Gurugram University
Scheme of Studies and Examination
Bachelor of Technology (SCHEME A3) Semester-1

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	HSE-101	Communication Skills in English	2	0	0	2	2
2.	BSM-103	Mathematics-I	3	1	0	4	4
3.	BSC-101 OR EEE-101	Chemistry OR Basic of Electrical and Electronics Engineering	3 3	0 0	0 0	3	3
4.	CSE-101	Programing for problem solving using C	3	0	0	3	3
5.	ENV-101	Basics of Environmental Science	2	0	0	2	2
6.	HSE-101P	Communication Skills in English (P).	0	0	2	2	1
7.	BSC-101P OR EEE-101P	Chemistry (P) OR Basics of Electrical and Electronics Engineering (P)	0	0	2	2	1
8.	CSE-101P	Programing for Problem solving using C (P)	0	0	2	2	1
9.	MEE-104P OR MEE-102P	Engineering Drawing OR Workshop Practices (P)	1 1	0 0	3 3	4	2.5
10.	AUS-101	Sports (Audit Course) Compulsory	0	0	2	2*	0
Total						**24+2***	**19.5**

Course code	HSE-101				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/ Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course:

- **a.** The course will focus on the four integral skills of language, improving the proficiency levels in all of them and to learn to use language as a tool for effective communication.
- **b.** This course will widen the understanding of the learners in all genres of literature (short stories, poetry, autobiographies.) with the help of expository pieces .
- **c.** The course will strive to equip the learner with the ability to express oneself and be understood by others with clarity and precision, in both written and spoken forms.
- **d.** This course will encourage creative use of language through translation, paraphrasing and paragraph writing.
- **e.** Along with the above, the course will also build confidence and encourage the students to use a standard spoken form of English in order to prepare them to face job interviews, workplace and in higher studies.

Unit:1

Remedial English : Parts of speech, Gerunds, Participles and infinitives; Clauses; Sentence constructions (unity; avoidance of choppy and rambling sentences, logic and consistency, conciseness, sequencing of ideas); Sentence errors-agreement between verb and subject, pronoun and antecedents, sequence of tenses, problems involving modifiers (dangling and misplaced modifiers); Shifts in point of view consistency of number and person, tense, mood, voice and subject; Parallelism; Omissions and mixed constructions.

Unit: 2

Vocabulary : Methods of building vocabulary-etmological roots, prefixes and suffixes; Commonly used foreign words and phrases; spelling; words often confused synonyms and homonyms; one word substitutes; verbal idioms.

Unit: 3

Punctuation and Mechanics: End Punctuation; internal Punctuation; Word Punctuation. Comprehension: Abstracting; Summarizing; Observation, Findings and Conclusions; Illustration and Inductive Logic; Deduction and Analogy.

Unit: 4

Presentation: Oral presentation- Extempore, discussion on topics of contemporary relevance, Interviews.

Written Comprehension: The ability to write after listening to and reading select speeches, news bulletins, presentations and answering questions based on what has been heard. Reading the given texts to skim, scan, infer and answer comprehension questions. Reading texts like case studies and project reports for critical assessment and book Review.

Suggested Books:

1. Nitin Bhatnagar and Mamta Bhatnagar, Communicative English for Engineers and Professionals. Pearson Education.
2.Bhatnagar, k. Manmohan.Ed. The Spectrum of Life: An Anthology of Modern Prose. Delhi: Macmillan India Ltd., 2006.
3 C. Murlikrishna& Sunita Mishra, Communication Skills for Engineers, Pearson Ed.
4 Sinha, R.P.Current English Grammar and Usage. OUP.
5.Rizvi, M. Ashraf.Effective Technical Communication. McGraw Hill Education (India) Pvt. Ltd., 2014.
6.Eastwood, John.Oxford Guide to English Grammar.OUP, 2010.
7.Kumar, Sanjay and PushpLata. Communication Skills. OUP, 2011.
8. Raman, Meenakshi and Sangeeta Sharma.CommunicationSkills.NewDelhi:OUP,2011.
9.Hill, L.A.A Guide to Correct English.London:OUP,1965.
10.Oxford Dictionary of English Idioms. New Delhi: OUP, 2009
11*http://yousigma.com/religionandphilosophy/swamivivekananda/thescecretofwork.pdf

Course code	BSM-103				
Category	Basic Science Course				
Course title	Mathematics-I				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To develop logical understanding of the subject
2. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
3. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Matrices & Its Application:

Elementary Matrices, Elementary Transformations, Inverse using elementary transformations, Rank of a matrix, Normal form of a matrix, Linear dependence and independence of vectors, Consistency of linear system of equations, Linear and Orthogonal Transformations, Eigenvalues and Eigenvectors, Properties of eigenvalues, Cayley-Hamilton Theorem, Diagonalization of Matrices.

