Faculty of Engineering
B.TECH and SIX YEAR B. TECH-M.B.A. INTEGRATED PROGRAM

FOR FOLLOWING BRANCHES

ELECTRONICS & COMMUNICATION ENGINEERING (ECE) / ELECTRONICS & COMPUTER ENGINEERING (ECM) / MECHANICAL ENGINEERING (ME) / CIVIL ENGINEERING

(Batch 2020 Onwards)
Session 2020-21

SCHEME OF PAPERS

FIRST SEMESTER (GROUP – A)

Sr. No.	Course No.	Title	L	T	P	Credits
1.	CPE 101	Computer Programming *	3	1	0	3.5
2.	ECE 101	Basic Electrical Engineering	3	1	0	3.5
3.	MCE 102	Manufacturing Processes *	3	0	0	3.0
4.	BAS 101	Applied Physics – I	3	1	0	3.5
5.	BAS 102	Applied Mathematics – I	3	1	0	3.5
6.	CPE 151	Computer Programming Lab *	0	0	2	1.0
7.	BAS 151	Applied Physics – I Lab	0	0	2	1.0
8.	MCE 152	Manufacturing Processes Lab *	0	0	3	1.5
9.	ECE 153	Electrical and Electronics Lab *	0	0	2	1.0
			15	**4**	**9**	**21.5**
						Total Contact Hours: 28

FIRST SEMESTER (GROUP – B)

Sr. No.	Course No.	Title	L	T	P	Credits
1.	HSS 101	Communication Skills *	2	1	0	2.5
2.	ECE 101	Basic Electrical Engineering	3	1	0	3.5
3.	BAS 101	Applied Physics –I	3	1	0	3.5
4.	BAS 102	Applied Mathematics – I	3	1	0	3.5
5.	BAS 103	Applied Chemistry *	3	1	0	3.5
6.	MCE 151	Engineering Graphics *	2	4	0	4.0
7.	BAS 151	Applied Physics – I Lab	0	0	2	1.0
8.	BAS 153	Applied Chemistry Lab *	0	0	2	1.0
			16	**9**	**4**	**22.5**
						Total Contact Hours: 29

* BAS 103, BAS 153, HSS 101, CPE 101, CPE 151, MCE 151, MCE 102, MCE 152 & ECE 153 papers will be taught in both the semesters, offered in such a way that the students study half of these papers in first semester and the remaining half in second semester.

* BAS 151, BAS 153, CPE 151, MCE-151, MCE 152 and ECE 153 are practical papers only. There will not be any theory examination for these papers.

Faculty of Engineering
Punjabi University, Patiala

General Instructions to the Paper Setters

B. Tech & Six Year B.Tech-MBA Integrated Program (For following Branches):-
Electronics & Communication Engineering (ECE) / Electronics & Computer Engineering (ECM) / Mechanical Engineering (ME) / Civil Engineering

Applicable 2016 Batch Onwards

The B. Tech paper structure will be as shown below:

Pattern of Question Paper

TITLE OF SUBJECT (CODE----)
Bachelor of Technology (Branch)
End Semester Exam

TIME ALLOWED: 3 Hour Roll. No……. Maximum Marks: 50
Pass Marks : 20

Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.

Section-A (From Section A of the syllabus)

Q1. .....
Q2. .....
Q3. .....
Q4. .....
Q5 ..... 3x5

Section-B (From Section B of the syllabus)

Q6. .....
Q7. .....
Q8. .....
Q9. .....
Q10. ..... 3x5

Section-C (From whole syllabus)

Q11
a).....
b) .....
c) .....
d) .....
e) .....
f) .....
g) .....
h).....
i).....
j)..... 10x2=20

Note for the paper setter:

1. Total numbers of questions to be set are Eleven (11) as per the above format.
2. There will be FIVE questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts.
3. Section C is compulsory and contains ten (10) sub-parts each of two (2) marks.
4. The maximum limit on numerical problems to be set in the paper is 35% while minimum limit is 20%.
5. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
6. The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
7. Log tables, charts, graphs, Design data tables etc. should be specified, whenever needed.
8. Use of non programmable calculators shall be specified clearly, if required.

CPE--101 Computer Programming

L	T	P	Credits
3	1	0	3.5

Course Objective:

Making the students understand and learn the basics of computer how to operate it, to make familiar with the part and function of computer and its types. Second part of the course is designed to provide complete knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future after completing the subject, student should be able to:

- Understand the meaning and basic components of a computer system,
- Define and distinguish Hardware and Software components of computer system,
- Design an algorithmic solution for a given problem
- Write a maintainable C program for a given algorithm.
- Trace the given C program manually.
- Write C program for simple applications of real life using structures and files.

