Panjab University, Chandigarh
Scheme of Examination and Syllabi for
B.E. (Electronics and Communications Engineering)
1st and 2nd Semesters for Academic Year 2018-2019

Year: First **Semester: First**

S. No.	Course Code	Course Name	Scheme of Teaching			Scheme of Examination			
			L-T-P	Contact hrs/week	Credits	Theory			Practical*
						Internal Assessment	University Assessment	Total	
1.	MATHS101	Calculus	4-1-0	5	4	50	50	100	-
2.	EC103	Introduction to Electronics	3-0-2	5	3+1	50	50	100	50
3.	ME103	Workshop Practice	0-0-4	4	0+2	-	-	-	50
4.	CH101	Applied Chemistry	4-0-3	7	4+1	50	50	100	50
5.	HSS102	Communication Skills	2-0-0	2	2	50	50	100	-
6.	CS104	Computer Programming	3-0-2	5	3+1	50	50	100	50
Total			**17-1-11**	**28**	**21**	**250**	**250**	**500**	**200**

Year: First **Semester: Second**

S. No.	Course Code	Course Name	Scheme of teaching			Scheme of Examination			
			L-T-P	Contact hrs/week	Credits	Theory			Practical*
						Internal Assessment	University Assessment	Total	
1.	MATHS201	Differential Equations and Transforms	4-1-0	5	4	50	50	100	-
2.	HSS201	Ethics and Self Awareness	2-0-0	2	2	50	50	100	-
3	-	Physics Course 1#	4-0-3	7	4+1	50	50	100	50
4.	GS201	Introduction to Environment Science	3-0-0	3	3	50	50	100	-
5.	EC204	Electrical Science	3-0-2	5	3+1	50	50	100	50
6.	EC203	Digital Design	3-1-2	6	3+1	50	50	100	50
Total			**19-2-7**	**28**	**22**	**300**	**300**	**600**	**150**

Summer Vacations training (four weeks):

S. No.	Subject Code	Subject Name	L-T-P	Contact hrs/week	Credits	Marks		
						Theory		Practical*
						Internal Assessment	University Exam	
1.	IPD201	Innovative product design	0-0-20	20	0+2	Nil	Nil	50

Note: Students will undergo four week in-house training during summer vacations in their respective branches. They will be trained to handle laboratory and practical aspects in their field of engineering.
The marks and credits of Innovative product design (IPD201) will be added in the second semester mark-sheet.

* Practical marks are for continuous and end semester evaluation

Any one of the following three papers to be chosen by the institute
Paper Title: Oscillation and optics Paper Code: APH 101/ APH 201
Paper Title: Quantum and Statistical Physics Paper Code: APH 103/ APH 203
Paper Title: Physics of Materials Paper Code: APH 207/ APH 107

FIRST SEMESTER

Course Code	**MATHS101**
Course Title	**Calculus**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	
Course Objectives (CO)	1. To understand the behaviour of infinite series and its use. 2. To learn the concepts of functions of two and more than two variables and their applications. 3. To learn the methods to evaluate multiple integrals and their applications to various problems. 4. To understand the concepts of Vector calculus and their use in engineering problems.
Course Outcome	1. The students are able to test the behaviour of infinite series. 2. Ability to analyze functions of more than two variables and their applications. 3. Ability to evaluate multiple integrals and apply them to practical problems. 4. Ability to apply vector calculus to engineering problems

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

FUNCTIONS OF ONE VARIABLE

Sequences and Series: Sequences, Limits of sequences, Infinite series, series of positive terms, Integral test, Comparison test, Ratio test, Root test. Alternating series, Absolute and Conditional Convergence, Leibnitz test. Power series: radius of convergence of power series, Taylor's and Maclaurin's Series. (Scope as in Chapter 10, Sections 10.1 – 10.9 of Reference 1).

Integral Calculus: Length of curves, Volume (disk and washer method) and surface areas of revolution (Scope as in Chapter 6, 6.1, 6.3, 6.4 of Reference 1).

(11 hours)

DIFFERENTIAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES

Concept of limit and continuity of a function of two and three variables, Partial derivatives, total derivative, composite function, differentiation of an implicit function, chain rule, change of variables, Jacobian, Taylor's theorem (statement only), Maxima and minima of a function of two and three variables, Lagrange's method of multipliers (Scope as in Chapter 14, Sections 14.1-14.4, 14.6-14.10 of Reference 1).

(10 hours)

SECTION-B

INTEGRAL CALCULUS OF FUNCTIONS OF TWO AND THREE VARIABLES

Double and triple integrals, Change of order of integration, Change of Variables, Applications to area, volume and surface area. (Scope as in Chapter 15 of Reference 1).

(9 hours)

VECTOR DIFFERENTIAL CALCULUS

Vector-valued functions and space curves and their tangents, integration, arc lengths, unit tangent vector, Curvature and torsion of a curve, Gradient of a Scalar field, Directional Derivative (Scope as in Chapter 13, Sections 13.1-13.5 Chapter 14, Section 14.5 of Reference 1).

(8 hours)

VECTOR INTEGRAL CALCULUS

Line integrals, Vector fields, Work, Circulation and Flux, Path Independence, Potential functions and Conservative fields, Green's theorem in the plane, Surface Areas and Surface Integrals, Stoke's Theorem, Gauss Divergence Theorem (Statements only) (Scope as in Chapter 16 of Reference 1).

(7 hours)

RECOMMENDED BOOKS

S. No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Calculus	Maurice D. Weir, Joel Hass, Frank R. Giordano, Thomas	12th edition, Pearson Education.
2.	Advanced Engineering Mathematics	E. Kreyszig.	8th edition , John Wiley.
3.	Advanced Engineering Mathematics	Michael D. Greenberg	2nd edition, Pearson Education.
4.	Advanced Engineering Mathematics	Wylie and Barrett	Tata McGraw Hill
5.	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw Hill.
6.	Advanced Engineering Mathematics	R. K. Jain, S. R. K. Iyenger	Narosa Publications

Course Code	EC103
Course Title	**Introduction to Electronics**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	
Course Objectives (CO)	1. To Introduce the principles of semiconductor Physics 2. To familiarize with transistor models 3. To explain the working of semiconductor circuits and systems
Course Outcome	At the end of this course students will demonstrate the ability to 1. Understand the principles of semiconductor Physics 2. Understand and utilize the mathematical models of semiconductor devices. 3. Understand the working of semiconductor circuits and systems

SYLLABUS

Note for Examiner: The semester question paper will be of 50 marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