Unit-II

Sequences and Series:

Convergence of sequence and series, Tests for convergence, Power series: Taylor's series, series for exponential, trigonometric and logarithm functions, Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit-III

Differential Calculus: Limit, Continuity and Differentiability of function of single variable, Successive Differentiation, Leibnitz Theorem, Taylor's and Maclaurin's Series for Single Variable function, Partial derivatives, Homogeneous functions, Euler's Theorem, Jacobian, Maxima-Minima of function of two variables, Lagrange's Method of undetermined multipliers.

Unit-IV

Integral Calculus: Basic concepts of integration and properties of definite integrals, Applications of single integration to find volume of solids and surface area of solids of revolution, Double integral, Change of order of integration, Double integral in Polar Co-ordinates, Applications of double integral to find area enclosed by plane curves, Triple integral, Beta and Gamma functions.

Reference Books:

1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.

2. Erwin Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.

3. D. Poole, Linear Algebra: A Modern Introduction, Brooks Cole.

4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.

5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.

6. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.

7. V. Krishnamurthy, V.P. Mainra and J. L. Arora, An introduction to Linear Algebra, Affiliated East– West Press Private limited

Course code	BSC-101				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30Marks				
Theory Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:

1. To analyse microscopic chemistry
2. Understand the concept of hardness of water and phenomenon of corrosion
3. Rationalise periodic properties
4. Distinguish the ranges of the electromagnetic spectrum

UNIT-I

Atomic and molecular structure: Schrodinger equation (Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations (derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

UNIT-III

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-III

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded).

UNIT-IV

Intermolecular forces: Ionic, dipolar and Van der Waals interactions.

Water Chemistry: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process).

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.
(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Education.
(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(vi) Physical Chemistry, by P. W. Atkins
(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

Course Outcomes:

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	EEE-101				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical and Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To provide basic knowledge of different elements of electrical and electronics engineering field.
To familiarize the students with the concepts of electrical circuits and network Analysis.

To understand the basics of AC and DC circuits.

To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1
DC Circuits

Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources(ideal & Controlled),series and parallel circuits, Network reduction: voltage and current division Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman,Substitution and Reciprocity theorem.

Unit: 2
AC Circuits

Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

Unit: 3

Introduction to p-n junction diode and its applications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator

Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

Unit: 4

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Suggested books:

1. E. Huges, "Electrical Technology", ELBS.
2. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill, 2nd Edition, 2009.
3. M.M. Mano: Digital Logic Design, Phi.

Suggested reference books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. V. Del Toro, "Principles of Electrical engineering", PHI.
3. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013.
4. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
5. R.P. Jain: Modern Digital Electronics, Tmh.
6. Malvino and Leach, " Digital Principles and Applications", TMH publishers, 8th Edition
7. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
8. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	CSE-101				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Unit 1

Introduction to Programming: Idea of Algorithm: Steps to solve logical and numerical problems. Representation of Algorithm: Flowchart/Pseudocode with examples. C Programming: Keywords, Variables and Data Types: basic, derived and user defined, Type Conversions, Header Files, Basic Input and Output Functions and Statements, Compilation, Syntax and Logical Errors in compilation, Object and Executable Code, Storage Classes, Arithmetic Expressions and Precedence.

Unit 2

Preprocessors, Conditional and Branching Statements, Loops/ Iterative Statements, Writing and evaluation of conditionals and consequent branching.

Unit 3

Arrays (1-D, 2-D), Character Arrays and Strings, Arrays with Pointers, Functions (including using built in libraries), Parameter passing in functions, Call by Value, Call by Reference, Passing arrays to functions, Recursion, as a different way of solving problems. Example programs, such as Finding Factorial, Fibonacci series, Ackerman function etc.

Unit 4

Idea of pointers, Defining pointers, Use of Pointers in self-referential structures, Introduction to Dynamic Memory Allocation and its Methods, Structures, Union, Defining Structures and Array of Structures, File Handling.

Suggested Text Books:

Ajay Mittal, Programming in C, 'A Practical Approach', Pearson Education.
Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
Yashavant Kanetkar, Let Us C, BPB Publication.

Suggested Reference Books

Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.

Course code	ENV-101				
Category	Humanities and Social Sciences				
Course title	Basics of Environmental Science				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work/Practical	50Marks				
Exam	50Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Objective:
To impart the knowledge and awareness for the environmental protection for real-time contribution during an execution of engineering practices in the society.

Unit 1
Environmental studies and Natural Resources:
Definition, scope and importance of environmental studies.
Natural Resources: Renewable and non-renewable resources, and associated problems
(a) Forest resources: Use and over-exploitation, deforestation, Timber extraction, mining, dams and their effects on forests and tribal people.
(b)Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dam's benefits and problems.
(c) Mineral Resources: Use and exploitation, environmental effects of extracting and using mineral resources.
(d)Food Resources: World food problems, changes caused by agriculture and over grazing, effects of modern agriculture, fertilizers-pesticides problems, water logging, salinity.
(e) Energy Resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources.

