Gurugram University
Scheme of Studies and Examination
Bachelor of Technology (SCHEME A2) 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.	BSP-103 OR EEE-103	Physics OR Basics of Electrical Engineering	3 3	1 0	0 0	4 OR 3	4 OR 3
4.	CSE-101	Programming 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.	BSP-103P OR EEE-103P	Physics (P) OR Basics of Electrical Engineering (P)	0	0	2	2	1
8.	CSE-101P	Programming for problem solving using C (P)	0	0	2	2	1
9.	MEE-102P	Workshop Practices (P)	1	0	3	4	2.5
10.	AUS-101	Sports (Audit Course) Compulsory	0	0	2	2*	0
Total						**25/ 24+2***	**20.5/19.5**

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	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	EEE-103				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical 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 explain the laws used in the analysis of DC and AC circuits.
To explain the behavior of circuit elements in single-phase circuits.
To explain the construction and operation of transformers, DC generators and motors, Induction motors, and synchronous generators.

Unit: 1.
DC Circuits:
Concept of electrical fields, charge, current, voltage, energy and their inter relationships. Electrical networks elements (R, L and C), voltage and current sources (ideal & controlled), series and parallel circuits.

Classification of electrical networks, Ohm's law, Kirchhoff's law and their applications for network solutions (Nodal and Mesh Analysis), Source transformation, star delta conversion. Network theorems: Superposition theorem, Thevenin and Norton Theorems, Millman Theorem, maximum power transfer theorem, Substitution and Reciprocity theorems.

Unit: 2

Electrostatics: Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant.

AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, concept of instantaneous, peak (maximum), average and R.M.S. values, frequency,
cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors.

Unit: 3
AC Circuits: Study of Single phase series and parallel R-L, R-C, R-L-C circuits, concept of impedance and admittance for different combinations, wave form and relevant voltage current phasor diagrams.

Concept of active power, reactive power, apparent power, complex power, power factor and resonance in series and parallel RLC circuit. Q- factor and bandwith. Introduction to three- phase circuits.

Single phase transformers: Construction, principle of working, E.M.F. equation, voltage and current ratios. Losses, definition of regulation and efficiency, determination of these by direct loading method. autotransformers and dimmer stats

Unit: 4

Electrical Machines: Introduction, Generation of rotating magnetic fields. Construction and working of separately excited DC motor, Single-phase induction motor, Three-phase induction motor and Synchronous generators.

Safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Working principle of Fuse and Miniature circuit breaker (MCB), Residual Current Circuit Breaker (RCCB).

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Suggested books:

1. E. Huges, "Electrical Technology", ELBS.

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. 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.

Communication Skills in English (P)

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				

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

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	EEE-103P				
Category	Engineering Science Course				
Course title	**Basics of Electrical 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. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. (Resistors, Capacitors and Inductors)

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

3. To measure the power in three phase circuits using two wattmeter method.

4. To verify Thevenin's and Norton theorems.

5. To verify Maximum power transfer and Superposition theorems.

6. To perform direct load test of a transformer and plot efficiency Vs load characteristic.

7. To perform O.C. and S.C. tests of a transformer.

8. Measurement of power in a 3-phase system by two wattmeter method.

9. Measurement of power by 3 voltmeter/3 Ammeter method.

10. To verify the resonance in R-L-C circuits.

11. 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.

12. Torque Speed Characteristic of shunt dc motor.

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-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 A2) 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-103 OR BSP-103	Basics of Electrical Engineering OR Physics	3 3	0 1	0 0	3 OR 4	3 OR 4
4.	CSE-102	Data Structure Using C	3	0	0	3	3
5.	CSE-106	Python Programming	3	0	0	3	3
6.	ECE-102	Electronics Engineering-I	3	0	0	3	3
7.	EEE-103P OR BSP-103P	Basics of Electrical Engineering (P) OR Physics (P)	0	0	2	2	1
8.	CSE-102P	Data Structure Using C (P)	0	0	2	2	1
9.	CSE-106P	Python Programming (P)	0	0	2	2	1
10.	ECE-102P	Electronics Engineering-I (P)	0	0	2	2	1
Total						**28 / 29**	**23/24**

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-103				
Category	**Engineering Science Course**				
Course title	**Basics of Electrical 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 explain the laws used in the analysis of DC and AC circuits.
To explain the behavior of circuit elements in single-phase circuits.
To explain the construction and operation of transformers, DC generators and motors, Induction motors, and synchronous generators.

