corrosion. Factors influencing rate of corrosion.
Corrosion control methods: Cathodic protection methods - Sacrificial anodic and impressed current methods. Surface coating methods: Hot dipping-Galvanizing.

UNIT-III
Engineering Materials: Polymers: Basics of terms polymers: Monomer and its functionality, Polymers and degree of polymerization. Classification of polymers - Thermoplastics & Thermosetting resins. Types of Polymerization (i) Addition (ii) Condensation (iii) Co-Polymerization. Mechanism of free radical polymerization
Preparation, Properties & Uses of the following polymers: Plastics - PVC and Bakelite, Fibres - Nylon 6:6, and Kevlar, Elastomers - Buna-S, Butyl and Silicone Rubbers.
Conducting polymers: Introduction, Classification and Mechanism of conduction in Poly-acetylene, Applications of conducting polymers.
Biodegradable polymers: Introduction preparation, properties and applications of polylactic acid

UNIT-IV
Chemical Fuels: Classification of fuels: Introduction, definition and classification of chemical fuels- Primary and secondary fuels. Solid, liquid and gaseous fuels. Requirements of a good fuel. Calorific Value – HCV and LCV. Theoretical calculations of calorific value by Dulong's formula – Numerical problems.
Solid Fuels: Coal and its Ranking. Analysis of coal - Proximate and Ultimate analysis.
Liquid Fuels: Fractionation of Petroleum. Composition and uses 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 and Uses.
Combustion: Ignition temperature of a fuel, calculation of air quantities by weight and volume required for combustion of a fuel- Numerical problems.

UNIT-V
Green Chemistry and Composites: Green Chemistry: Concept, Principles of green chemistry – Atom Economy, Catalysis. and examples of clean technology.
Biodiesel: Sources, Concept of Trans esterification and carbon neutrality. Properties and significance
Composites: Introduction to composites, composition and characteristic properties of composites. Classification of composites based on matrix, reinforcement and ply. Applications of composites.

Suggested Readings:

1. Principles of Physical Chemistry by Puri, Sharma and Pathania S.N. Chand & Co. New Delhi (Latest edition).
2. Engineering Chemistry by P C Jain and M Jain Dhanpat Rai & Sons (15th Edn), New Delhi.
3. Chemistry in Engineering and Technology by J C Kuriacose and J Rajaram, TMH, New Delhi.
4. Engineering Chemistry by O G Palanna, TMH, and New Delhi.
5. Engineering Chemistry by S S Dara, S Chand & Sons, New Delhi.
6. Engineering Chemistry by Sashi Chawla. Dhanpat Rai & Sons, New Delhi.
7. Engineering Chemistry by Shikha Agrawal, Cambridge, New Delhi.
8. Engineering Chemistry by Prasanta Rath, Cengage Learning India Pvt. Ltd.

Course Code	Course Title						Core / Elective
ES107CS	**Programming for Problem Solving (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	-	-	-	**30**	**70**	3

Course Objectives

- To introduce the basic concepts of Computing environment, number systems and flowcharts
- To familiarize the basic constructs of C language – data types , operators and expressions
- To understand modular and structured programming constructs in C
- To learn the usage of structured data types and memory management using pointers
- To learn the concepts of data handling using pointers

Course Outcomes

The students will able to

- Formulate simple algorithms for arithmetic and logical problems.
- Translate the algorithms to programs (in c language).
- Test and execute the programs and correct syntax and logical errors.
- Implement conditional branching, iteration and recursion.
- Decompose a problem into functions and synthesize a complete program using divide and conquer approach.
- Use arrays, pointers and structures to formulate algorithms and programs.
- Apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
- Apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.

Unit - I

Introduction to Programming: Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.).

Idea of Algorithm: steps to solve logical and numerical problems.

Representation of Algorithm: Flowchart / Pseudocode with examples. From algorithms to programs; source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code.