Unit 2
Eco Systems:
Concept of an eco-system, Structure and function of an eco-system, Producers, consumers, decomposers, Energy flow in the ecosystems, Ecological succession, Food chains, food webs and ecological pyramids.
Introduction, types, characteristic features, structure and function of the following ecosystems:
(a) Forest ecosystem

(b) Grass land ecosystem
(c) Desert ecosystem
(d) Aquatic eco systems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3
Environmental Pollution:
Definition, Causes, effects and control measures of;
(a) Air pollution
(b)Soil pollution
(c) Marine pollution
(d)Noise pollution
(e) Nuclear hazards
Disaster management: Floods, earth quake, cyclone and landslides.

Unit 4
Social issues and the Environment:
From unsustainable to sustainable development, Urban problems related to energy, Water conservation, rain water harvesting, watershed management.
Environmental ethics: issues and possible solutions, Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Environment protection Act, Air (prevention and control of pollution) Act, Water (prevention and control of pollution) Act, Wildlife protection Act, Forest conservation Act, Issues involved in enforcement of environmental legislations.

Recommended Books:
1. Textbook of Environmental studies, Erach Bharucha, UGC.
2. Fundamental concepts in Environmental Studies, D. D. Mishra, S Chand & Co Ltd.
Course Outcomes :
1.To understand the basic concepts of environmental studies and natural resources.
2. To learn about the various eco-systems of nature.
3. To gain knowledge about different types of environmental pollutions and their control measures.
4. To acquire the knowledge about the various social aspects related to the environment.

Course code	HSE-101P				
Category	Humanities and Social Sciences				
Course title	Communication Skills in English (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work/ Practical	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Communication Skills in English (P)

Lab Activity: The students will acquire basic proficiency in English with special emphasis on listening, comprehension and speaking skills both at social and professional platforms.

(i) Listening comprehension
(ii) Recognition of phonemes in International Phonetic Alphabet
(iii) Self introduction and introduction of another person
(iv) Conversation and dialogues in common everyday situations
(v) Communication at work place (Standard phrases and sentences in various situations)
(vi) Telephonic communication
(vii) Speeches for special occasions (Welcome speeches, Introduction speeches, Felicitation speeches and Farewell speeches)
(viii) Tag Questions
(ix) Formal Presentations on literary texts prescribed in theory paper, Question Formation & Mock Press Conference

Course code	BSC-101P				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
External Practical	50 Marks				
Internal Practical	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

LIST OF EXPERIMENTS: -
1. Determination of surface tension of given liquid by drop number method.
2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwood viscometer.
3. Calculate the Rf value of given sample using Thin layer chromatography / Paper chromatography.
4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
5. Determination of chloride content in given water sample.
6. Calculate the strength of strong acid by titrating it with strong base using conductometer.
7. Calculate the emf value of given cell.
8. To prepare the of urea formaldehyde and phenol formaldehyde resin.
9. To determine the rate constant of a reaction.
10. To Prepare iodoform.
11. Calculate the saponification value / acid value of given oil sample.
12. Chemical analysis of two anions and two cations in given sample of salt.
13. Determination of the partition coefficient of a substance between two immiscible liquids.
14. To determine the total hardness of given water sample by EDTA method.

Note: At least 08 experiments are to be performed by the students.

Suggested Books:
1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

Course code	EEE-101P				
Category	Engineering Science Course				
Course title	**Basics of Electrical and Electronics Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. Verification of temperature co-efficient of resistance: (i) Positive for Tungsten and Nichrome and (ii) Negative for carbon.

4. To measure DC voltage and current, AC voltage and current with multi-meter

5. To observe waveforms on oscilloscope, measure basic parameters amplitude and frequency of sine wave and square wave.

6. Obtain VI characteristics of semiconductor rectifier diode, LED, Photo-diode

7. To observe waveform at the output of half wave rectifier with and without filter capacitor.

8. To observe waveform at the output of full wave rectifier with and without filter capacitor.

9. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
10. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
11. To study the transfer and drain characteristics of JFET and calculate its various parameters.
12. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.

Course code	CSE-101P				
Category	Professional Core Course				
Course title	Programming for Problem Solving Using C (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Note: At least 6 experiments are to be performed by the students.