Section A

Number System: Bit, Byte, Binary, Decimal, Hexadecimal and Octal System, Conversion from one System to another.
Binary Arithmetic: Addition, Subtraction and Multiplication.
Introduction to Computer Language: Machine Language, Assembly Language, Higher Level Language, Assembler, Compiler, Interpreter.
Introduction to Operating System: Batch Systems, Multiprogramming, Time sharing Systems, Real Time Systems, Network Operating System and Distributed Operating System.

Introduction to C: Concepts of Procedure oriented programming, Character Set, Identifiers, Keywords and Data types and storage classes.
Operators and Expressions: Arithmetic, Unary, Logical, Relational, Assignment and Conditional Operator, Associatively and Precedence of Operators
Control Structures: If, while, do-while and for loop, Nested Control Structure, Switch-case, break and Continue statements

Section B

Arrays: Single Dimensional, Multidimensional Arrays and Pointers, String reading/writing
Functions: Types of Functions, Call by Value and Call by reference, Recursion, Structures. File processing: Opening and closing data files, simple writing and reading in unformatted data files.

Object Oriented Concepts: Comparison between C and C++, structure of C++ Program, Basic Input/ Output statements, introduction to Classes and Objects, creating a class and object, accessing class members (private, public), C++ Fundamentals Concepts (Definition with example) of : Encapsulation, Function Overloading, Single level Inheritance, Polymorphism and Friend Functions.

Note: This subject is common to all branches. Only basics of C++ is covered

Recommended Books:

1. E. Balagurusamy, “Programming in C”, Tata McGraw Hill
2. Yashwant Kanetkar, “Let Us C”, BPB
3. B. Ram, “Computer Fundamentals”, Wiley
4. P.K.Sinha, “Computer Fundamentals”.
5. V. Rajaraman, “ Fundamentals of Computers”, PHI
6. Brain W. Kernigha and Dennis M. Richie: The C Programming Language, PHI
7. Robert Lafore, “Turbo C++”
8. E. Balagurusamy, “Programming in C++”, Tata McGraw Hill

ECE--101 BASIC ELECTRICAL ENGINEERING

L	T	P	Credits
3	1	0	3.5

Course Objective:

Understanding of basic concepts of Electrical Science is very important as life today, is unthinkable without the use of electrical energy. This forms the base for all the engineering disciplines. Light, Industry, Agriculture, air-conditioning, broadcasting and television systems, telephone all are dependent on electrical energy. The aim of course is to study Electrical Laws, DC Networks, Electrical circuits, transformers and electrical machines

Section-A

Kirchhoff's laws and their applications in solving electrical network problems, Stardelta transformation D.C. Networks: Superposition theorem. Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, Step voltage response of RL and RC series circuits.

Sinusoidal Steady-State Response of Circuits: Concept of Phasor diagram, form factor and peak factor of a waveform. Series and parallel circuits, power and power factors, Resonance in circuits, Balanced 3-phase voltage, current and power relations, 3- phase power measurement.

Section-B

Single-Phase Transformers: Constructional feature, Working principle of a transformer, emf equations, Transformer on no -load and its phasor diagram, Transformer on load, voltage drops and its phasor diagram, Equivalent circuit, Ideal transformer, open and short circuit tests, Calculation of efficiency, condition for maximum efficiency

Electrical Machines: Construction, Principle of working, Function of the commutator for motoring and generation action, Characteristics and applications of DC Motor.

Course Learning Outcomes (CLO): After the completion of the course, the student should be able to:

- Learn basic concepts of Electrical Engineering.
- Apply network laws and theorems to solve electric circuits.
- Analyze transient and steady response of DC circuits.
- Explain and Analyse the behaviour of transformer.
- Understand the principle and characteristics of DC motor and DC generator.

Text Books:

1. B.L.Theraja & A.K.Theraja, A textbook of Electrical Technology, S Chand publishers.
2. Naidu, M.S. and Kamashaiah, S., Introduction to Electrical Engineering, Tata McGraw Hill (2007).
3. Del Toro, V., Electrical Engineering Fundamentals, Prentice Hall of India Private Limited (2004).
4. Hughes, E., Smith, I.M., Hiley, J. and Brown, K., Electrical and Electronic Technology, PHI (2008).
5. Nagrath, I.J. and Kothari, D.P., Basic Electrical Engineering, Tata McGraw Hill (2002).

Reference Books:

1. Chakraborti, A., Basic Electrical Engineering, Tata McGraw Hill (2008).

MCE--102 MANUFACTURING PROCESSES

L	T	P	Credits
3	0	0	3.0

Course Objective:

The objective of this course is to have a good understanding the basic concepts of manufacturing via engineering materials, casting, machining, forming, joining, welding and assembly, enabling the students to develop a basic knowledge of the mechanics, operation and limitations of basic machining tools. The course also introduces the concept of basic carpentry operations.