Unit - II

Control Structures: Arithmetic expressions and precedence, Conditional Branching and Loops**,** Writing and evaluation of conditionals and consequent branching.

Arrays: Arrays (1-D, 2-D), Character arrays and Strings

Unit - III

Basic Algorithms: Searching, Basic Sorting Algorithms (Bubble and Selection), Finding roots of Equations. **Functions:** Functions (including using built in libraries), Parameter passing in functions, call by value. **Passing arrays to functions:** idea of call by reference

Unit - IV

Recursion: Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series. **Structure:** Structures, Defining structures and Array of Structures

Unit - V

Pointers - Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, notion of linked list (no implementation), **Introduction to File Handling.**

Suggested Readings:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. A.K. Sharma, Computer Fundamentals and Programming in C, Universities Press, 2nd Edition, 2018.
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
4. Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India.

Course Code	Course Title						Core / Elective
BS 153 CH	**Chemistry Lab (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	3	**25**	**50**	1.5

Course Objectives

- 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 Outcomes

On successful completion of this course, students will be able to :

- Apply the principles of Colourimetry and Electrochemistry in quantitative estimations.
- Estimate the rate constants of reactions from concentration of reactants/ products as a function of time.
- Synthesize small drug molecules.

List of Experiments:

1. Introduction to Chemical Analysis.
2. Techniques of Weighing.

   Volumetric Analysis:
3. Preparation of Standard Mohr's salt solution, Standardization of $KMnO_4$ and estimation ferrous ion.
4. Estimation Iron(II) by Dichromatometry

   Water Analysis:
5. Preparation of Standard Magnesium sulphate solution, standardization of EDTA and Estimation of Total Hardness.
6. Preparation of Standard Sodium Carbonate Solution, Standardization of HCl and Estimation of Carbonate and Bicarbonate Alkalinity.

   Conductometry :
7. Estimation of HCl
8. Estimation of CH_3COOH and mixture of acids

   Potentiometry
9. Estimation of HCl
10. Estimation of Iron
11. **pH Metry:**
12. Estimation of HCl
13. **Colorimetry:**
14. Verification of Beer-Lambert's law and estimation of Manganese.

    Chemical Kinetics:
15. Determination of rate constant of acid catalyzed hydrolysis of methyl acetate.
16. **Drug Synthesis**

    Preparation of Aspirin

Note: Minimum ten experiments should be conducted in the semester

Suggested Readings:

1. Senior Practical Physical Chemistry, B.D. Khosla, A. Gulati and V.Garg (R. Chand & Co., Delhi)
2. An Introduction to Practical Chemistry, K. K. Sharma and D.S. Sharma (Vikas publishing, N. Delhi)

Course Code	Course Title						Core / Elective
ES 155 CS	**Programming for Problem Solving Lab (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	4	**25**	**50**	2

Course Objectives

- 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

Course Outcomes

The students will able to

1. Choose appropriate data type for implementing programs in C language.
2. Design and implement modular programs involving input output operations, decision making and looping constructs.
3. Implement search and sort operations on arrays.
4. Apply the concept of pointers for implementing programs on dynamic memory management and string handling.
5. Design and implement programs to store data in structures and files.

Programming Exercise:

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. Conversion of binary to decimal, octal, hexadecimal and vice versa.
4. Generating Pascal triangle, pyramid of numbers.
5. Recursion: factorial, Fibonacci, GCD.
6. Matrix addition and multiplication using arrays, linear search and binary search using recursive and non-recursive procedures.
7. Bubble sort and selection sort.
8. Programs on pointers: pointer to arrays, pointer to functions.
9. Functions for string manipulations.
10. Programs on structures and unions.
11. Finding the number of characters, words and lines of given text file.
12. File handling programs

Suggested Readings:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. A.K. Sharma, Computer Fundamentals and Programming in C, Universities Press, 2018.
3. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
4. Brian W. Kernighan and Dennis M. Ritchie, the C Programming Language, Prentice Hall of India.