List of Subject related Experiments:

Laboratory Outcomes

- To formulate the algorithms for simple problems
- To translate given algorithms to a working and correct program
- To be able to correct syntax errors as reported by the compilers
- To be able to identify and correct logical errors encountered at run time
- To be able to write iterative as well as recursive programs
- To be able to represent data in arrays, strings and structures and manipulate them through a program

Tutorial 1: Problem solving using computers:
Lab1: Familiarization with programming environment

Tutorial 2: Variable types and type conversions:
Lab 2: Simple computational problems using arithmetic expressions

Tutorial 3: Branching and logical expressions:
Lab 3: Problems involving if-then-else structures

Tutorial 4: Loops, while and for loops:
Lab 4: Iterative problems e.g., sum of series
Tutorial 5: 1D Arrays
Lab 5: 1D Array manipulation

Tutorial 6: 2D arrays and Strings
Lab 6: Matrix problems, String operations

Tutorial 7: Functions, call by value:
Lab 7: Simple functions

Course code	MEE - 104P				
Category	Engineering Science Course				
Course title	Engineering Drawing (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes:

On completion of this course, the students will be 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

UNIT-I

Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes –Auxiliary Planes;

UNIT-II

Module3: Projections of Regular Solids

Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioningand scale.Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module4: Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of RightRegular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings(foundation to slab only)

Module5: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions;Isometric Views of lines, Planes, Simple and compound Solids; Conversion of IsometricViewsto OrthographicViews andVice-versa,Conventions;

UNIT- III

Module6: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Back ground, Crosshairs, Coordinate System),Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line(where applicable),The Status Bar, Different methods of zoom as used in CAD, Select and eraseobjects.; IsometricViews of lines,Planes,Simple andcompound Solids]

UNIT-IV

Module7: Annotations, layering & other functions

Applying dimensions to objects, applying an notations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solidsand project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies.

Drawing of Engineering objects like coupling, crank shaft, pulley.

Module8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

SuggestedText/ReferenceBooks:

(i) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education
(ii)Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(iii) A grawal B. & Agrawal C. M.(2012), Engineering Graphics, TMH Publication
(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
(v) CAD Software Theory and User Manuals

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

1. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
2. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
3. To impart fundamental Knowledge of Lathe machine
4. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

1. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
2. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
3. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
4. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
5. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
6. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Gurugram University

Scheme of Studies and Examination

Bachelor of Technology (SCHEME A3) Semester-2

Sr. No.	Course Code	Course Title	Hours per week			Total Contact Hrs. per week	Credit
			L	T	P		
1.	BSM-104	Mathematics-II	3	1	0	4	4
2.	HSV-102	Human Value & Soft Skills	2	0	2	4	3
3.	EEE-101 OR BSC-101	Basics of Electrical and Electronics Engineering OR Chemistry	3	0	0	3	3
4.	BSP-103	Physics	3	1	0	4	4
5.	MEE-106	Engineering Mechanics	3	1	0	4	4
6.	EEE-101P OR BSC-101P	Basics of Electrical and Electronics Engineering (P) OR Chemistry (P).	0	0	2	2	1
7.	BSP-103P	Physics (P)	0	0	2	2	1
8.	MEE-102P OR MEE-104P	Workshop Practices (P) OR Engineering Drawing	1	0	3	4	2.5
Total						**27**	**22.5**

Course code	BSM-104				
Category	Basic Science Course				
Course title	Mathematics-II				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

4. Demonstrate their understanding of mathematical ideas from multiple perspectives.
5. To develop logical understanding of the subject
6. To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem from Engineering fields.
7. To make aware students about the importance and symbiosis between Mathematics and Engineering.

Unit-I

Ordinary Differential Equations: Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, Heat flow and Orthogonal trajectories, Linear Differential equations of second and higher order, Complete solution, Complementary function and Particular integral, Method of variation of parameters to find particular integral, Cauchy's and Legendre's linear equations.

Unit-II

Laplace Transforms and its Applications: Laplace transforms of elementary functions, Properties of Laplace transforms, Existence conditions, Transforms of derivatives, Transforms of integrals, Multiplication by tn , Division by t, Evaluation of integrals by Laplace transforms, Laplace transform of unit step function, Unit impulse function and Periodic function, Inverse transforms.

Unit-III

Partial Differential Equations: Formation of partial differential equations, Lagrange' linear partial differential equation, First order non-linear partial differential equation, Charpit's method, Method of separation of variables

Unit-IV

Basic Statistics: Measures of Central tendency: Mean, Median, Mode, Measures of Dispersion, Moments, Skewness and Kurtosis, Moments, Variance of a sum, Correlation coefficient, Correlation and regression – Rank correlation; Curve fitting by the method of least squares-fitting of straight lines, second degree parabolas and more general curves.