Unit: 1.
DC Circuits:
Concept of electrical fields, charge, current, voltage, energy and their inter relationships. Electrical networks elements (R, L and C), voltage and current sources (ideal & controlled), series and parallel circuits.

Classification of electrical networks, Ohm's law, Kirchhoff's law and their applications for network solutions (Nodal and Mesh Analysis), Source transformation, star delta conversion. Network theorems: Superposition theorem, Thevenin and Norton Theorems, Millman Theorem, maximum power transfer theorem, Substitution and Reciprocity theorems.

Unit: 2

Electrostatics: Electrostatics field, electric flux density, electric field strength, absolute permittivity, relative permittivity, capacitance and capacitor, composite dielectric capacitors, capacitors in series and parallel, energy stored in capacitors, charging and discharging of capacitors and time constant.

AC Fundamentals: Sinusoidal voltages and currents, their mathematical and graphical representation, concept of instantaneous, peak (maximum), average and R.M.S. values, frequency,
cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors.

Unit: 3
AC Circuits: Study of Single phase series and parallel R-L, R-C, R-L-C circuits, concept of impedance and admittance for different combinations, wave form and relevant voltage current phasor diagrams.

Concept of active power, reactive power, apparent power, complex power, power factor and resonance in series and parallel RLC circuit. Q- factor and bandwith. Introduction to three- phase circuits.

Single phase transformers: Construction, principle of working, E.M.F. equation, voltage and current ratios. Losses, definition of regulation and efficiency, determination of these by direct loading method. autotransformers and dimmer stats

Unit: 4

Electrical Machines: Introduction, Generation of rotating magnetic fields. Construction and working of separately excited DC motor, Single-phase induction motor, Three-phase induction motor and Synchronous generators.

Safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock, and Working principle of Fuse and Miniature circuit breaker (MCB), Residual Current Circuit Breaker (RCCB).

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Suggested books:

2. E. Huges, "Electrical Technology", ELBS.

Suggested reference books

4. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
5. V. Del Toro, "Principles of Electrical engineering", PHI.
6. Basic Electrical Engineering, A.E. Fitzgerald , David Higginbotham 2009 , Arvin Grabel, Tata McGraw-Hill Publishing Company; 5th Edition.

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

4. To impart knowledge of basic concepts in applied physics
5. To enhance the analytical capability of the engineering students.
6. 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

12. E. Hecht, "Optics", Pearson Education
13. D. J. Griffiths, "Quantum mechanics", Pearson Education
14. B.G. Streetman, "Solid State Electronic Devices", Pearson Education
15. G. Main, "Vibrations and waves in physics", Cambridge University Press
16. H. J. Pain, "The physics of vibrations and waves", Wiley
17. A. Ghatak, "Optics", McGraw Hill Education,
18. O. Svelto, "Principles of Lasers", Springer Science & Business Media,
19. R. Robinett, "Quantum Mechanics", OUP Oxford
20. D. McQuarrie, "Quantum Chemistry", University Science Books
21. D. A. Neamen, "Semiconductor Physics and Devices", Times Mirror High Education Group, Chicago
22. E.S. Yang, "Microelectronic Devices", McGraw Hill, Singapore

Course code	CSE-102				
Category	Professional Core Course				
Course title	Data Structures 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

Fundamentals of pointers in C, pointer declaration, passing pointer to functions, pointers and arrays, dynamic memory allocation, Definition of Algorithm, Data Abstraction, Performance Analysis & Measurement, Files and related operations inC. Data Structures vs Data Types.

Searching and SortingTechniques

Searching techniques: Linear and Binary, Sorting techniques: Selection, Bubble, Insertion, Merge sort, Quicksort, List and Table Sorting.

Unit: 2

Linear Data Structures- I

Arrays: Definition of array, Array storage, sparse arrays; Transpose, addition, and multiplication of sparse matrices, Stacks and Queues and their applications, expression evaluation, A mazing problem; multiple stacks and queues in an array, Application of stacks recursion polish expression and their compilation conversion of infix expression to prefix and postfix expression, Tower of Hanoi problem.

Unit: 3

Linear Data Structures- II

Linked Lists; definition, allocation for stacks and queues. Examples of linked lists, polynomial addition, comparison of sequential and linked allocation of storage; inversion, concatenation & copying of the lists. Implementations in C language.