Course Code	Course Title						Core / Elective
ES 157 ME	**Workshop/ Manufacturing Process (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	1	-	-	4	**50**	**50**	3

Course Objectives

- 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 a good basic working knowledge required for the production of various engineering products.
- To Study different hand operated power tools, uses and their demonstration.
- Adopt safety practices while working with various tools

Course Outcomes

The students will able to

- Demonstrate an understanding of and comply with workshop safety regulations.
- Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.
- Study and practice on machine tools and their operations
- Undertake jobs connected with Engineering Workshop trades including fitting, carpentry, sheet metal, house wiring, welding, smithy and foundry.
- Apply basic electrical engineering knowledge for house wiring practice

A. TRADE FOR EXERCISES:

1. Carpentry
2. Fitting
3. House wiring
4. Sheet metal working
5. Smithy
6. Welding
7. Plumbing

B. TRADES FOR DEMONSTRATION AND EXPOSURE:

1. Machining (Lathe & Drilling)
2. Injection molding
3. Mould making and casting
4. Basic Electronics lab instruments

C. PRESENTATIONS AND VIDEO LECTURES

1. Manufacturing Methods
2. Rapid Prototyping
3. Glass Cutting
4. 3D printing
5. CNC LATHE

D. **IT WORKSHOP**: Computer hardware, identification of parts, Disassembly, Assembly of computer to working condition, operating system installation.

Suggested Reading:

1. Venugopal,K, "Workshop manual", Anuradha Publications, Kumbakonam, TN, 2012
2. K.C. John, "Mechanical Workshop" 2nd Edn., PHI, 2010.
3. Hajra Choudary, "Elements of Workshop Technology" Vol. 1, Asian Publishers, Edn., 1993.
4. G.S. Sawhney, "Mechanical Experiments and Workshop Practice", I.K. International Publishing House, New Delhi, 2009.

Note: At least two exercises from each trade.

SCHEME OF INSTRUCTION & EXAMINATION
B.E. (All Branches) II - Semester
(Group - B)

S. No.	Course Code	Course Title	Scheme of Instructions				Scheme of Examination			Credits
			L	T	P/D	Contact Hours/Week	CIE	SEE	Duration in Hours	
Theory Course										
1	HS101EG	English	2	-	-	2	30	70	3	2
2	BS103MT	Mathematics-II	3	1	-	4	30	70	3	4
3	BS104PH	Physics	3	1	-	4	30	70	3	4
4	ES106EE	Basic Electrical Engineering	3	1	-	4	30	70	3	4
Practical/ Laboratory Course										
5	HS151EG	English Lab	-	-	2	2	25	50	3	1
6	BS152PH	Physics Lab	-	-	3	3	25	50	3	1.5
7	ES154EE	Basic Electrical Engineering Lab	-	-	2	2	25	50	3	1
8	ES156CE	Engineering Graphics & Design	1	-	4	5	50	50	3	3
		Total	**12**	**03**	**11**	**28**	**245**	**480**		**20.5**

HS: Humanities and Social Sciences **BS**: Basic Science **ES:** Engineering Science
L: Lectures **T**: Tutorials **P**: Practical **D**: Drawing
CIE: Continuous Internal Evaluation **SEE:** Semester End Examination (Univ. Exam)

Note:
1. Each contact hour is a Clock Hour
2. The students have to undergo a Summer Internship of 1 week duration after II-Semester.

Course Code	Course Title						Core / Elective
HS 101 EG	**English (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	2	-	-	-	**30**	**70**	2

Course Objectives

- Communicate clearly, accurately and appropriately
- Learn different models of interpersonal communication
- Learn to communicate grammatically
- Learn to write essays, formal letters and technical reports
- Comprehend the different types of texts

Course Outcomes

The students will able to

- Communicate clearly, accurately and appropriately
- Learn different models of interpersonal communication
- Learn to communicate grammatically
- Learn to write essays, formal letters and technical reports
- Comprehend the different types of texts

Unit – I

Effective Communication: Role and importance of communication; Features of human communication; Process of communication; Barriers to communication; Oral and Written Communication; Importance of listening, speaking, reading, and writing; Types of communication: Verbal – formal versus informal communication, one-way versus two-way communication, Non-verbal communication.