Reference Books:

1) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, Pearson Education.
2) Erwin kreyszig, Advanced Engineering Mathematics, John Wiley & Sons.
3) Ramana B.V., Higher Engineering Mathematics, Tata McGraw-Hill Publishing Company Limited.
4) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers.
5) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications.
6) P. Sivaramakrishna Das and C. Vijyakumari, Engineering Mathematics, Pearson Education.
7) W. E. Boyce and R. C. DiPrima, Elementary Differential Equations and Boundary Value Problems, Wiley India.
8) S. L. Ross, Differential Equations, Wiley India.
9) R. K, Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, Narosa Publication House Private Limited

Course code	HSV-102				
Category	Humanities and Social Sciences				
Course title	Human Values and Soft Skills				
Scheme and Credits	L	T	P	Credits	
	2	0	2	3	
Class work/Practical	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

a. The course aims at developing the desired English language skills of students of Engineering and Technology so that they become proficient in communication to excel in their professional lives. The course has been designed as to enhance their linguistic and communicative competence.
b. Understanding (Clarity) of Human Relationships and Family.
c. Exposure to Issues in Society and nature (larger manmade systems and Nature).

Unit: 1

Motivation and Objectives of Human Values Course, Purpose of Education, Complimentarily of skills and values, how the current education system falls short, Peers Pressure, Social Pressure In various dimensions of life, Concept of Competition and Time Management.

Unit: 2

Concept of Preconditioning, Concept of Natural Acceptance in Human Being, Understanding Relationships, Dealing with anger, Nine universal values in human relationships. Concept of prosperity, idea of Society, Idea of decentralization of politics, economics, education, justice etc., Its comparison with centralized systems, Balance in nature.

Unit: 3

Techniques of Good Writing , Writing self assessment tasks, Precis writing and note making. Paragraph and Essay writing, Article writing and summarizing

Unit: 4

Business Communication: Formal and Informal Letter writing, Statement of Purpose, Job application & CV (summary statement of academic & professional profiles) and Power point presentations through relevant slides.

English Lab Activity: Blog Writing/Creating a Newsletter, Script writing & enacting for a street play. Develop negotiating skills by using appropriate language of courtesy, Recording individual efforts and holding paired interactions and Group Discussions, Preparing and practising for Interviews.

Suggested reference books

Recommended Readings:
1. Bhatnagar, Nitin andMamtaBhatnagar.Communicative English for Engineers and Professionals.Pearson Education, 2013.
2. Swan, Michael.Practical English Usage. OUP, 1995.
3. Gangal, J.K. Practical Course in Spoken English. New Delhi: PHI Learning, 2015.
4. Konar,Nira. Communication Skills for Professionals. New Delhi: PHI Learning Pvt. Ltd., 2009.
5. Bansal, R.K. and J.B. Harrison. Spoken English. Orient Longman, 1983.
6. Sharma, Sangeeta and Binod Mishra. Communication Skills for Engineers and Scientists. Delhi: PHI Learning Pvt. Ltd., 20
7. Annie Leonard, `` The Story of Stuff,'' Free Press
8. Mohandas Karamchand Gandhi,`` The Story of My Experiments with Truth," Beacon Press
9. J Krishnamurthy,`` On Education," Official repository
10. Hermann Hesse ,`` Siddhartha," Bantam Books
11. ThichNhatHanh,`` Old Path White Clouds," Parallex Press
12. On Education - The Mother Aurobindo Ashram Publication

Course code	EEE-101				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical and Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	
	3	**0**	**0**	3	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

To provide basic knowledge of different elements of electrical and electronics engineering field.
To familiarize the students with the concepts of electrical circuits and network Analysis.

To understand the basics of AC and DC circuits.

To familiarize students to the analysis and design of analog electronic circuits which form the basic building blocks of almost any electronic system.

To introduce p-n junction theory, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1
DC Circuits

Role and importance of circuits in Engineering, Concept of fields, charge, current, voltage, energy and their interrelationships. Electrical circuit elements (R, L and C), voltage and current sources(ideal & Controlled),series and parallel circuits, Network reduction: voltage and current division Kirchhoff current and voltage laws with their applications (Nodal and Mesh Analysis), Source transformation - star delta conversion. Superposition theorem, Thevenin and Norton Theorems, Millman,Substitution and Reciprocity theorem.

Unit: 2
AC Circuits

Representation of sinusoidal waveforms, average, peak and rms values, complex representation of impedance, phasor representation, complex power, real power, reactive power, apparent power, power factor and Energy, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel),Resonance; Introduction to three- phase circuits

Unit: 3

Introduction to p-n junction diode and its pplications. Half wave & full wave rectifiers. clipping and clamping circuits, Varactor, Varistor, Voltage Regulator

Bipolar junction transistors and its biasing BJT operation, BJT voltages and currents, CE, CB and CC characteristics, DC load line and bias point, base bias, emitter feedback bias, collector feedback bias, voltage divider bias, Thermal stability, biasing BJT switching circuits, transistor power dissipation and switching time, Testing of bipolar junction transistor with multi-meter, Reading datasheet of BJT.