ENERGY BANDS AND CHARGE CARRIERS IN SEMICONDUCTOR: Bonding Forces and Energy Bands in Solids, Bonding Forces in Solids, Energy Bands in Metals, Semiconductors, and Insulators, Direct and Indirect Semiconductors, Variation of Energy Bands with Alloy Composition, Electrons and Holes, Effective Mass, Intrinsic Material, Extrinsic Material, Electrons and Holes in Quantum Wells, Carrier Concentration, The Fermi Level, Electron and Hole Concentrations at Equilibrium, Temperature Dependence of Carrier Concentrations, Compensation and Space Charge Neutrality, Drift of Carriers in Electric and Magnetic Field Electrons in periodic Lattices, Conductivity and Mobility, Drift and Resistance, Effects of Temperature and Doping on Mobility, The Hall Effect, Invariance of the Fermi Level at Equilibrium. (13 hours)

EXCESS CARRIERS IN SEMICONDUCTOR: Optical Absorption, Luminescence, Photoluminescence, Electroluminescence, Carrier Lifetime and Photoconductivity, Direct Recombination of Electrons and Holes, Indirect Recombination; Trapping, Steady State Carrier Generation; Quasi-Fermi Levels, Photoconductive Devices, Diffusion of Carriers, Diffusion Processes, Diffusion and Drift of Carriers; Built-in Fields, Diffusion and Recombination; The Continuity Equation, Steady State Carrier Injection; Diffusion Length (10 hours)

SECTION-B

JUNCTIONS: Equilibrium Conditions, The Contact Potential, Equilibrium Fermi Levels, Space Charge at a Junction, Forward- and Reverse-Biased Junctions; Steady State Conditions, Qualitative description of Current Flow at a Junction, Carrier Injection, Reverse Bias, Reverse-Bias Breakdown, Zener Breakdown, Avalanche Breakdown, Rectifiers, The Breakdown Diode, Transient and A-C Conditions, Time Variation of Stored Charge, Reverse Recovery Transient, Switching Diodes, Capacitance of p-n Junctions. (10 hours)

JUNCTION BASED DEVICES: Working principle and applications of Avalanche breakdown, Zener diode, Schottky diode, LED, photodiode, Varactor Diode and solar cell. (5 hours)

BIPOLAR JUNCTION TRANSISTOR: Fundamentals of BJT Operation, Amplification with BJTs, Minority Carrier Distributions and Terminal Current I-V characteristics, Ebers-Moll Model. (7 hours)

TEXT BOOKS			
S. No.	**Title**	**Author(s)**	**Publisher**
1	Solid State Electronic Devices	G. Streetman, and S. K. Banerjee	7th edition, Pearson
2	Semiconductor Physics and Devices	Neamen , D. Biswas	McGraw-Hill Education
RECOMMENDED BOOKS			
1	Physics of Semiconductor Devices	S. M. Sze and K. N. Kwok	3rd edition, John Wiley & Sons
2	Fundamentals of solid state electronics	C.T. Sah	World Scientific Publishing Co. Inc

Introduction to Electronics Lab

List of Experiments

1. Familiarization with electronic components and usage of Multimeter
2. Familiarization with CRO and Signal Generator.
3. To study the V-I characteristics of PN junction diode and determine static resistance and dynamic resistance.
4. Investigate the AC characteristics of the PN junction diode, and find the zero-bias junction capacitance CJO.
5. To study the working of PN junction diode as a rectifier.
6. To study the characteristics of Zener diode.
7. To implement zener diode as voltage regulator.
8. To study the characteristics of the photodiode.
9. To study the characteristics of LED.
10. To study the characteristics of Varactor Diode.
11. To plot the study I-V characteristics of the basic configuration of BJT.
12. A project related to the implementation of an application based Electronic Circuit on a general purpose PCB.

Course Code	**ME 203 / ME103**
Course Title	**Workshop Practice**
Type of Course	Core
Course Assessment Methods Practical (Continuous and end semester evaluation)	50
Course Prerequisites	Basic Workshop Practices
Course Objectives (CO)	1. To know different machines, tools and equipment, Identify different Engineering materials, metals and non-metals. 2. To understand different Mechanisms, Use of Machines, Tools and Equipment. 3. Knowledge of basic Manufacturing Processes in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal.Smithy, Foundry and Carpentry Workshops.
Course Outcome	1. Familiarity with common machines, Tools and Equipment in basic Workshop Practices. 2. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops in Engineering professions. 3. Applications of Basic Workshop Practices.

SYLLABUS

Instruction for Students: The candidate will be attending a laboratory session of three hours weekly.

Practice of basic exercises related with different shops. On hand basic workshop practices in Electronics, Electrical, Machine, Welding, Fitting, Sheet Metal. Smithy, Foundry and Carpentry Workshops in Engineering professions.

Welding Workshop :

(Theory)Joining Processes, Welding and its Classification, Welding Processes, Fusion Welding, Pressure Welding, Electric Arc Welding, Gas Welding, Resistance Welding, Metal Inert gas Welding, Welding Joints, Welding Positions, Welding defects, Welding Applications, Basic welding design and Procedures, identification of materials,

Jobs: Butt Joint in Flat Position using SMAW, Lap Joint using Spot Welding, Edge Joint in Horizontal Position using SMAW, Tee Joint in Flat position using SMAW, Corner Joint in vertical position using SMAW.

Defect Identification and marking, Edge preparation and Fillet making, Tacking, Distortion identification.

Electronics Workshop

To know about Soldering mechanism and techniques, Familiarity with Electronic Components / symbols, Testing of electronic components, Application of Soldering : Circuit Assembly

List of Jobs :

Practice of Soldering and de-soldering, Identification and testing of a) passive electronic components b) Active electronic components, Assembly of Regulated Power supply circuit.

Electrical Workshop

Introduction of Various Electric wirings, Wiring Systems, Electrical wiring material and fitting, different type of cables, Conduit pipe and its fitting, inspection points, switches of all types, Distribution boards, M.C.B's etc., Electric Shock and its management.

Electric Tools: Conversance with various tools and to carry out the following:

a) Measurement of wire sizes using SWG and micrometer

b) Identification of Phase and neutral in single phase supply

Jobs:

To control a lamp with a single way switch

To control a lamp from two different places

To assemble a fluorescent lamp with its accessories

To control a lamp, fan and a three pin socket in parallel connection with single way switches

Fitting Shop

Introduction of Fitting, different type of operations, Tools, materials, precision instruments like Vernier caliper and Micrometer etc, Safety precautions and Practical demonstration of tools and equipments

Jobs:

To make a square from MS Flat, Punching, Cutting, Filling techniques and practice, Tapping, Counter Drilling.

Smithy Workshop

Introduction of Smithy and Forging process, Tools and Equipment's, Operations, Heat Treatment processes, Advantages, Dis-advantages, Defects and Safety precautions.