Unit – II

Personality Development and Interpersonal Communication: Models of interpersonal development: Johari window, Knapp's model; Styles of communication; Time management; Emotional Quotient; Teamwork; Persuasion techniques.

Unit – III

Remedial English: Tenses, Subject-verb agreement, Noun-pronoun agreement, Misplaced modifiers, Articles, Prepositions, Redundancies, Clichés. (Note: The focus is on appropriate usage).

Unit – IV

Vocabulary Building and Written Communication: Roots and affixes; Words often confused: Homonyms, Homophones, Homographs; One-word substitutes; Idiomatic usage: Idioms, Phrases, Phrasal Verbs; Synonyms; Antonyms; Paragraph writing; Précis writing; Essay writing; Official letters; E-mail etiquette; Technical report writing: Feasibility and Progress reports.

Unit – V

Reading Comprehension: Unseen Passages, A.P.J. Abdul Kalam, Azim Premji, Sachin Tendulkar, Sathya Nadella, Sam Pitroda (Note: No descriptive questions to be set from this

unit and only Reading Comprehension/s from unseen passages should be set in the Examination Question Papers).

Suggested Readings:

1. E. Suresh Kumar, *Engineering English*, Orient Black Swan, 2014
2. *Language and Life A Skills Approach*, Orient Black Swan, 2018
3. Michael Swan, *Practical English Usage*. OUP, 1995
4. Ashraf Rizvi, M, *Effective Technical Communication*, Tata McGraw Hill, 2009.
5. Meenakshi Raman and Sangeeta Sharma. *Technical Communication: Principles and Practice*. OUP, 2011.

Course Code	Course Title						Core / Elective
BS 103 MT	**Mathematics – II (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	1	-	-	**30**	**70**	4

Course Objectives

- To study matrix algebra and its use in solving system of linear equations and in solving eigen value problems
- To provide an overview of ordinary differential equations
- To study special functions like Legendre and Beta Gamma functions
- To learn Laplace Transforms and its properties

Course Outcomes

The students will able to

- Solve system of linear equations and eigen value problems
- Solve certain first order and higher order differential equations
- Solve basic problems of Beta Gamma and Legender's Function.
- Apply Laplace Transforms; solve ordinary Differential Equations by using it.

Unit-I

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

Unit-II

Differential Equations of First Order: Exact differential equations, Integrating factors, Linear differential equations, Bernoulli's, Riccati's and Clairaut's differential equations, Orthogonal trajectories of a given family of curves.

Unit-III

Differential Equations of Higher Orders: Solutions of second and higher order linear homogeneous equations with constants coefficients, Method of reduction of order for the linear homogeneous second order differential equations with variable coefficients , Solutions of non-homogeneous linear differential equations, Method of variation of parameters, solution of Euler-Cauchy equation.

Unit-IV

Special Function: Gamma Functions, Beta Functions , Relation Between Beta and Gamma Function, Error Functions. Power Series Method, Lengender's Differential Equations and Legender's Polynomial $P_n(x)$, Rodrigue's Formula (without proof).

Unit-V

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.

Suggested Readings:

1. R.K. Jain & S.R.K. lyengar, *Advanced Engineering Mathematics*, Narosa Publications, 4th Edition,2014.
2. Erwin Kreyszig, *Advanced Engineering Mathematics*, John Wiley, 9th Edition, , 2012.
3. Dr.B.S.Grewal, *Higher Engineering Mathematics*, Khanna Publications, 43rd Edition,2014.
4. B.V. Ramana, *Higher Engineering Mathematics*, 23rd reprint, 2015.
5. N. Bali, M.Goyal, A text book of *Engineering Mathematics*, Laxmi publications,2010
6. H.K. Dass, Er. Rajnish Varma, *Higher Engineering Mathematics*, Schand Technical Third Edition.