At the end of the course, the students should be able to - (1) demonstrate the capability of selecting suitable manufacturing processes to manufacture the products optimally, (2) ability to clear basic fundamental concepts of machining, welding, casting, forming processes (3) selecting or suggesting suitable manufacturing processes to achieve the required products with the aim of avoiding material and time wastage.

Section – A

Introduction: Common engineering materials and their important mechanical and manufacturing properties. General classification of manufacturing processes, Importance of manufacturing processes, economics and selection of manufacturing processes.

Metal Casting: Principles of metal casting, casting terminology, Patterns, their functions, types, materials and pattern allowances, Characteristics of molding sand, Types of sand molds, Types of cores, chaplets and chills; their materials and functions. Casting Defects, their causes and remedies.

Machining Processes: Principles of metal cutting, cutting tool materials and applications, types of single point cutting tools. Geometry of single point cutting tool. Cutting fluids and their functions, types of cutting fluids, selection of cutting fluids.

Machine Tools: Introduction to Centre Lathe, parts of a lathe, lathe attachments, Operations performed on lathe, work holding devices in Lathes.

Section – B

Introduction to shaper and planner machines, their operations. Introduction to multipoint cutting tools. Introduction to milling and milling operations, Drilling and allied operations, Sawing operations.

Welding & Allied Joining Processes: Welding classification, types of welding electrodes,functions of flux and types of welding joints. Elements of Electric arc, Gas, Resistance and Thermit welding.Soldering, Brazing and Braze welding, Submerged arc welding (SAW). Applications of various welding processes. Welding defects, their causes and remedies.

Metal Forming and Shearing: Hot and cold working, Types of Forging processes. Rolling, Wire drawing and extrusion processes, drawing, bending, spinning, stretching, embossing and coining. Die and punch operation, shearing, piercing and blanking, notching, lancing, bending and deep drawing operations.

Carpentry Operations: Woods and their types, seasoning of wood, types of joints.

Recommended Books

1. Degramo, Kohser and Black. Materials and Processes in Manufacturing, 8thEdition, Prentice Hall of India, New Delhi.
2. Amstead Ostwald, and Bageman, Manufacturing Processes, John Wiley and sons, New Delhi.
3. Campbell, Principles of Manufacturing, Materials and Processes, Tata Macgraw HillCompany
4. Kalpakjian, S. and Schemid, S.R., Manufacturing Engineering & Technology,Prentice Hall, New York.
5. Groover, M.P., Fundamentals of Modern manufacturing: Materials, Processes andSystems, John Wiley and Sons Inc., New York.
6. B. S. Raghuwanshi, Workshop Technology (Part – I & II), Dhanpat Rai and Co., New Delhi.
7. Singh, Manufacturing Technology, Pearson Education Asia, New Delhi.
8. Khanna, O.P. and Lal, M., A Text Book of Production Technology, Dhanpat Rai Publication, New Delhi.

BAS --101 APPLIED PHYSICS – I

L	T	P	Credits
3	1	0	3.5

Course Objective:

The course is aimed at developing the basic scientific skills among students of engineering that are imperative for effective understanding of engineering subjects. Physical concepts included in this syllabus are importance for understanding various engineering and technological problems. At the end of the course, students shall be able to deal with phenomena related to oscillations, diffraction, interference, polarization, lasers and quantum mechanics. They will learn how to implement their scientific knowledge to solve real world problems.

Section A

Simple harmonic motion: Differential equation, Energy of simple harmonic oscillator, lissajous figures formed by superposition of two SHM, Charge oscillations in a LC circuit. Damped oscillator: Differential equation, methods of describing damping of an oscillator- logarithmic decrement, relaxation time, quality factor, Damped oscillations in a LCR circuit.

Interference by division of amplitude: plane parallel thin films, colors in thin films, non-reflecting films/coatings, high reflectivity thin film coatings, Michelson interferometer.

Fraunhoffer diffraction from circular aperture, double slit and a grating (normal incidence case), Rayleigh's criteria of resolution, resolving power of telescope, microscope and grating.

Polarization by double refraction, Nicol prism, Concept of plane, circular and elliptical polarization with mathematical expression.

Section B

Transitions between energy states, Einstein coefficients, principle and properties of laser beam, three and four level lasers, elementary description of principle, construction and operation of He-Ne laser, CO_2 laser, ruby laser, Nd-YAG laser and semi-conductor laser. Applications of lasers.