Jobs:

Drawing and Upsetting Practice using Open Hearth Furnace, Cold working process practice, Heat Treatment \: Annealing and hardening process

Machine Shop

Application, Function and different parts, Operations of Lathe, Type of Cutting Tools and their materials, Drill machine Types, applications and Functions. Hacksaw machines and functions, Work Holding devices and tools, chucks, Vices, machine Vices, V Block, Measuring Instruments uses, Shaper and Milling machine Applications.

Jobs:

To perform Marking, Facing, Turning, taper Turing, Grooving, Knurling, parting, Drilling, Reaming operations on lathe machine, Hacksawing practice on Power hacksaw, Shaping operation practice on Shaper.

Carpentry Shop

Classification of Tree, Timber. Advantages and uses of Timber, Seasoning of Wood, Tools Used, Defects and Prevention of Wood,

Jobs:

Tee Joint, Cross Joint,Tenon Joint, L Shape Joint, Practice of Wood Working Lathe, Practice on multi-purpose Planer.

Foundry Shop

Introduction to Foundry, Advantages and Disadvantages of castings process, Introduction to pattern and various hand tools, Ingredients of Green sands, Various Hand Molding processes, Introduction to Casting Defects.

Jobs:

Identification and uses of hand tools, Preparation of Green sand in Muller, Preparation of Sand Mould of Single piece solid pattern, Split pattern, Preparation of Green sand Core, casting of a Mould and study its defects.

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	Introduction to Basic Manufacturing Processes and Workshop Technology	Rajender Singh	New Age International Publication
2	Manufacturing Processes	Chapman	Viva Books Private Limited

Course Code	**CH101 / CH201**
Course Title	**Applied Chemistry**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	10+2
Course Objectives (CO)	To teach the fundamentals of basic chemical sciences essential for the development of new technologies to all branches of engineering.
Course Outcome	1) Thermodynamics will help the students learn different thermodynamic laws, heat changes and energy calculations. 2) Studying catalysis will be beneficial to understand the role and mechanism of various heterogeneous and homogeneous catalysts in increasing reactions rate of many synthetically important chemical reactions. 3) By studying corrosion, the students will learn about basic nature and reasons of corrosion, its impact in many sectors of our lives. 4) Studying spectroscopy will help to understand the basic principles of spectroscopy and its use to determine chemical structures. 5) By studying coordination chemistry and CFT, explanation about different properties of coordination compounds will be given.

SYLLABUS

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SECTION - A

Thermodynamics: Review of objectives and limitations of chemical thermodynamics, State

functions, Thermodynamic equilibrium, work, heat, internal energy, enthalpy, heat capacity, Zeroth law of thermodynamics, First law of thermodynamics, Reversible, isothermal and adiabatic expansion & compression of an ideal gas. Irreversible isothermal and adiabatic expansion of an ideal gas. Carnot cycle and efficiency of reversible engines, Enthalpy change and its measurement. Flame temperature, Second and third law of thermodynamics. Concept of entropy. Gibb's and Helmholtz equations. Simple numerical for calculating w, q, ΔE, ΔH and entropy.
(10 hours)

Catalysis: Catalysis and general characteristics of a catalytic reactions, homogeneous catalysis, kinetics of acid, base and enzyme catalysis – Michealis Menten equations. Heterogenous catalysis. Application of catalysis for industrially important processes– hydrogenation (Wilkinson's catalyst), hydroformylation, acetic acid process and Wacker process. (6 hours)

Electrochemistry: Introduction to electrochemistry, types of electrodes, Ion selective electrodes, Reference electrodes, Fuel cells (hydrogen-oxygen, propane-oxygen, methanol-oxygen fuel cells), Corrosion: Types of corrosion, dry and wet corrosion and their mechanisms, types of electrochemical corrosion (galvanic, pitting, waterline, differential aeration, soil, microbiological, inter-granular, stress corrosion), Factors influencing corrosion, Prevention of corrosion. (8 hours)

SECTION - B

Polymer chemistry: Classification of polymers, Mechanism and methods of polymerisation, idea of number average and weight average molecular masses of polymers, preparation, properties and uses of polystyrene, polyester, polyamide, phenol-formaldehyde, silicones and epoxy resins. (5hours)

Spectroscopy: UV- Introduction, Lambert-Beer's Law, selection rules, electronic transitions, Application to simple organic molecules (auxochrome, chromophore), effect of conjugation and solvent on transition of organic molecules, Woodward-Fieser Rules for calculating λ_{max} for dienes. IR-Introduction, Principle of IR spectroscopy-Fundamental vibrations, Application to simple organic molecules (effect of masses of atoms, bond strength, nature of substituent, hydrogen bonding on IR frequency), sample preparation for IR. (10 hours)

Coordination chemistry: Introduction, Crystal Field Theory, Splitting of octahedral, tetrahedral and square planar complexes, crystal field stabilization energies of octahedral and tetrahedral complexes and its applications. (6 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	Organic Chemistry	Joseph M. Hornback Brooke	Cole Publishing Company U.S.A.
2.	Atkin's Physical Chemistry	Peter Atkins, Julio de Paula	7th Edition, Oxford University Press.
3.	Concise Inorganic Chemistry	J D Lee	Vth Edition, Chapman & Hall, 2003
4.	A Textbook of Engineering Chemistry	Shashi Chawla	Dhanpat Rai & Co. Pvt. Ltd
5.	Introductory Polymer Chemistry	G.S.Mishra	John Wiley & Sons, New York, 1993.
6.	Principles of Physical Chemistry	Puri, Sharma and Pathania	W.H. Freeman & Co, 2008.
7.	Introduction to spectroscopy	D. S. Pavia, G.M. Lasmpman and G.S. Kriz	4th Edition, Thomson learning, Indian Edition 208.
8	Basic Inorganic Chemistry	F.A. Cotton, G. Wilkinson and P.L. Gaus	3rd Ed., John Wiley & Sons.

List of Experiments

Instruction for Students: The candidate will be attending a laboratory session of three hours weekly and has to perform any eight experiments.

1. Volumetric analysis: Iodometric titrations, complexometric titrations, Acid-base titrations (conductometric), Precipitation titrations
2. Analysis of lubricants: Viscosity/surface tension/saponification value/acid value
3. Instrumental techniques for chemical analysis: Conductometry, potentiometry, UV-visible/IR spectrophotometer.
4. Preparation of few organic compounds/inorganic complexes/polymer.