Course Code	Course Title						Core / Elective
BS 104 PH	**Physics (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	1	-	-	**30**	**70**	4

Course Objectives

- Aware of limits of classical free electron free theory and to apply band theory of solids
- Acquire knowledge on various properties of semiconductors.
- Grasp the intricacies in semiconductor-optical interaction

Course Outcomes

- Distinguish materials based on band theory of solids
- Classify semiconductors on the basis doping and to estimate conductivity and learn transport phenomenon in semiconductors
- Appreciate use of optical absorption by semiconductors.

Unit – I

Crystallography: Introduction, Types of crystal systems, Bravais lattices, Lattiee planes and Miller Indices (Cubic system), Inter planar spacing (Cubic system), Bragg's law, Powder diffraction method.

Crystal Defects: Classification of point defects, Concentration of Schottky defects in metals and ionic crystals, Concentration of Frankel defects, Line defects, Screw and Edge dislocations, Burger's vector

Unit – II

Band Theory of Solids & Semiconductors: Classical free electron theory (qualitative), Kronig Penney model (qualitative treatment), Energy band formation in solids, Intrinsic and Extrinsic semiconductors, Concept of a hole, Carrier concentration and conductivity in intrinsic semiconductors, Formation of P-N junction diode and its I – V characteristics, Thermistor and its characteristics, Hall effect and its applications.

Dielectric Materials: Dielectrics, Types of polarizations, Electronic, Ionic, Orientational and Space charge polarizations, Expression for Electronic polarizability, Frequency and temperature dependence of dielectric polarizations, Determination of dielectric constant by capacitance Bridge method, Ferro electricity, Barium titanate, Applications of Ferroelectrics.

Unit – III

Wave Mechanics: Matter waves –de-Broglie wavelength, properties of wave function, Physical significance, Schrodinger time dependent and time in-dependent wave equation. Particle in a 1-D box.

Electromagnetic theory: Basic laws of electricity and magnetism, Maxwell's equations in integral and differential forms, Conduction and displacement current, Relation between D, E and P – **Electromagnetic waves:** Equation of plane wave in free space, Poynting theorem.

Unit – IV

Magnetic Materials: Classification of magnetic materials: dia, para, ferro, antiferro and ferrimagnetic materials, Weiss molecular field theory of ferromagnetism, Magnetic domains, Hysteresis curve, soft and hard magnetic materials, Ferrites: Applications of ferrites.

Superconductivity: Introduction, General properties of super conductors, Meissner effect, Type I and Type II superconductors, BCS theory (qualitative), Introduction to High T_c superconductors, Applications of superconductors.

Unit – V

Lasers: Characteristics of Lasers, spontaneous and stimulated emission of radiation, Einstein's Coefficients, population inversion, Ruby Laser, Helium Neon Laser, Semi Conductor Laser and applications of lasers.

Fiber Optics: Introduction, Propagation of light through an optical fiber, Acceptance angle, Numerical aperture (NA), Types of Optical fibers and Refractive index profiles, Fiber drawing process (double Crucible Method), Losses in optical fibers, applications of optical fibers.

Suggested Reading:

1. B.K. Pandey and S. Chaturvedi Engineering Physics Cengage Learning 2012
2. A.K. Bhandhopadhya, Nano Materials, New Age International, 1st Edition, 2007
3. M.S. Avadhanulu and P.G. Kshirusagar, Engg. Physics, S. Chand & Co. 1st Edition, 1992.
4. C.M. Srivastava and C. Srinivasan – Science of Engg Materials, New Age International.
5. R.K Gaur and S.L Gupta- Engineering Physics, Dhanpathrai Publications, New edition.
6. Sanjay D Jain & Girish G Sahasrabudhe -Engineering Physics, University Press

Course Code	Course Title						Core / Elective
ES 106 EE	**Basic Electrical Engineering (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	3	1	-	-	**30**	**70**	4

Course Objectives

- To provide an understanding of basics in Electrical circuits.
- To explain the working principles of Electrical Machines and single phase transformers.