Unit: 4

Field Effect Devices: JFET : basic Operation and characteristics, drain and transfer characteristics, pinch off voltage, parameters of JFET: Transconductance (gm), ac drain resistance (rd), amplification factor(μ) ,Small Signal Model & Frequency Limitations. MOSFET: basic operation, depletion and enhancement type, pinch-off voltage, Shockley equation and Small Signal Model of MOSFET, MOS capacitor.

Suggested books:

1. E. Huges, "Electrical Technology", ELBS.
2. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill, 2nd Edition, 2009.
3. M.M. Mano: Digital Logic Design, Phi.

Suggested reference books

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. V. Del Toro, "Principles of Electrical engineering", PHI.
3. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013.
4. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
5. R.P. Jain: Modern Digital Electronics, Tmh.
6. Malvino and Leach, " Digital Principles and Applications", TMH publishers, 8th Edition
7. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
8. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

Course code	BSC-101				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30Marks				
Theory Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:

1. To analyse microscopic chemistry
2. Understand the concept of hardness of water and phenomenon of corrosion
3. Rationalise periodic properties
4. Distinguish the ranges of the electromagnetic spectrum

UNIT-I

Atomic and molecular structure: Schrodinger equation (Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations (derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

UNIT-III

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-III

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded).

UNIT-IV

Intermolecular forces: Ionic, dipolar and Van der Waals interactions.

Water Chemistry: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process).

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.
(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane
(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Education.
(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(vi) Physical Chemistry, by P. W. Atkins
(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

Course Outcomes:

The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	BSP-103				
Category	**Basic Science Course**				
Course title	**Physics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	3	**1**	**0**	**4**	
Class work	**30 Marks**				
Exam	**70 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Objectives of the course

1. To impart knowledge of basic concepts in applied physics
2. To enhance the analytical capability of the engineering students.
3. To givea balance account of the fundamentals of Physics as well as some of recent developments in this area best suited to the Engineering applications in different branches and to provide the knowledge and methodology necessary for solving problems in the field of engineering.

UNIT – I

Electrostatics in vacuum and linear dielectric medium

Calculation of electric field and electrostatic potential for a charge distribution; Divergence and curl of electrostatic field; Laplace's and Poisson's equations for electrostatic potential Boundary conditions of electric field and electrostatic potential; energy of a charge distribution and its expression in terms of electric field. Electrostatic field and potential of a dipole. Bound charges due to electric polarization; Electric displacement; boundary conditions on displacement.

UNIT – II

Electromagnetism and Magnetic Properties of Materials

Laws of electrostatics, electric current and the continuity equation, laws of magnetism. Ampere's Faraday's laws. Maxwell's equations. Polarisation, permeability and dielectric constant, polar and non-polar dielectrics, applications of dielectric Magnetisation, permeability and susceptibility, classification of magnetic materials, ferromagnetism, magnetic domains and hysteresis, applications.

UNIT – III

Wave Optics and Lasers

Wave Optics: Huygens' principle, superposition of waves and interference of light by wave-front splitting and amplitude splitting; Young's double slit experiment, Newton's rings, Michelson interferometer. Fraunhofer diffraction from a single slit and a circular aperture, the Rayleigh criterion for limit of resolution and its application to vision; Diffraction gratings and their resolving power.

Lasers: Einstein's theory of matter radiation interaction and A and B coefficients; amplification of light by population inversion, different types of lasers: gas lasers (He-Ne, CO), solid-state lasers (ruby, Neodymium), dye lasers; Properties of laser beams: mono-chromaticity.

UNIT – IV

Introduction to Solids and Semiconductors

Free electron theory of metals, Fermi level, density of statesin1, 2 and 3 dimensions, Bloch's theorem for particles in a periodic potential, Kronig-Penney model and origin of energy bands. Types of electronic materials: metals, semiconductors, and insulators. Intrinsic and extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature (equilibrium carrier statistics), Carrier generation and recombination, Carrier transport: diffusion and drift, p -n junction.

Suggested reference books

1. E. Hecht, "Optics", Pearson Education
2. D. J. Griffiths, "Quantum mechanics", Pearson Education
3. B.G. Streetman, "Solid State Electronic Devices", Pearson Education
4. G. Main, "Vibrations and waves in physics", Cambridge University Press
5. H. J. Pain, "The physics of vibrations and waves", Wiley
6. A. Ghatak, "Optics", McGraw Hill Education,
7. O. Svelto, "Principles of Lasers", Springer Science & Business Media,
8. R. Robinett, "Quantum Mechanics", OUP Oxford
9. D. McQuarrie, "Quantum Chemistry", University Science Books
10. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago
11. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore

Course code	MEE-106				
Category	Program Core Course				
Course title	Engineering Mechanics				
Scheme and Credits	L	T	P	Credits	
	3	1	0	4	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes (COs):

At the end of the course, the student shall be able to:

1. Understand the basic force system.
2. Apply principles of particle kinematics.
3. Grasp the concepts of particle dynamics.
4. Learn energy methods & momentum methods.