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	A textbook of Quantitative Inorganic Analysis	A. I. Vogel	Longman Gp. Ltd, 4th editon
2	Essentials of Experimental Engineering Chemistry	Shashi Chawla	Dhanpat Rai and Co. Delhi (2001)
3	Vogel's text book of quantitative chemical analysis	J. Mendham, R. C. Denny, J. D. Barnes and M. J. K. Thomas	Pearson Education

Course Code	**HSS102 / HS202**
Course Title	**Communication Skills**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	

SYLLABUS

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SECTION-A

Fundamentals of Communication Skills

Scope and Significance of Communication Skills, Listening, Speaking, Reading and Writing

(2 hours)

Writing Skills

Basics of Grammar – Word Order, Sentence Construction, Placing of Subject and Verbs, Parts of Speech, Use of Tenses, Articles, Prepositions, Phrasal Verbs, Active-Passive, Narration.

(4 hours)

Vocabulary Building and Writing

Word Formations, Synonyms, Antonyms, Homonyms, One-Word Substitutes, Idioms and Phrases, Abbreviations of Scientific and Technical Words (3 hours)

Speaking Skills

Introduction to Phonetic Sounds, English Phonemes, Stress, Rhythm and Intonation, Countering Stage Fright and Barriers of Communication (3 hours)

Reading and Comprehension (2 hours)

SECTION–B

Advanced Communication Skills

Scope, Significance, Process of Communication in an organization, Types and Levels, Communication Networks, Technical Communication, Tools of Effective Communication

(2 hours)

Speaking Skills and Personality Development

Interpersonal Communication, Presentation Skills, Body Language and Voice Modulation, Persuasion,Negotiation and Linguistic Programming, Public Speaking, Group Discussions, Interviews and Case Studies, Power Point Presentations , Relevant to the context and locale, Technical Presentations, Conducting , Meeting and Conferences. (5 hours)

Communication and Media

Social and Political Context of Communication, Recent Developments in Media (1 hour)

Advanced Techniques in Speaking Skills

Importance of Listening/Responding to native and global accents, Telephonic Interviews and Video Conferencing (2 hours)

Advanced Techniques in Technical Writing

Job Application, CV Writing, Business Letters, Memos, Minutes, Reports and Report Writing Strategies, E-mail Etiquette, Blog Writing, Instruction Manuals and Technical Proposals

(4 hours)

Practical Sessions

1. Individual presentations with stress on delivery and content
2. Overcoming Stage Fright - Debates, extempore
3. How to discuss in a group - Group Discussion
4. Discussion on recent developments and current debates in the media
5. How to prepare for an Interview and face it with confidence
6. Conducting meeting and conferences
7. Exercises on Composition & Comprehension, Reading Improvement

TEXT BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	The Essence of Effective Communication	R. Ludlow and F. Panton	Prentice Hall
2.	Unversity Grammer of English	Randolph. Quirk and Greenbaum Sidney	Pearson Education
3.	Effective Technical Communication	M. Rizvi Ashraf	McGraw Hill
4.	Business Communication Today	Bovee L. Courtland, V. Thill John	Pearson Education
RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHOR(S)**	**PUBLISHER**
1.	Essential of Business Communications	Mary E. Guffrey	South-Western College Publishing
2.	Technical Communications : Principles and Practice	Minakshi Raman and S. Sharma	Oxford University press
3.	Effective Communication	M. V. Rodrigues	Himalaya Publishing House
4.	English Vocabulary in Use	Michael. McCarthy, Felicity O'Dell	Cambridge University Press
5.	The Pronunciation of English	Daniel Jones	University Book Stall
6.	Business Correspondence and Report Writing	R. C. Sharma and K. Mohan	Tata McGraw Hill
7.	Communications for Professional Engineers	Bill Scott	Thomas Teleford Ltd.
8.	Handbook for Technical Writing	David A. McMurrey, Buckley Joanne	Cengage Learning
9.	Enhancing Employability and Recognizing Diversity	L. Harve, W. Locke, A. Morey	Universities UK and CSU
10.	Student Activities for taking charge of your carrer direction and Job Search	R. Locke	Core Publishing
11.	Body Language	A. Pease	Sheldon Press
12.	Technical Communication: Principles and Practice	Minakshi Raman and S. Sharma	Oxford university Press

Course Code	**CS104 / CS204**
Course Title	**Computer Programming**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	
Course Objectives (CO)	To get basic knowledge of computers, its components and Operating systems and Linux. Shell Commands. To acquire programming skills in C and basic knowledge of Object Oriented Programming.
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Introduction

Computer Basic, Block Diagram of Computer, Memory Hierarchy, Types of RAM, Secondary Memory Introduction to Operating Systems, Programming Languages, Program Structure, Linux Shell Commands, Bourne Shell, C Shell, Korn Shell (8 hours)

Basic Constructs of C:

Keywords, Identifiers, Variables, Symbolic Constants, Data Types and their storage, Operands, Arithmetic Operators, Relational Operators, Logical Operators, Bitwise Operators, Increment & Decrement Operators, Expressions, Conditional Expressions, Assignment Operators and Expressions, Type Conversions, Precedence and Order of Evaluation, External Variables and Scope of Variables. Basic Input Output, Formatted I/O. (8 hours)

Program Control Flow

Statements and Blocks, Conditional Statements, IF, ELSE-IF, Switch Case statements, Control Loops, For, While and Do-While, Go to and Labels. (4 hours)

Arrays & Functions

Pointers and Addresses, Arrays, Multi dimensional arrays, strings, pointer arrays, Functions, Function Prototyping, Scope of functions, Arguments, Call by value and call by references, static variables, recursion. (8 hours)

SECTION - B

Structures

Structures, Array of Structures, pointer to structures, Typedef, Unions, Bit fields, passing structures as an argument to functions , C-Preprocessor and Macros, Command line arguments.

(4 hours)

Input and Output

Standard and Formatted Input and Output, File Access & its types, Line Input and Output, Types of Files, Binary & ASCII Files, Error handling, stderr and exit functions (7 hours)

Introduction to Object Oriented Programming:

Classes and Objects, Structures vs Classes, Abstraction, Encapsulation, Polymorphism, Inheritance.

(6 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	The C Programming Language	Brian Kernighan and Dennis M. Ritchie	Prentice Hall, 2nd Edition 2007
2.	Fundamentals of Information Technology and Computer Programming	V. K. Jain	PHI. Latest Edition
3.	C Programming : A Modern Approach	Michael D. Greenberg	W.W. Norton Company 2nd edition (2008).
4.	C: The Complete Reference	Herbert Schildt	Tata McGraw Hill, 4th edition.
5.	Let us C++	Yashwant Kanetkar	BPB Publications
6.	Programming in ANSI C++	E. Balaguruswamy	TMH publications, edition, Reprint (2008).
7.	Programming in ANSI C, Scha series	Gottfired	TMH Publications, 2nd edition (1996)

List of experiments

Instruction for Students: The candidate will be attending a laboratory session of 2 hours weekly and students have to perform the practical related to the following list.