Course Outcomes

- To analyze Electrical circuits to compute and measure the parameters of Electrical Energy.
- To comprehend the working principles of Electrical DC Machines.
- To Identify and test various Electrical switchgear, single phase transformers and assess the ratings needed in given application.
- To comprehend the working principles of electrical AC machines.

Unit-I

DC Circuits: Electrical circuit elements (R, L and C), voltage and current sources, Kirchoff current and voltage laws, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

Unit-II

AC Circuits: Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, and RL, RC, RLC combinations (series only). Three phase balanced circuits, voltage and current relations in star and delta connections.

Unit-III

Transformers and 3-ph Induction Motors: Transformers: Electromagnetic induction, Faradays laws, Statically induced emf, Lenz law, BH characteristics, ideal and practical transformer, losses and efficiency, Auto-transformer and three-phase transformer connections.

Three Phase Induction motor: Generation of rotating magnetic fields, Construction and working of a three-phase induction motor, squirrel cage IM, slip-ring IM, Applications.

Unit-IV

Single-phase induction motor & DC Machines: Single-phase induction motor: Construction and principle of operation, Capacitor start & capacitor run motor, applications

DC Generators: Dynamically induced emf, Flemming's Right hand and Left hand rules, Construction and principle of operation of DC generator, EMF equation, Types of DC Generators, OCC characteristics, applications

DC Motors: principle of operation of DC Motor, Types of DC motors, applications.

Unit-V

Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for Batteries. Elementary calculations for energy consumption, power factor improvement and battery backup.

Suggested Reading:

1. N.K. De, “Basic Electrical Engineering”, Universities Press, 2015.
2. J.B.Gupta, “Fundamentals of Electrical Engineering and Electronics” S.K.Kataria & Sons Publications, 2002.
3. J.B.Gupta, “Utilization of Electric Power and Electric Traction” S.K.Kataria & Sons Publications, 2010
4. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, “ Basic Elactrical Engineering” Tata McGraw Hill, Publications,2009
5. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995.

Course Code	Course Title						Core / Elective
HS 151 EG	**English Lab (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	2	**25**	**50**	1

Course Objectives

- Learn IPA
- Learn minimal pairs and types of syllables
- Overcome the difficulties with sounds of English
- Learn to participate well in gds, Debates and Presentations
- Communicate with appropriate body language and expressions

Course Outcomes

The students will able to

- Learn IPA
- Learn minimal pairs and types of syllables
- Overcome the difficulties with sounds of English
- Learn to participate well in gds, Debates and Presentations
- Communicate with appropriate body language, expressions

1. **Introduction to English Phonetics: Organs of Speech:** respiratory, articulatory and phonatory systems; **Sounds of English:** Introduction to International Phonetic Alphabet; Minimal pairs; Syllable; Word Stress; Introduction of rhythm and intonation; Difficulties of Indians speakers with stress and intonation.
2. **Speaking Activities:** Self Introduction, Picture perception, JAM.
3. Group discussion, Debate, Presentation skills
4. **Listening Activities:** Listening to different types of materials for effective comprehension
5. **Role play:** Use of dialogues in a variety of situations and settings

Suggested Readings:

1. E. Suresh Kumar, a Handbook for English Language Laboratories (with CD).
2. Revised edition, Cambridge University Press India Pvt. Ltd. 2014
3. T. Balasubramanian. A Textbook of English Phonetics for Indian Students. Macmillan, 2008.
4. J. Sethi et al., A Practical Course in English Pronunciation (with CD). Prentice Hall of India, 2005.
5. Hari Mohan Prasad. How to Prepare for Group Discussions and Interviews. Tata McGraw Hill, 2006.