Doubly Linked List: Definition of circular and doubly linked list, header node, insertion and deletion, sparse matrix, representation using doubly linked lists. Examples for application of doubly linked lists; dynamic storage management; node structures,

routines for allocation and deallocation, generalized lists and recursive algorithms for copying and comparison oflists.

Unit: 4

Non Linear Data Structures

Trees, Basic concepts and definitions of a tree and binary tree and associated terminology, Binary tree traversal techniques, Binary tree representation of trees, transformation of trees into binary trees, some more operations on binary trees, Binary Search Trees, Heaps and heapsort, threaded binary trees, Graphs: Representation of graphs and their traversal, Minimum cost Spanning Trees.

BOOKS:

1.Seymour Lipschutz:Data Structures with C, Schaum's outline by TMH

1. E Horowitz and S. Sahni: Fundamentals of Data Structures in C, Second Edition, UniversitiesPress, Hyderabad.
2. R.B. Patel: Expert Data Structures in C, Khanna Publishers,2001.
3. R.L. Kruse: Data Structures & Program Design in C, PHI.
4. D.F. Knuth: The art of Computer Programming Vol 1, Narosa Publications,1985.
5. Byron S. Gottfried & J K Chhabra: Theory and Problems of Programming with C Language, SchaumSeries, TMH,2005.

Course code	CSE-106				
Category	Professional Core Course				
Course title	Python Programming				
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: Installing Python; basic syntax, interactive shell, editing, saving, and running a script; data types; variables, assignments; numerical types; arithmetic operators and expressions; Loops and selection statements, Control statements String manipulations: subscript operator, indexing, slicing a string; text files: reading/writing text and numbers from/to a file; creating and reading a formatted file

Unit: 2

Lists, dictionary and Design with functions: Basic list operators, replacing, inserting, removing an element; searching and sorting lists; dictionary literals, adding, and removing keys, accessing and replacing values; traversing dictionaries. Hiding redundancy, complexity; arguments and return values; Program structure and design. Recursive functions.

Unit: 3

Object Oriented concepts: Design with Classes persistence storage of objects, inheritance, polymorphism, operator overloading, exception handling, module, packages. Graphical User Interfaces: Terminal based and GUI based programs, Simple GUI-Based Programs, Windows and Window Components, Input and Output with Entry Fields, Defining and Using Instance Variables, Other Useful GUI Resources

Unit: 4

Advance concepts: Simple graphics and image processing, Turtle operations, Manipulating turtle screen, Drawing two dimensional shapes, examining an object attributes, Taking a random walk, Image processing: Image manipulation operations, properties of images.

Basics of panda and numpy, use of anaconda, How to create dashboard and overview of Django

Suggested books:

Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.

Karl Beecher, “Computational Thinking: A Beginner's Guide to Problem Solving and programming”, 1st Edition, BCS Learning & Development Limited, 2017.

Suggested reference books

1. Fundamentals of Python: First Programs, Kenneth Lambert, Course Technology, Cengage Learning, 2012.
2. Introduction to Computer Science Using Python: A Computational Problem-Solving Focus, By Charles Dierbach, John Wiley & Sons, December 2012

Course code	ECE-102				
Category	**Engineering Science Course**				
Course title	**Electronics Engineering -I**				
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 familiarize students to the electronics devices.

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

To introduce BJT & FET, operation of the semiconductor devices and their use in basic electronic circuits.

Unit: 1

Conducting materials: Review of energy bands, description of materials, drift velocity, collision time, Mean free path, mobility, conductivity, relaxation time, factors affecting conductivity of materials, types of thermal conductivity, Wiedmann-Franz law, super conductivity, effect of magnetic field, conducting materials, applications.

Semiconductor characteristics: Review of Si and Ge as semiconducting materials, Continuity Equation, P-N junction, Drift & Diffusion, Diffusion & Transition capacitances of P-N junction. Introduction to p-n junction diode and its applications.

Unit: 2

P-N junction diode and its applications: Introduction to p-n junction diode and its applications. Half wave & full wave rectifiers. clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

Some Special Devices: Zener diode, Photodiodes, photo detectors, solar cell, light emitting diodes, semiconductor lasers, and light emitting materials.

Unit: 3

Bipolar junction transistors: Fundamentals of BJT, BJT biasing :base bias, emitter feedback bias, collector feedback bias, voltage divider bias and its operation , BJT voltages and currents characteristics: CE, CB and CC, and DC & AC load line and bias point. Thermal stability, BJT as a switching circuits, transistor power dissipation.