Propagation of light through optical fiber, its geometry, numerical aperture and acceptance angle, step index and graded index fibers, Signal attenuation and dispersion (qualitative ideas). Applications of optical fibers.

de-Broglie waves, velocity of de-Broglie waves, wave packets, Davisson and Germer experiment (Qualitative only), wave functions, time dependent and time independent Schrodinger wave equation, expectation value, application of Schrodinger equation to particle in an infinite potential box, potential barrier (tunneling effect)

Recommended Books

1. Wave and Vibrations by H.J. Pains
2. Fundamentals of optics by Jenkins and White (McGraw Hills)
3. Lasers- Theory and applications by Thyagrajan and Ghatak (McMillan Publishers)
4. Physics for Engineering Applications by S. Puri (Narosa Publishers)

Scheme of Examination

- English will be the medium of instruction and examination.
- This course will carry 100 marks of which 50 marks shall be reserved for Internal Assessment and remaining 50 marks for external end semester examination.
- The duration of final written examination of this paper shall be of three hours.
- The students shall be declared passed in the paper if he/she secures minimum 40% marks in each of the Internal Assessment and External Examinations separately.

Instructions to the External Paper Setter

- The External Paper will carry 50 marks and would be of three hours. The Question paper will be divided into three Sections, namely Section-A, Section-B and Section-C. There will be FIVE questions in each of the Sections A and B, of five (05) marks each. However, a question may be segregated into subparts. Section C is compulsory and contains TEN (10) sub-parts each of two (2) marks. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A& B.
- The maximum limit on numerical problems to be set in the paper is 35%.
- The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
- The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
- Use of non-programmable calculator shall be specified clearly if required.

BAS--102 APPLIED MATHEMATICS-I

L	T	P	Credits
3	1	0	3.5

Course Objective:

The course is aimed at developing the basic mathematical skills among the students of engineering that are imperative for effective understanding of engineering subjects. The main objective is to inculcate the knowledge of basic concepts of Calculus, Algebra, Complex Analysis and their applications for the solutions of engineering and mathematical problems. At the end of the course, students shall be able to deal with functions of several variables, matrices, system of linear equations, improper integrals and functions of complex variables. They shall learn how to implement their mathematical knowledge to solve real world problems.

Course Content

Section-A

Matrix Algebra: Special Matrices: Hermitian matrices, Skew-Hermitian matrices, Unitary matrices and Orthogonal matrices; Rank of matrices, Rank by Echelon form; Consistency of system of homogeneous and non-homogeneous equations: Gauss Elimination method, Gauss Jordan method; Eigen values and Eigen vectors of a matrix, Elementary properties of Eigen values and Eigen vectors,Eigen values of Special Matrices, Cayley Hamilton's Theorem.

Functions of several variables: Partial derivatives, Total differential, Approximation by Total Differentials, Derivatives of composite and implicit functions,Homogenous functions, Euler's theorem, Maximumand Minimum values of functions of two and three variables, Lagrange's Method of Multipliers.

Section-B

Complex Analysis: De Moivre's Theorem, Power and roots of complex numbers,Expansion of $\cos^n\theta$, $\sin^n\theta$ in terms of $\cos n\theta$ and $\sin n\theta$ and vice-versa, Analytic functions, Necessary and Sufficient condition for a function to be analytic, CR-equations, Polar form of CR-equations, Harmonic functions, Conjugate of Harmonic functions, Laplace equation.

Improper integrals: Improper integral of First and Second kind, Absolute convergence of Improper integrals, Comparison tests (without proof), Beta and Gamma functions and their properties.

RECOMENDED BOOKS:

1. R. K. Jain and S. R. K. Iyenger, Advanced Engineering Mathematics, Narosa Publishing House, New Delhi.
2. E. Kreyzic, Advanced Engineering Mathematics,Johan Wiley & Sons, (10th Edition).
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand and Company.
4. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher.

Scheme of Examination

- English will be the medium of instruction and examination.
- This course will carry 100 marks of which 50 marks shall be reserved for Internal Assessment and remaining 50 marks for external end semester examination.
- The duration of final written examination of this paper shall be of three hours.
- The students shall be declared passed in the paper if he/she secures minimum 40% marks in each of the Internal Assessment and External Examinations separately.

Instructions to the External Paper Setter

- The External Paper will carry 50 marks and would be of three hours. The Question paper will be divided into three Sections, namely Section-A, Section-B and Section-C. There will be FIVE questions in each of the Sections A and B, of five (05) marks each. However, a question may be segregated into subparts. Section C is compulsory and contains TEN (10) sub-parts each of two (2) marks. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A& B.
- The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
- The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.