1. Introduction to UNIX Shells, C Shell, Bourne Shell, Korn Shell
2. Writing and compiling C Program in Linux.
3. Introduction to basic structure of C program, utility of header and library files.
4. Implementation of program related to the basic constructs in C
5. Program using different data types in C
6. Programs using Loops and Conditional Statements in C
7. Programs using arrays single dimension and multi dimensions in C.
8. Implementation of Matrices and their basic functions such as addition, subtraction, multiplication, inverse.
9. Programs using functions by passing values using call by value and call by reference method
10. Programs related to structures and unions
11. Program to implement array using pointers
12. Programs related to string handling in C
13. Program to manage I/O files
14. Introduction to classes and program related to basic use of classes showing their advantages over structures.
15. Any other program related to theory program to enhance the understanding of students in the subject.

Course Code	**ME102**
Course Title	**Engineering Graphics**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continous Assessment (Sessional, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 Nil 50 50
Course Prerequisites	
Course Objectives (CO)	1. Learn basic engineering drawing formats 2. Learn to sketch and take field dimensions 3. Learn basic Auto Cad skills
Course Outcome	1. The students will able to draw orthographic, isometric projections and sections 2. Students will become familiar with Auto Cad, two dimensional drawings 3. The students will able to read drawings

SYLLABUS

Introduction to Engineering Graphics, Methods of projections, Theory of orthographic projection.
Introduction to CAD software
Conventional practices, dimensioning as per BIS SP 46-1988
Pictorial sketching
Projection of points, lines and planes on principal planes
Projection on auxiliary planes
Projection of solids, solid modeling
Section of solids
Elementary development and intersection of solids
General introduction to isometric views
Applications: Drawing of threaded fasteners, Electrical and Electronic drawings using first angle projection

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	AutoCAD	James D. Bethune	Pearson Publishers
2.	A textbook of engineering Drawing	R. K.Dhawan	S. Chand & Co. Ltd.
3.	Understanding AutoCAD 2006	Sham Tickoo	Wiley Publication

List of Experiments

The candidates will be required to make various drawing sheets covering syllabus of Engineering Graphics (ME202) using the software such as AutoCAD.

SECOND SEMESTER

Course Code	**MATHS201**
Course Title	**Differential Equations and Transforms**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	Calculus (MATHS101)
Course Objectives (CO)	1. To learn the methods to formulate and solve linear differential equations and their applications to engineering problems 2. To learn the concepts of Laplace transforms and to evaluate Laplace transforms and inverse Laplace transform 3. To apply Laplace transforms to solve ordinary differential equations 4. To learn the concept of Fourier series, integrals and transforms. 5. To learn how to solve heat, wave and Laplace equations.
Course Outcome	1. The student will learn to solve Ordinary Differential equations. 2. The students will be able to apply the tools of Laplace Transforms to model engineering problems and solve the resulting differential equations. 3. Students will understand the nature and behavior of trigonometric (Fourier) series and apply it to solve boundary value problems.

SYLLABUS

Note for the examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

ORDINARY DIFFERENTIAL EQUATIONS

Review of geometrical meaning of the differential equation, directional fields, exact differential equations(scope as in chapter 8, sections 8.1 – 8.10 of reference 5), solution of differential equations with constant coefficients; methods of differential operators (scope as in chapter 9, sections 9.1 – 9.5 of reference 5). Non-homogeneous equations of second order with constant coefficients: Solution by method of variation of parameters, reduction by order (scope as in chapter 9, section 9.7, 9.10 of reference 5). Power series method of solution (scope as in chapter 10, section 10.2 of reference 5)
(13 hours)

Laplace Trasforms

Laplace transform, Inverse transforms, shifting, transform of derivatives and integrals. Unit step function, second shifting theorem, Dirac's Delta function. Differentiation and integration of transforms. Convolution Theorem on Laplace Transforms. Application of Laplace transforms to solve ordinary differential equations with initial conditions (Scope as in Chapter 6, Sections 6.1 – 6.6 of Reference 2). (10 hours)

SECTION – B

Fourier Series and Transforms: Periodic functions, Fourier series, Even and odd series, half range expansions, Complex Fourier Series, Approximation by trigonometric polynomials. Fourier integrals, Fourier Cosine and Sine transforms, Fourier Transforms (Scope as in Chapter 11, Sections 11.1 – 11.2, 11.4-11.5, 11.7 – 11.9 of Reference 2). (8 hours)

Partial Differential Equations: Partial differential equations of first order, origin, solution of linear partial differential equations of first order, Integral surfaces passing through a given curve (Scope as in Chapter 2, Sections 1, 2, 4, 5 of Reference 1). (6 hours)

Boundary Value Problems: D'Alembert's solution of wave equation, separation of variables: one dimension and two dimension heat and wave equation, Laplace equation in Cartesian and Polar coordinates (Scope as in Chapter 12, Sections 12.1, 12.3 – 12.4, 12.6, 12.9 of Reference 2).
(8 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Elements of Partial Differential Equations	Ian N. Sneedon	McGraw Hill,Singapore 1957.
2.	Advanced Engineering Mathematics	E. Kreyszig.	10th edition , John Wiley.
3.	Advanced Engineering Mathematics	Michael D. Greenberg	2nd edition, Pearson Education.
4.	Advanced Engineering Mathematics	Wylie and Barrett	Tata McGraw Hill
5.	Higher Engineering Mathematics	B.V.Ramana	Tata McGraw Hill.
6.	Advanced Engineering Mathematics	R. K. Jain, S. R. K. Iyenger	Narosa Publications
7.	Theory and problems of Differential Equations	Frank Ayers	Shuam outline series, McGraw-Hill, Singapore, 1957

Course Code	**HSS 201 / HSS 101**
Course Title	**Ethics and Self Awareness**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

Introduction to Ethics: Concept of Ethics – Nature, Scope, Sources, Types, Functions and Factors influencing Ethics, Approaches to Ethics – Psychological, Philosophical and Social, Broader Ethical Issues in Society. (6 hours)

Values, Norms, Standards and Morality: Concept and Role, Relation with Ethics, Psycho-Social Theories of Moral Development – Kohlberg and Carol Gilligan. (4 hours)

Ethics and Business

Concept of Business Ethics – Nature, Objectives and Factors influencing Business Ethics, 3 C's of Business Ethics, Ethics in Business Activities, Ethical Dilemmas in Business, Managing Ethics (5 hours)