UNIT-I

Introduction: Force system, dimensions and units in mechanics, laws of mechanics, vector algebra, addition and subtraction of forces, cross and dot products of vectors, moment of a force about a point and axis, couple and couple moment, transfer of a force to a parallel position, resultant of a force system using vector method, Problems involving vector application

Equilibrium: Static and dynamic equilibrium, static in determinacy, general equations of equilibrium, Varingnon's theorem, Lami's theorem, equilibrium of bodies under a force system, Problems.

UNIT-II

Truss and Frames: Truss, classification of truss, assumptions in truss analysis, perfect truss, analysis of perfect plane truss using method of joints and method of sections, Problems.Centroid , Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.

UNIT-III

Moment of Inertia: Area moment of inertia, mass moment of inertia, parallel axis andperpendicular axis theorems, radius of gyration, polar moment of inertia, product of inertia, principle axis, problem based on composite figures and solid objects.

Kinematics: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problems.

UNIT-IV

Particle Dynamics: Energy methods and momentum methods, Newton's laws, work energy Equation for a system of particles, linear and angular momentum equations, projectile motion, problem. Shear Force and Bending Moment Diagram for statically determinant beams classification Of beams, types of loads, shear force and bending moment calculation and their graphical presentation, point of inflection, problem.

RecommendedBooks:-

- Engineering Mechanics– Irving H. Shames, PHI Publication
- Engineering Mechanics–U.C. Jindal, Galgotia Publication
- Engineering Mechanics–A.K.Tayal, Umesh Publication

Course code	EEE-101P				
Category	Engineering Science Course				
Course title	**Basics of Electrical and Electronics Engineering (P)**				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
Class work	50 Marks				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	03 Hours				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Verify that resistance of conductor is directly proportional to resistivity and length and inversely proportional to cross- sectional area of the conductor.

2. Verification of Ohm's Law, Kirchhoff current and voltage laws

3. Verification of temperature co-efficient of resistance: (i) Positive for Tungsten and Nichrome and (ii) Negative for carbon.

4. To measure DC voltage and current, AC voltage and current with multi-meter

5. To observe waveforms on oscilloscope, measure basic parameters amplitude and frequency of sine wave and square wave.

6. Obtain VI characteristics of semiconductor rectifier diode, LED, Photo-diode

7. To observe waveform at the output of half wave rectifier with and without filter capacitor.

8. To observe waveform at the output of full wave rectifier with and without filter capacitor.

9. To experimentally plot the input and output characteristics of a given BJT transistor in CE configuration and calculate its various parameters.
10. To experimentally plot the input and output characteristics of a given BJT transistor in CB configuration and calculate its various parameters.
11. To study the transfer and drain characteristics of JFET and calculate its various parameters.
12. To study the transfer and drain characteristics of MOSFET and calculate its various parameters.

Course code	BSC-101P				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
External Practical	50 Marks				
Internal Practical	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

LIST OF EXPERIMENTS: -
1. Determination of surface tension of given liquid by drop number method.
2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwood viscometer.
3. Calculate the Rf value of given sample using Thin layer chromatography / Paper chromatography.
4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
5. Determination of chloride content in given water sample.
6. Calculate the strength of strong acid by titrating it with strong base using conductometer.
7. Calculate the emf value of given cell.
8. To prepare the of urea formaldehyde and phenol formaldehyde resin.
9. To determine the rate constant of a reaction.
10. To Prepare iodoform.
11. Calculate the saponification value / acid value of given oil sample.
12. Chemical analysis of two anions and two cations in given sample of salt.
13. Determination of the partition coefficient of a substance between two immiscible liquids.
14. To determine the total hardness of given water sample by EDTA method.

Note: At least 08 experiments are to be performed by the students.

Suggested Books:
1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

PHYSICS Lab

Course code	BSP-103P				
Category	**Basic Science Course**				
Course title	**Physics (P)**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	
	0	**0**	**2**	**1**	
Class work	**50 Marks**				
Exam	**50 Marks**				
Total	**100 Marks**				
Duration of Exam	**03 Hours**				

Note: At least 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. To find out wavelength of monochromatic light using Newton's ring experiment.
2. To find out wavelength of monochromatic light using Diffraction grating.
3. To find out wavelength of monochromatic light using Freshnel's bi-prism
4. To study interference phenomena using Michelson's Interferometer and to find out wavelength of monochromatic light.
5. To study Hall effect in semiconductors and measure the Hall coefficient.
6. To find frequency of AC mains using sonometer.
7. To study the magnetic properties of materials using B-H curve.
8. To study the Curies temperature of materials using Dielectric set up.
9. To verify the inverse square law with the help of a photovoltaic cell.
10. To determine Planks constant using photocell.
11. To study the characteristics of Solar cell and find out the fill factor.
12. To find temperature co-efficient of platinum using Callender Griffith bridge.
13. To study the forward and reverse characteristics of P-N junction diode.