Construction and working of SCR (semiconductor controlled rectifier), DIAC, TRIAC, IGBT,

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. UJT: Introduction and its applications.
Brief introduction to Planar Technology for device fabrication.

Suggested books:

3. J. Millman and C. Halkias, Integrated Electronics, McGraw Hill, 2nd Edition, 2009.
4. A. Sedra and C. Smith, Microelectronic Circuits: Theory and Applications, Oxford University Press, 6th Edition, 2013

Suggested reference books

7. Boylestad and Nashelsky, "Electronic Devices and Circuit Theory" Pearson publishers, 10th Edition
8. Tyagi M.S., "Introduction to Semiconductor Materials and Devices", John Wiley & Sons, 1993.
9. Spencer and Ghausi, Introduction to Electronic Circuit Design, Pearson Education, 2003
10. A. Dutta, Semiconductor Devices and Circuits, Oxford University Press, ND 2008

Course code	EEE-103P				
Category	Engineering Science Course				
Course title	**Basics of Electrical 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. Introduction and use of measuring instruments – voltmeter, ammeter, multi-meter, oscilloscope. (Resistors, Capacitors and Inductors)

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

3. To measure the power in three phase circuits using two wattmeter method.

4. To verify Thevenin's and Norton theorems.

5. To verify Maximum power transfer and Superposition theorems.

6. To perform direct load test of a transformer and plot efficiency Vs load characteristic.

7. To perform O.C. and S.C. tests of a transformer.

8. Measurement of power in a 3-phase system by two wattmeter method.

9. Measurement of power by 3 voltmeter/3 Ammeter method.

10. To verify the resonance in R-L-C circuits.

11. 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.

12. Torque Speed Characteristic of shunt dc motor.

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	CSE-102P				
Category	Professional Core Course				
Course title	Data Structures 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 8 experiments are to be performed by the students.

List of Subject related Experiments:

1. Write a program to search an element in a two-dimensional array using linear search.
2. Using iteration & recursion concepts write programs for finding the element in the array using Binary Search Method
3. Write a program to perform following operations on tables using functions only
(a) Addition (b) Subtraction (c) Multiplication (d) Transpose
4. Using iteration & recursion concepts write the programs for Quick Sort Technique
5. Write a program to implement the various operations on string such as length of string concatenation, reverse of a string & copy of a string to another.
6. Write a program for swapping of two numbers using 'call by value' and 'call by reference strategies.
7. Write a program to implement binary search tree.
8. (Insertion and Deletion in Binary search Tree)
9. Write a program to create a linked list & perform operations such as insert, delete, update, reverse in the link list
10. Write the program for implementation of a file and performing operations such as insert, delete, update a record in the file.
11. Create a linked list and perform the following operations on it
(a) add a node (b) Delete a node

Course code	CSE-106P				
Category	Professional Core Course				
Course title	Python Programming (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. Compute the GCD of two numbers.
2. Find the square root of a number (Newton‘s method)
3. Exponentiation (power of a number)
4. Find the maximum of a list of numbers
5. Linear search and Binary search
6. Selection sort, Insertion sort
7. Merge sort
8. First n prime numbers
9. Multiply matrices
10. Programs that take command line arguments (word count)
11. Find the most frequent words in a text read from a file
12. Simulate elliptical orbits in Pygame
13. Simulate bouncing ball using Pygame

Course Code	ECE-102P				
Category	Professional Core Course				
Course title	Electronics Engineering -I (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.

Objective: To attain expertise in lab equipment handling and understanding the basic devices, their properties, characteristics in detail. Along with their practical usage in the circuit

1. Study of lab equipments and components: CRO, Multimeter, Function Generator, Power supply- Active, Passive Components & Bread Board.

2. Study of V-I Characteristics of Si and Ge Diodes

3. Study of Zener Diode Characteristics and Zener Diode as Voltage Regulator

4. Study of Half Wave and Full Wave Rectifiers

5. Study of Rectifiers with Filters

6. Study of BJT Characteristics

7. Study of FET Characteristics

8. Study of BJT Biasing

9. To plot V-I Characteristics of DIAC.

10. To draw V-I characteristics of TRIAC for different values of Gate Currents.

11. Study of Characteristic of silicon-controlled rectifier.