SECTION-– B

Self-Awareness: Concept of Self Awareness – Need, Elements, Self Assessment – SWOT Analysis, Self Concepts – Self-Knowledge, Assertiveness and Self-Confidence, Self-Esteem. (4 hours)

Self-Development : Concept of Self-Development, Social Intelligence, Emotional Intelligence, Managing Time and Stress, Positive Human Qualities (Self-Efficacy, Empathy, Gratitude, Compassion, Forgiveness and Motivation), Personality Development Models – Johari Window,

Transactional Analysis, Myers Briggs Type Indicator, Self-Awareness and Self-Development Exercises. (11hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Business Ethics – Text and Cases	C.S.V. Murthy	Himalaya Publishing House
2.	Business Ethics	Hartman, Laura P. And Chatterjee, Abha	Tata McGraw Hill
3.	Business Ethics and Professional Values	A. B. Rao	Excel Books
4.	Business Ethics – Concepts and cases	Manuel G. Velasquez	Prentice Hall
5.	Issues and Ethics in the Helping Professions	G. Corey, M. Schneider Corey, P. Callanan	Brooks/Cole
6.	Theories of Personality	S. Calvin Hall, Dardner Lindzey and John B. Cambell	Hamilton Printing Company
7.	The Curse of Self-awareness, Egotism and the Quality of Human Life	M. R. Leary	Oxford University Press
8.	Self – Awareness	Allan Twain	

Physics Course 1

Any one of the following three papers to be chosen by institute

Course Code	**APH 101 / APH 201**
Course Title	**Oscillations and Optics**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Ultrasonics: Production and detection of ultrasonics (2 hours)

SHM: Review of SHM, superposition of two SHM in one dimension, charge oscillations in LC circuits (3 hours)

Damped Oscillations: Concept and cause of damping, differential equation of a damped oscillator and different kinds of damping, Methods of describing damping of an oscillator - logarithmic decrement, relaxation time, quality factor, band width. Series LCR circuit as a damped oscillator. (3 hours)

Forced Oscillations: States of forced oscillations, differential equation of forced oscillator – its displacement, velocity and impedance, behaviour of displacement and velocity with driver's

frequency, Power, bandwidth, Quality factor and amplification of forced oscillator, resonance in forced oscillators, forced oscillations in series LCR circuit (4 hours)

Wave Motion: Wave equation and its solution, characteristic impedance of a string, reflection and transmission of waves on a string at a boundary, reflection and transmission of energy, the matching of impedances . (3 hours)

SECTION – B

Interference: Division of wave front and amplitude; Fresnel's biprism, Newton's rings, Michelson interferometer and its applications for determination of λ and dλ. (4 hours)

Diffraction: Fresnel and Fraunhofer diffraction, qualitative changes in diffraction pattern on moving from single slit to double slit, plane transmission grating, dispersive power & resolving power of a grating. (5 hours)

Polarization: Methods of polarization, analysis of polarized light, quarter and half wave plates, double refraction. (4 hours)

Lasers: Elementary idea of LASER production, spontaneous emission, stimulated emission, Einstein's coefficients, Helium-Neon, Ruby and semiconductor lasers, applications of lasers. (4 hours)

Fibre Optics: Basics of optical fibre - its numerical aperture, coherent bundle, step index and graded index fibre, material dispersion, fibre Optics sensors, applications of optical fibre in communication systems. (3 hours)

Holography: Basic principle, theory and requirements, applications (2 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Physics for Engineers	N. K. Verma	Prentice Hall India
2.	Physics of Vibrations and Waves	H. J. Pain	5th edition, John Wiley & Sons
3.	Vibrations and Waves	A. P. French	CBS Publishers
4.	Optics	Ajoy Ghatak	McGraw Hill Publications

Course Code	**APH 101 / APH 201**
Course Title	**Oscillations and Optics (Practical)**
Type of Course	Core
L T P	4 0 3
Credits	1
Course Assessment Methods Internal Assessment	 50

List of Experiments

1. To study Lissajous figures obtained by superposition of oscillations with different frequencies and phases.
2. To find the wavelength of sodium light using Fresnel's biprism.
3. (i) To determine the wavelength of He-Ne laser using transmission grating.
   (ii) To determine the slit width using the diffraction pattern.
4. To determine the wave length of sodium light by Newton's rings method.
5. To determine the wave length of sodium light using a diffraction grating.
6. To find the specific rotation of sugar solution using a Bi-quartz Polarimeter.
7. To design a hollow prism and used it find the refractive index of a given liquid.
8. To determine the wavelength of laser using Michelson interferometer.

Course Code	**APH 103 / APH 203**
Course Title	**Quantum and Statistical Physics**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Special Theory of Relativity: Inertial and non-inertial frames of reference, Galilean transformation, Michelson Morley Experiment, postulates of special theory of relativity, Lorentz transformation, Simultaneity, Length contraction, Time dilation, Doppler effect, Addition of velocities, variation of mass with velocity, mass-energy relation . (7 hours)

Origin and Postulates of Quantum Physics: Quantum theory of light, X-rays production, spectrum & diffraction (Bragg's law), photoelectric effect, Compton effect, pair production, photons & gravity, black holes, de-Broglie hypothesis, particle diffraction, uncertainty principle and applications

(7 hours)

Postulates of quantum mechanics, Schrodinger theory, time-dependent and time-independent Schrodinger equation, wave function, Born interpretation and normalization, expectation values

(3 hours)

SECTION - B

Applications of Quantum Physics: Particle in a box (infinite potential well), finite potential step and barrier problems, tunneling, linear harmonic oscillator (one-dimensional). (4 hours)

Hydrogen atom (qualitative), radiative transitions and selection rules, Zeeman effect, Spin-orbit coupling, electron spin, Stern-Gerlach experiment, exclusion principle, symmetric and antisymmetric wavefunctions (5 hours)

Statistical Physics: Maxwell-Boltzmann statistics, molecular energies in an ideal gas, Bose-Einstein and Fermi-Dirac statistics, black body radiation, Rayleigh-Jeans and Planck's radiation laws, free electrons in a metal, electron-energy distribution, Fermi energy, electronic specific heat, conduction in metals, thermionic emission. (10 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Concepts of Modern Physics	Arthur Beiser	McGraw Hill Publications
2.	Solid State Physics	C. Kittel	Wiley Eastern Publications
3.	Solid State Physics	S. O. Pillai	New Age International
4.	Statistical Physics & Thermodynamics	V. S. Bhatia	

List of Experiments

1) To study the quantized energy level of the first excited state in the Argon using the Frank-Hertz setup.
2) To find the value of Planck's constant and evaluate the work function of cathode material by used of photoelectric cell.
3) To study various characteristics of photo-voltaic cell: (a) Voltage-current characteristics, (b) loading characteristics, (c) power-resistance characteristics and (d) inverse square law behavior of the photo-current with distance of source of light from photo-voltaic cell
4) To study the response of a photo-resistor to varying intensity of light falling on it and deduce spectral sensitivity of its semiconductor material.
5) To study the Balmer Series of Mercury and Hydrogen spectrum using diffraction grating and calculate Rydberg constant.
6) To evaluate charge on an oil drop using Millikan's oil drop method.
7) To verify Rutherford's alpha scattering formula using a mechanical model.