CPE--151 COMPUTER PROGRAMMING LAB

L	T	P	Credits
0	0	2	1.0

Course Objective:

To familiarize the students with basic concepts of computer programming and developer tools. To present the syntax and semantics of the "C" language as well as data types offered by the Language. To allow the students to write their own programs using standard language infrastructure regardless of the hardware or software platform. After completing the subject, student should be able to:

- Design an algorithmic solution for a given problem
- Write a maintainable C program for a given algorithm.
- Trace the given C program manually.
- Write C program for simple applications of real life using structures and files.

List of Experiments

1. Experiencing DOS internal and external commands.
2. Introducing 'C' language basics such as data types, variables, constants etc.
3. Working with operators (arithmetic, logical and relational).
4. Write a program showing input and output functions.
5. Write a program to illustrate decision control structures.
6. Write program using looping control structures.
7. Write applications based on one and two dimensional arrays.
8. Working with pointers.
9. Write a program showing array and pointer relationship.
10. Illustrate functions and recursion.
11. Show the use of pointers in functions.
12. Write a program to show the use of functions with arrays.
13. Write a program based on structure and using union.
14. Use the pointer to point to structure.
15. Use the structures with functions.
16. Illustrate the file handling.
17. Write program to illustrate C++ program structure.
18. Write program to illustrate the use of classes and objects.
19. Write program to illustrate the concept of inheritance.
20. Write program to illustrate the concept of polymorphism.

BAS--151 APPLIED PHYSICS – I LAB

L	T	P	Credits
0	0	2	1.0

Course Objective:

The main aim of the Applied Physics –I Lab is to inculcate the practical abilities in the students along with theoretical studies. Students will be able to understand the concept of electromagnetic waves, phenomena of reflection, refraction, interference and diffraction of electromagnetic light through various experiments. At the end, students will be able to understand the optical properties of waves.

List of Experiments

1. To measure the wavelength of Laser (He-Ne) light by using reflection grating.
2. To measure angle of prism using a spectrometer.
3. To measure refractive index of prism using a spectrometer.
4. To determine wavelength of sodium light using a plane diffraction grating.
5. To determine specific rotation of sugar using Polarimeter.
6. To study Transverse nature of light.
7. To study use of CRO to measure amplitude and frequency of different waveforms.
8. To superposition of two waves using Lissajous figures.
9. To determine numerical aperture of an optical fibre.
10. To study optical fibre transmitter & receiver function for audio signal.

Scheme of Examination

- English will be the medium of instruction and examination.
- This course will carry 100 marks of which 50 marks shall be reserved for Internal Assessment and remaining 50 marks for external end semester examination.
- The duration of final written examination of this paper shall be of two hours.
- The students shall be declared passed in the paper if he/she secures minimum 40% marks in the Internal Assessment and end semester external examinations collectively.

Instructions to the Paper Setter

- The External Paper will carry 50 marks and would be of two hours.
- Use of non-programmable calculator shall be specified clearly if required.

MCE--152 MANUFACTURING PROCESSES LAB

L	T	P	Credits
0	0	3	1.5

Course Objective:

The objective of this course is to inculcate practical knowledge to students regarding basic manufacturing processes like: casting, machining, sheet metal forming, fitting, smithy, welding and basic carpentry operations.

At the end of the course, the students should be able to - (1) demonstrate the capability of selecting suitable manufacturing processes to manufacture the products optimally, (2) ability to clear basic fundamental concepts of machining, welding, casting, smithy, sheet metal forming, fitting and carpentry processes.

List of Experiments

1. Machine Shop: Six in one job in Machine Shop (involving turning, step cutting, threading, grooving, taper turning, knurling, drilling and tapping)
2. Fitting Shop: L – Cutting from square piece in fitting shop (involving squaring, L – cutting and squaring, drilling, tapping, reaming)
3. Sheet Metal Shop: Layout marking, cutting/shearing, bending in box shape with drilling and Riveting
4. Carpentry Shop: Cross and Lap joints, T – Joint
5. Welding Shop: Butt Welding / Gas welding, Soldering.
6. Foundry Shop: Moulding of Flange, Moulding of Core and casting of pipe.
7. Smithy Shop: Poker, Circular Ring.

ECE--153 ELECTRICAL AND ELECTRONICS LAB

L	T	P	Credits
0	0	2	1.0

Objective: The educational objective of the **Electrical and Electronics Lab** is to provide student the basic engineering knowledge by way of electrical and electronic devices and components.