Course Code	Course Title						Core / Elective
BS 152 PH	**Physics Lab (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	3	**25**	**50**	1.5

Course Objectives

- Make precise measurements using basic physical principles and acquire skills to handle the instruments
- Relates the theoretical Knowledge to the behavior of Practical Physical world.
- Analyze errors in the experimental data.
- Plot graphs between various physical parameters.

Course Outcomes

- Conduct experiments, take measurements independently.
- Write appropriate laboratory reports.
- Compute and compare the experimental results and draw relevant conclusions.
- Use the graphical representation of data and estimate results from graphs

List of Experiments:

1. To determine the Dielectric constant and Phase transition temperature of Lead Zirconium Titanate (PZT).
2. To draw the I - V Characteristics of P-N Junction diode and to evaluate the resistance.
3. To find the values of Electrical conductivity and energy gap of Ge crystal .
4. Determination of rigidity of modulus of Torsion pendulum.
5. Determination of carrier concentration, Mobility and Hall Coefficient of Ge crystal using Hall Effect Experiment.
6. To determine the constants of A, B and **α** using Thermistor characteristics.
7. To draw the curve between the magnetizing field and the intensity of magnetization of the specimen (soft iron rod) and to find out
   i) Coercivity ii) Retentivity and iii) Hysteresis loss.
8. To draw the I - V Characteristics of a solar cell and to calculate the
   i) Fill factor Efficiency and ii) Series resistance.
9. To Determine the Numerical aperture (NA) of Optical fiber.
10. To determine the wave length of the given Laser source.

Note: Minimum eight experiments should be conducted in the semester

Suggested Reading:

1. N.K. De, "Basic Electrical Engineering", Universities Press, 2015.
2. J.B.Gupta, "Fundamentals of Electrical Engineering and Electronics" S.K.Kataria & Sons Publications, 2002.
3. J.B.Gupta, "Utilization of Electric Power and Electric Traction" S.K.Kataria & Sons Publications, 2010

Course Code	Course Title						Core / Elective
ES 154 EE	**Basic Electrical Engineering Lab (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	-	-	-	2	**25**	**50**	1

Course Objectives

- To impart the practical knowledge on testing of DC and AC Machines and the usage of common electrical measuring instruments

Course Outcomes

- Get an exposure to common electrical components and their ratings.
- Analyze the performance of DC and AC Machines.
- Comprehend the usage of common electrical measuring instruments.
- Test the basic characteristics of transformers and electrical machines.

Suggested List of Laboratory Experiments/Demonstrations:

Dem1. Basic safety precautions. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. Real-life resistors, capacitors and inductors.

Exp 1. Verification of KVL and KCL, superposition theorem (with DC excitation)

Exp 2 Verfication of Thevinens and Nortons theorems (with DC excitation)

Exp 3. Sinusoidal steady state response of R-L, and R-C circuits – impedance calculation and verification. Observation of phase differences between current and voltage. Power factor calculation

Exp 4. Transformers: Observation of the no-load current waveform on an oscilloscope (nonsinusoidal wave-shape due to B-H curve nonlinearity should be shown along with a discussion about harmonics).

Exp 5. Loading of a transformer: measurement of primary and secondary voltages and currents, and power.

Exp 6. Three-phase transformers: Star and Delta connections. Voltage and Current relationships (line-line voltage, phase-to-neutral voltage, line and phase currents).

Exp 7. Measurement of phase voltage/current, line voltage/current and power in a balanced three-phase circuit connected in star and delta

Dem2. Demonstration of cut-out sections of machines: dc machine (commutator-brush arrangement), induction machine (squirrel cage rotor), synchronous machine (field winging - slip ring arrangement) and single-phase induction machine.

Exp 8. OCC characteristics of DC Generator

Exp 9. Synchronous speed of two and four-pole, three-phase induction motors. Direction reversal by change of phase-sequence of connections.