Course Code	**APH 107 / APH 207**
Course Title	**Physics of Materials**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Crystal structure: Bonding forces and energies, Primary and Secondary bonds, Space Lattices, Symmetries in a cubic lattice, Crystal Structures (cubic and hexagonal cells), Assignment of coordinates, directions and planes in crystals, Linear, Planar and Space densities in crystals, close packed morphology (Hexagonal and cubic close packing), single and polycrystalline structures, interstitial spaces (trigonal, tetrahedral and octahedral voids)

Structure of ceramics (NaCl, Zinc blende, silica and silicates, diamond crystal, Graphite, Fullerenes and carbon nanotubes)

Structure of polymers, crystallinity of long chain polymers

Crystal Structure analysis, X-ray diffraction and Bragg's law, Powder method for study of X-ray diffraction pattern

Crystal Defects (Point, line, surface and volume imperfections) (14 hours)

Diffusion: Diffusion mechanisms, steady state diffusion, non-steady state diffusion, factors affecting diffusion, applications based on diffusion (corrosion resistance of Duralumin, carburization of steel, decarburization of steel, doping of semiconductors) (3 hours)

Elastic, Anelastic and Viscoelastic Behaviour Elastic behaviour and its atomic model, rubber like elasticity, anelastic behaviour, relaxation processes, viscoelastic behaviour, spring-dashpot model (3 hours)

SECTION - B

Plastic Deformations and strengthening mechanisms : Tensile properties (Yield strength, Tensile Strength, Ductility, Resilience, Toughness), Dislocations and plastic deformation, characteristics of dislocations, slip systems, slip in single crystals, plastic deformation of polycrystalline materials, mechanisms of strengthening in metals (grain size reduction, solid-solution strengthening, strain hardening), recovery, recrystallization and grain growth (5hours)

Fracture, Fatigue and Creep : Fracture (Ductile and brittle fractures), principles of fracture mechanics, fracture toughness, ductile to brittle transitions Cyclic stresses, S-N curve, crack initiation and propagation, factors that affect fatigue life, environmental effects, generalized creep behavior, stress and temperature effects. (5 hours)

Phase Diagrams : One-Component (or Unary) Phase Diagrams, Binary Isomorphous Systems, Interpretation of Phase Diagrams, Development of Microstructure in Isomorphous Alloys, Mechanical Properties of Isomorphous Alloys ,Binary Eutectic Systems, Development of Microstructure in Eutectic Alloy, Equilibrium Diagrams Having Intermediate Phases or Compounds, Eutectic and Peritectic Reactions, The Gibbs Phase -Rule (6 hours)

Phase Transformations: Kinetics of phase transformation, kinetics of solid state reactions, Isothermal transformation diagrams, continuous cooling transformation, temper embrittlement (4 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Material science and engineering – An Introduction	William D Callister	6Th edition, John Willey and Sons.
2.	Material Science and	V. Raghvan	4th edition, Eastern

	Engineering – A First Course		economy edition
3.	Solid State Physics	S. O. Pillai	New Age International
4.	Introduction to Solids	Leonid V Azaroff	Tata McGraw Hill, 3rd edition.

List of Experiments

1. To find the energy band gap of the given semiconductor by four probe method.
2. To study the Hall Effect of a given semiconductor.
3. To determine the dielectric constant of the given materials.
4. To study the B-H curve of the ferromagnetic materials.
5. To determine the value of e/m for electron by long solenoid (helical) method.
6. To study the variation of magnetic field with distance along the axis of a circular coil carrying current by plotting a graph.
7. To find the Curie temperature of a Ferroelectric material by measuring Capacitance as a function of temperature.
8. To determine the thermal conductivity of an insulator material using guarded plate method (Lee's disc method).
9. To Study (a) Voltage-current characteristics (b) loading characteristics (c) Power-Resistance characteristics and (d) intensity response of photovoltaic cell.

Course Code	**GS 101 / GS 201**
Course Title	**Introduction to Environment Science**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz)	 50 50
Course Prerequisites	10+2
Course Objectives (CO)	
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION - A

General: Introduction, components of the environment, environmental degradation. (4 hours)

Ecology: Elements of ecology: Ecological balance and consequences of change, principles of environmental impact assessment. (4 hours)

Air pollution and control: Atmospheric composition, energy balance, climate, weather, dispersion, sources and effects of pollutants, primary and secondary pollutants, green house effect, depletion of ozone layer, standards and control measures. (6 hours)

SECTION - B

Water pollution and control: Hydrosphere, natural water, pollutants their origin and effects, river/lake/ground water pollution, standards and control. (6 hours)

Land Pollution: Lithosphere, pollutants (municipal, industrial, commercial, agricultural, hazardous solid wastes): their origin and effects, collection and disposal of solid waste, recovery and conversion methods. (6 hours)

Noise Pollution: Sources, effects, standards and control. (6 hours)

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Introduction to Environmental Engineering and Science	C. M. Masters	Prentice Hall of India Pvt. Ltd., 1991
2.	Environmental Science	B. J. Nebel	Prentice Hall Inc., 1987

Course Code	**EC204**
Course Title	**Electrical Science (Theory)**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	
Course Objectives (CO)	1. To acquire knowledge about Circuit components and Network graph. 2. To identify the Network Theorems and Two Port Network Descriptions. 3. To identify response of Network Functions. 4. To identify the characteristics of Attenuators, Filters, and network synthesis. 5. To acquire knowledge about Electrical motors. 6. To impart practical knowledge of Filter Design.
Course Outcome	1. Identify the circuit components and their applications in various circuits. 2. Evaluate RL, RC and RLC circuits by hand. 3. Evaluate and analyze the Norton and Thevenin equivalent circuits. 4. Measure the frequency response of circuits, analyze the two port networks and develop both active and passive filters. 5. Understanding of working of Electrical motors.