List of Experiments

1. Identification and familiarization with the basic tools used in lab.
2. Familiarization and testing of Resistance, Capacitor & Inductors.
3. To study various types of switches such as normal/miniature toggle, slide, push button, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multiway Master Mains Switch.
4. To study various types of protective devices such as Wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, and thermal fuse, single/multiple circuit breakers, over and under current relays.
5. To get familiar with the working knowledge of the measuring instruments: a) Ammeter & Voltmeter b) Cathode ray oscilloscope (CRO) c) Multimeter (Analog and Digital)
6. To get familiar with the working knowledge of the following instruments: a) Signal generator b) Function generator c) Power supply.
7. Familiarization and testing of Diode, BJT & FET.
8. Use of diode as half wave and full wave rectifier.
9. To verify Kirchhoff's laws.
10. Verification of truth tables of logic gates.
11. Fabrication of Printed Circuit Board.
12. To learn soldering and desoldering techniques.

HSS--101 COMMUNICATION SKILLS

L	T	P	Credits
2	1	0	2.5

Course Objective:
The objective of the course is to hone the communicative skills of the budding engineers who are expected to be globally competent. It aims at inculcating in them the skills of effective Business communication, Reading, Writing, Listening and Speaking (LSRW) skills in English. It also aims at developing the learners' grammatical competence so as to equip them with appropriate language expressions to communicate effectively in both oral and written contexts.

Section – A

Communication: Process of communication, semantic gap, Types and channels of communication. Significance of communication in a professional organisation.

Reading and Comprehension Skills: Reading purposes, gears, types and effective strategies of reading. Strategies of comprehension, analysis and interpretation: character analysis, theme, central idea, etc.

The following text is prescribed for this unit:

Prose Parables, Orient Blackswan Private Limited-2013

Selected Texts from this book are to be studied:

1. **Kabuliwallah,** Rabindranath Taagore
2. **The Eyes are Not Here,** Ruskin Bond
3. **Grief,** Anton Chekhov
4. **The Doctor's Word,** R. K. Narayan

Writing Skills: Elements of effective writing, writing styles, one word substitution.

Business Correspondence: Elements & kinds of business letters; quotations & tenders, Job application, Résumé, Agenda, memorandum, Report writing, e-mail etiquettes.

Section – B

Listening Skills: Process of listening, kinds of listening, barriers to listening, how to become an effective listener and feedback skills.

Grammar: Transformation of sentences, Active and Passive voice, Narration, correction of Sentences

Speaking Skills: Speech Mechanism, articulation of sounds, phonetic transcription, components of effective talk, group discussion, oral presentation skills, types and use of audio visual aids in presentation.

Text and Readings:

1. Lata, Pushp and Sanjay Kumar. *Communication Skills.*2015.OUP India.
2. Raman, Meenakshi, and Sangeeta Sharma. *Technical Communication :Principles and Practice.*2011.OUP India.
3. Rizvi, M. Ashraf.*Effective Technical Communication.*2005.Tata McGraw Hill Education Pvt. Ltd.
4. Lewis,Norman.*Speak Better Write Better English.* 2011.Goyal publishers.
5. Greenbaum,Sidney.*OxfordEnglish Grammar.*2005.Oxford.
6. Martin,Wren.*High School English Grammar and Composition.* 1995.S. Chand & Company Ltd., New Delhi
7. Best,Wilfred D. *The Students' Companion* . Harper collins.

Scheme of Examination:

- English will be the medium of communication.
- The course will carry 100 marks of which 50 marks shall be reserved for Internal Assessment and remaining 50 for External End-semester examination.
- The duration of final written examination of this paper shall be three hours.

Instructions to the External Paper Setter:

- The External Paper will carry 50 marks and would be of three hours duration.The Question Paper will be divided into three Sections, namely Section-A, Section-B and Section-C.There will be FIVE questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts.Section C is compulsory and contains TEN (10) sub-parts each of two (2) marks. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A & B.
- The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.

BAS--103 APPLIED CHEMISTRY

L	T	P	Credits
3	1	0	3.5

Course Objective:

The objective of this course is to have good and basic understanding of concepts of chemistry and related problems in the engineering field. The topic like spectroscopy, corrosion, polymers, lubricants, thermodynamics etc is for the development of right attitude, intectual breadth and depth in engineering and also to educate students with strong background. At the end of the course, the students certainly are able to achieve better employment opportunities and other avenues for higher studies.