Course code	MEE-102P				
Category	Engineering Science Course				
Course title	Workshop Practices (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Objectives of the course

5. To impart fundamental Knowledge of engineering practices such as fitting, wood working, foundry, machining, welding, etc. for manufacturing a product.
6. To prepare the students to understand the various tools and equipment's used in these processes and their working principle
7. To impart fundamental Knowledge of Lathe machine
8. To able to understand the basic knowledge of various welding processes

Class Work

Introduction:

Introduction to Manufacturing Processes and their Classification, Introduction to additive manufacturing, Industrial Safety.

Machining Shop

Lathe, description of lathe: headstock, tailstock, gearbox, carriage, apron, cutting speed, feed & depth of cut, cutting tools, Chucks: 3 jaw, 4 jaw.

Fitting shop:

Introduction, classification of metals: ferrous and nonferrous, fitting tools: measuring and marking tools, marking schemes for a fitting jobs, cutting tools.

Carpentry shop:

Introduction of carpentry, types of woods, carpentry tolls: measuring tools, marking tolls, cutting tools: saws, chisels, planning tools, drilling tools, striking tools, drilling tools, wood working joints, wood working lathe.

Foundry Shop

Introduction, foundry hand tools, measuring boxes, ladle, moulding, furnaces,Pattern: Types of Pattern and Allowances

Welding Shop

Introduction to welding, Classification of Welding Processes,Arc welding & Gas welding equipment's.

Reference Books:

7. S K Hajra Choudhury, Nirjhar Roy, A K Hajra Choudhury, Elements of workshop Technology (vol. 1&2), Media Promoters.
8. B S Raghuwanshi, A Course in Workshop Technology (manufacturing Process vol. 1& 2) Dhanpat Rai & CO.
9. O.P. Khanna, Workshop Technology. Dhanpat Rai Publication.
10. W A J Chapman, Workshop technology in SI unit (part – 1 &2), Mc Graw Hill Education.
11. M.P. GROOVER, Principles of Modern Manufacturing, Wiley.
12. Kalpakjian, Manufacturing Process for Engineering Materials, Pearson Education India.

Lab Work

List of Experiments

1. To study different types of measuring tools used in metrology and determine least counts of vernier callipers, micrometres and vernier height gauges.

2. To study different types of machine tools (lathe, shaper, planer, milling, drilling machines)

3. To prepare a job on a lathe involving like facing, outside turning, taper turning, step turning, radius making and parting-off.

4. To study different types of fitting tools and marking tools used in fitting practice.

5. To prepare a job made out of MS Flats, making saw – cut filling V-cut taper at the corners.

6. To prepare lay out on a metal sheet by making and prepare rectangular tray pipe shaped components e.g. funnel.

7. To prepare joints for welding suitable for butt welding and lap welding.

8. To study various types of carpentry tools and prepare simple types of at least two wooden joints.

9. To prepare simple engineering components/shapes by forging.

10. To prepare mold and core assembly.

11. To prepare horizontal surface/vertical surface/curved surface/slats or V-grooves on a shaper/planner.

12. To prepare a job involving side and face milling on a milling

13. To prepare a job on CNC Machine/Additive Manufacturing.

Note : At least eight experiments/jobs are to be performed/prepared by the students in the semester.

Course code	MEE - 104P				
Category	Engineering Science Course				
Course title	Engineering Drawing (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes:

On completion of this course, the students will be 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

UNIT-I

Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes –Auxiliary Planes;

UNIT-II

Module3: Projections of Regular Solids

Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioning and scale. Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module4: Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings(foundation to slab only)

Module5: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Views to Orthographic Views and Vice-versa, Conventions;

UNIT- III

Module6: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Back ground, Crosshairs, Coordinate System),Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line(where applicable),The Status Bar, Different methods of zoom as used in CAD, Select and eraseobjects.; IsometricViews of lines,Planes,Simple andcompound Solids]

UNIT-IV

Module7: Annotations, layering & other functions

Applying dimensions to objects, applying an notations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solids and project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies.

Drawing of Engineering objects like coupling, crank shaft, pulley.

Module8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

Suggested Text/Reference Books:

(vi) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education
(vii) Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House
(viii) A grawal B. & Agrawal C. M.(2012), Engineering Graphics, TMH Publication
(ix) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers
(x) CAD Software Theory and User Manuals