SYLLABUS

Note for Examiner: The semester question paper will be of 50 Marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION-A

Circuit Concepts **(3 hours)**

Circuit elements, Independent and dependent sources, signals and waveforms, periodic and singularity voltages, Amperes law, Electromagnetic Induction and force, Self and mutual Inductance

Mesh & Nodal Analysis **(5 hours)**

Loop currents and loop equations, node voltages and node equations, mesh and nodal analysis, duality, graphical method of determining the dual of N/Ws, Star Connections, Delta connections

Network Theorems **(5 hours)**

Superposition, Thevenin's, Norton's, Maximum power Transfer, Tellegen's, Reciprocity theorem

Networks functions **(10 hours)**

Concept of complex frequency, Transform Impedance and transform circuits, Network functions for the one port and two port, Calculation of network functions, Poles and Zeros for Network functions, Restrictions on Poles and Zeros, Locations for Driving Point and Transfer functions, Time domain behavior from Pole and Zero plot, Stability of networks functions

SECTION-B

Two Port Network **(6 hours)**

Relationship of Two port variables, Short Circuit Admittance and Open circuit Impedance parameters, Transmission and hybrid parameters, Network Topology and Graph Theory

Filter Synthesis **(7 hours)**

Classification of filters, characteristic impedance and propagation constantof pure reactive network, Ladder network, T–section, Pi–section, terminating half section, Pass bands and stop bands, Design of constant–K, m–derived filters, Composite filters

Introduction to Electrical Motors **(9 hours)**

Introduction to DC motors: Construction, types, torque and EMF equations, Commutations, Armature reactions, Characteristics and Applications. Principle of single and three-phase induction motors, Rotating field concept, concept of slip, torque-slip characteristics, Starting and speed control methods

RECOMMENDED BOOKS			
S.No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Engineering Circuit Analysis	Milliam H. Hayt., Jack E. Kemmerly	
2.	Networks and Systems	Ashfaq Hussain	
3.	Network Analysis and Synthesis	D. R. Chaudhry	
4.	Circuits and Networks	A. Sudhakar & S.P.	Tata McGraw Hill

	(Analysis and Synthesis)	Shyammohan	1994, Edition 2ND
5	Networks, Lines and Fields	John D. Ryder	PHI, Edition 2ND
6	A Course in Electrical Circuits Analysis	Soni-Gupta,	DhanpatRai& Sons
7	Theory and Problems of Electric Circuits	Joseph A. Edminister	Tata McGraw Hill, 1991, 2nd Edition
8	Network Analysis	M.E. Van Valkenburg	PHI
9	Network Analysis	G K Mithal	
10	Basic Electrical and Electronics Engineering	Kothari and Nagrath	Mc-Graw Hill

List of Experiments

Implementation and proof of

Low Pass Filters, High Pass Filters, Band Pass Filters, Band Stop Filters

Design and implementation of

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

Study of transfer characteristics of

Low Pass Filters, High Pass Filters, Band Pass Filters, Band Stop Filters

Design and implementation of

Constant–k, m–derived, and Composite filters

Course Code	**EC 203**
Course Title	**Digital Design**
Type of Course	Core
Course Assessment Methods End Semester Assessment(University Exam) Continuous Assessment (Minors, Assignments, Quiz) Practical (Continuous and end semester evaluation)	 50 50 50
Course Prerequisites	
Course Objectives (CO)	1. To apply minimization techniques for reducing the functions up to six variables. 2. To design various combinational circuits 3. To write the truth table, excitation table, characteristic equations of various flip flops and to design the sequential circuits using Flip flops. 4. To familiarize the various A/D, D/A Converters, Logic families and their characteristics.
Course Outcome	

SYLLABUS

Note for Examiner: The semester question paper will be of 50 marks having 7 questions of equal marks. Students are required to attempt 5 questions in all. First question, covering the whole syllabus and having questions of conceptual nature, will be compulsory. Rest of the paper will be divided into two parts having three questions each and the candidate is required to attempt two questions from each section.

SECTION – A

Introduction (5 hours)

Digital logic, Number Systems and Conversions for Binary, Octal, Decimal, Hexadecimal, Binary Arithmetic, Basic and Universal gates, Boolean Alegbra, Binary addition and subtraction.

Minimization Techniques (6 hours)

Sum of Products and Products of Sum forms, Minterms & Maxterms, Karnaugh Map for two, three, four five and six variables, Quine-McCluskey method.

Combinational Circuit Design (6 hours)

Half adder, full adder, subtractor, BCD adder, comparator, code converter, encoder decoder, multiplexer, demultiplexer, parity detector and generator, PLA, PAL and ROM

Flip Flops (5 hours)

1-bit memory cell, clocked and unclocked flip flops, S-R Flip flop, D flip flop, JK Flip flop, T flip flop, edge triggered flip flop, race around condition , Master slave flip flop, conversion of flip flops using excitation table.

SECTION - B

Counters (5 hours)

Ripple counter, design of Mod-N ripple counter, design of synchronous counter with and without lockout condition, decade counter, ring counter, Johnson counter

Shift Registers (5 hours)

Serial in serial out shift register, serial in parallel out shift register, parallel in serial out shift register and parallel in parallel out shift register, bidirectional shift register, universal shift register.

A/D and D/A Converters (6 hours)

Weighted resistor D/A converter, Binary ladder D/A converter. A/D Converters- flash type, successive approximation, counter ramp type, dual slope type, characteristics of ADC and DAC.

Logic Families (7 hours)

Characteristics of logic families: fan-out, noise margin, propagation delay, power dissipation. Circuit diagrams and working of DTL, DCTL, I^2L, HTL, TTL, Totem pole TTL, ECL, CMOS logic families.

RECOMMENDED BOOKS			
S. No.	**NAME**	**AUTHORS**	**PUBLISHER**
1.	Digital Design	Morris Mano	PHI, 4th edition
2.	Digital principles and Applications	Malvino Leach	Tata-McGraw Hill
3.	Digital System Principles and Applications	R J Tocci	PHI
4.	Modern Digital Electronics	R P Jain	Tata-McGraw Hill
5.	Digital Integrated Electronics	Taub Schilling	Tata-McGraw Hill

List of Experiments

1. To Study the data sheets of TTL and ECL gates
2. Implementation of Adder and Subtractor using Logic Gates.
3. Implementation of Binary Adder/Subtractor.
4. Implementation of BCD Adder.
5. Design & implementation of Combinational circuits using Multiplexers
6. Design and implement a Universal shift register having shift-right, shift-left, SISO, PIPO capabilities.
7. Implementation of Flip-flops using Logic Gates.
8. Implementations of Ripple counter.
9. Implementation of Modulo-N Synchronous Counter.
10. Implementation of Synchronous counters with unused states and/or avoiding Lock Out condition.
11. To convert 8 bit Digital data to Analog value using DAC
12. To convert Analog value into 8 bit Digital data using ADC.