Section A

Water & its Treatment: Specifications of water for different uses, Common Impurities of water, Hardness of water: Determination of hardness by complexometric (EDTA) method. Municipal Water Supply: Requisites of drinking water, Steps involved in purification of water; Sedimentation, coagulation, Filtration and Sterilization, Break point Chlorination. Trace elements in water and their permissible limits. Softening of Water: Lime-Soda Method, Permutit (Zeolite) Method and Deionization or Demineralization Method, Boiler troubles & their causes, disadvantages and prevention: Formation of solids (Scale and Sludge), Carry over (Priming and Foaming), Boiler Corrosion and Caustic Embrittlement, BOD and COD,
Desalination of water. Numerical Problems based on hardness and EDTA method and Lime-Soda softening methods.
Corrosion: Corrosion and cause of corrosion, factors effecting corrosion, Types of corrosion, chemical corrosion (Dry) and electrochemical corrosion (Wet) and their mechanism, types of electrochemical corrosion (galvanic, pitting, waterline, differential aeration, soil, passivity, microbiological, stress corrosion and atmospheric corrosion), prevention of corrosion. Pilling- Bedworth rule. Numerical Problems based on Pilling Bedworth rule.
Electrochemistry: Electrolytic conductance, factors affecting conductance, strong and weak electrolytes, Kohlrausch's law, effect of dilution on molar and equivalent conductance, diffusion and Ionic mobility, conductometric titrations, types and its applications, Electrochemical cell, types of electrodes, electrode potential, EMF, Cell reactions, EMF of galvanic cell, electrochemical series & its applications, Nernst's equation, primary (Dry cell) and secondary batteries (Lead storage batteries and Ni -Cd cell), fuel cells(H_2 -O_2). Numericals problems of Kohlrausch's law and molar and
equivalent conductance and EMF and Electrochemical cell.
Lubricants: Classification of lubricants, lubricating oils, semisolid lubricants, solid and synthetic lubricants, properties of lubricating oils (viscosity, flash and fire points, cloud and pour point, mechanical stability and saponification number) and their significance. Numerical of viscosity index.

Section B

UV-Visible spectroscopy: Introduction to molecular spectra, UV-VIS spectroscopy theory, & Instrumentation, types of Electronic transitions, Lambert Beer's Law and its limitations, Auxochrome & Chromophore, Bathochromic, hypsochromic, hyperchromic and hypochromic shifts and effects of conjugation and solvent on transition of organic molecules, Woodward-Fieser Rules for calculating λmax for dienes, application of UV spectroscopy to simple organic molecules, Frank-Condon principle.
IR: Introduction to IR spectroscopy, theory and instrumentation, selection rules, fingerprint region, factors affecting molecular vibrations, applications of IR to simple functional groups (carbonyl, hydroxyl, amine, carboxylic acids). Numericals of Lambert Beer's law.
Chromatography: Basic principle and theory of chromatography, thin layer and column chromatography, gas chromatography, gas-liquid chromatography, gas-solid chromatography, ion exchange and high pressure liquid chromatography, simple applications of chromatography.

Cont…

BAS 103 APPLIED CHEMISTRY Cont….

Polymers: Classification and physical properties of polymers, Different methods of classification in polymers: addition and condensation polymerization, Determination of number average and weight average molecular masses of polymers, Index of Poydispersity (Polydispersity index), Tacticity of polymers (stereochemistry of polymers), Different types of polymers: Fibre forming, conducting and photochromic polymers; Synthesis and applications of engineering polymers, Preparations, properties and its applications of: silicon polymers, polyurethanes and epoxy resins. Numerical problems of Mn and Mw method.

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. Simple numericals for calculating w, q, ΔE, ΔH and entropy.

Books Recommended

1. Introductory Polymer Chemistry by G.S.Mishra, John Wiley & Sons, New York, 1993.
2. Puri, Sharma and Pathania : Principles of Physical Chemistry, W.H. Freeman & Co, 2008.
3. Applied chemistry by Nidhi Gupta and Rajeev Mall, Kalyani Publishers, New Delhi.
4. Engineering Chemistry by P.C. Jain & Monica Jain Dhanpat Rai Publishers, New Delhi.

Scheme of Examination

1. English will be the medium of instructions and examinations.
2. This course will carry 100 marks of which 50 marks shall be reserved for the internal assessment and remaining 50 Marks for external end semester examination.
3. The duration of final written examination of this paper shall be of three hours.
4. The students shall be declared passed in the paper if he/she secures minimum 40% marks in each of the internal assessment and external examination separately.

Instructions to the External Paper setter

1. The external paper will carry 50 marks and would be of three hours. The question paper will be divided into three sections, namely ,Section- A, Section –B and Section –C. There will be FIVE questions in each of the Sections A and B .Of five(05)marks each. However a question may be segregated into subparts. Section C is compulsory and contains TEN(10) sub-parts each of (2) marks. Candidates will be required to attempt SIX questions by selecting three questions from each Sections A & B.
2. The maximum limit on numerical problems to be set in the paper is, 30%.
3. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided in the solutions.
4. The paper setter should seal the internal and external envelope properly with signatures and cello tape at proper place.
5. Use of non programmable calculators shall be specified clearly ,if required.

MCE--151 ENGINEERING GRAPHICS

L	T	P	Credits
2	4	0	4.0

Course Objective:

The objective of this course is to inculcate good understanding of basic fundamentals of engineering graphics in the students. This course is aimed at to make the student understand visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.