Exp 10. Power factor improvement of Induction Motor using static capacitors

Exp 11. Load Test of DC Motor

Note - 1:

(i) List of Experiments and Demonstrations suggested above are already available in the Laboratory of the electrical department. No need to purchase any extra equipment except Demonstration2 equipments

(ii) Procurement of Demonstration 2 equipments can be done during the course work of that semester. It can be included in the laboratory.

Note - 2:

(i) Experiments 9, 10 and Demonstration 3 can be incorporated in the Lab syllabus if the topics concerned to the above experiments are considered in new BEE syllabus .

Suggested Reading:

1. J.B.Gupta, “Fundamentals of Electrical Engineering and Electronics” S.K.Kataria & Sons Publications, 2002.
2. J.B.Gupta, “Utilization of Electric Power and Electric Traction” S.K.Kataria & Sons Publications,2010
3. Abhijit Chakrabarti, Sudipta Nath, Chandan Kumar Chanda, “ Basic Elactrical Engineering” Tata McGraw Hill, Publications,2009
4. Hughes, "Electrical Technology", VII Edition, International Student -on, Addison Welsey Longman Inc., 1995.

Course Code	Course Title						Core / Elective
ES 156 CE	**Engineering Graphics & Design (Common to All Branches)**						**Core**
Prerequisite	Contact Hours per Week				CIE	SEE	Credits
	L	T	D	P			
-	1	-	4	-	**50**	**50**	3

Course Objectives

- To prepare you to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- To prepare you to communicate effectively
- To prepare you to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Course Outcomes

The students will able to

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling
- Exposure to computer-aided geometric design
- Exposure to creating working drawings
- Exposure to engineering communication

Sheet No	Description of the Topic	Contact Hours	
		Lecture	Drawing
1	Principles of Engineering Graphics and their significance, usage of drawing instruments.	1	
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), rectangular hyperbola.		2
4	**Cycloids** (cycloid & epicycloid)	1	2
5	**Involutes** (involute of triangle, square & circle)		2
6	**Scales** (plain & diagonal scales)	1	2 + 2
7	**Introduction to AutoCAD** Basic commands and simple drawings.		2 + 2
8	**Orthographic Projection** Projections of points situated in different quadrants.	1	2
9	**Projections of straight lines – I** Line parallel to both the reference planes, line perpendicular or inclined to one reference plane.	1	2
10	**Projections of straight lines – II** Line inclined to both the reference planes.	1	2

11	**Projections of planes – I** Perpendicular planes	1	2
12	**Projections of planes – II** Oblique planes		2
13	**Projections of solids – I** Polyhedra and solids of revolution, Projections of solids in simple position.	1	2
14	**Projection of solids – II** Projections of solids when the axes inclined to one or both the reference planes.	1	2 + 2
15	**Section of solids – I** When the sectional plane is parallel or perpendicular to one reference plane.	1	2
16	**Section of solids – II** When the sectional plane is inclined to one reference plane.		2
17	**Development of surfaces – I** Prisms and Cylinders	1	2
18	**Development of surfaces – II** Pyramids and Cones		2
19	**Intersection of surfaces – I** Intersection of cylinder and cylinder	1	2
20	**Intersection of surfaces – II** Intersection of cylinder and cone		2
21	**Isometric projection – I** planes and simple solids	1	2
22	**Isometric projection – II** combination of two or three solids		2
23	Conversion of Isometric Views to Orthographic Views	1	2
24	**Floor plans** of 2 or 3 rooms including windows, doors, and fixtures such as WC, bath, sink, shower, etc.	1	2

Suggested Text:

1. Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
2. Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
3. S.N Lal, Engineering Drawing with Introduction to Auto CAD, CengageLearning India Pvt Lid, New Delhi, 2018.
4. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
5. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
6. (Corresponding set of) CAD Software Theory and User Manuals

NOTE:

1. At least 20 sheets must be covered.
2. Sheet number 1 to 6 (Graph sheets / drawing sheets)
3. Sheet number 7 to 24 (AutoCAD drawings.