At the end of the course, the students should be able to - (1) acquire knowledge of different conventions and methods of engineering drawing, (2) understand dimensioned projections, (3) learn how to create two-dimensional images of objects using first angle orthographic projection, (4) learn how to create isometric, perspective and auxiliary projections.

Section-A

Lines, Lettering, Dimensioning, Scales; Reference and Auxiliary Planes; Systems of Orthographic Projections; Projection of Points and Lines; True length of lines and their true angles of inclination with the reference planes; Projection of Planes and their true shape.
Polyhedral and Solids of Revolution; Projection of Solids in simple positions: Axis parallel to both the reference planes, parallel or perpendicular to one and inclined to the other or inclined to both the reference planes.
Section of solids: Section Planes, Sections and projection of sections on the reference planes; True shape of sections of simple solids.

Section-B

Development of lateral surfaces of simple solids such as cubes, prisms, cylinders, pyramids, cones, spheres etc. Intersection of lateral surfaces of simple solids penetrating into one another; Projection of lines/curves of intersection/interpenetration on the reference planes.
Isometric axes, lines and planes; Isometric scale; Drawing/Sketching isometric view of planes, plane figures and simple solids from orthographic projections; Conversion of pictorial view of simple solids into orthographic projections.

Recommended Books:

1. P.S. Gill, A Text Book of Engineering Drawing (Geometrical Drawing), S.K. Kataria & Sons, New Delhi.
2. Dhananjay A. Jolhe, Engineering Drawing with an Introduction to Autocad, Tata McGraw Hill, New Delhi
3. M.B. Shah and B.C. Rana, Engineering Drawing, Pearson Education Asia, New Delhi
4. Basant Agrawal and C.M. Agrawal, Engineering Drawing, Tata McGraw Hill, New Delhi
5. French and Virck, Graphic Science, McGraw Hill Publishers, New York.
6. R. K. Dhawan, A text book of Engineering Drawing, S. Chand and Co. Ltd., New Delhi
7. N. D. Bhatt and V. M. Panchal, Engineering Drawing, Charotor Publication House, Anand
8. Venugopal, Engineering Drawing and Graphics, New Age International Publishers, New Delhi

BAS--153 APPLIED CHEMISTRY LAB

L	T	P	Credits
0	0	2	1.0

Course Objective:

The objectives of this paper is to develop the skill to identify the problem, analyze and solve it. Learn how to cope up and upgrade with the continuous flow of new technologies and also to educate students with strong background so that they will fulfill the needs and expectations of scientific and industrial communities.

List of Experiments

1. To determine the strength of a given acid by titrating with N/10 NaOH, conductometerically.
2. To determine the strength of a given acid by titrating with N/10 NaOH, pH metrically.
3. To verify Beer's law and to find the concentration of an unknown solut- ion using colorimeter/ Uv-Vis spectrophotometer.
4. To estimate the strength of the given HCl solution by titrating with N/10 NaOH potentiometrically using Quinhydrone as the indicator electrode.
5. To determine the amount of Fe^{2+} ions in the given sample of Mohr salt provided with N/20 oxalic acid.
6. To determine the composition of a mixture of acid (HCl + Oxalic acid).
7. To determine the composition of a mixture of bases (NaOH + Na_2CO_3).
8. To determine the copper content in a given sample Iodometrically.
9. Preparation of Urea/formaldehyde and Phenol/formaldehyde resin.
10. To determine the total hardness of water by EDTA method.
11. Determination of coefficient of viscosity of given liquid by using Ostwald viscometer.
12. Determine the CMC of a soap/surfactant by conductometric measurements.
13. Analysis of organic compounds (Aspirin) by Gas Chromatography.

Scheme of Examination

1. English will be the medium of instructions and examinations.
2. This course will carry 100 marks of which 50 marks shall be reserved for the internal assessment and remaining 50 marks for external end semester examination.
3. The duration of final written examination of this paper shall be of two hours.
4. The students shall be declared passed in the paper if he/she secures minimum 40% marks in aggregates.

Faculty of Engineering
B.TECH and SIX YEAR B. TECH-M.B.A. INTEGRATED PROGRAM

FOR FOLLOWING BRANCHES

ELECTRONICS & COMMUNICATION ENGINEERING (ECE) / ELECTRONICS & COMPUTER ENGINEERING (ECM) / MECHANICAL ENGINEERING (ME) / CIVIL ENGINEERING

(Batch 2020 Onwards)
Session 2020-21

SCHEME OF PAPERS

SECOND SEMESTER (GROUP – A)

Sr. No.	Course No.	Title	L	T	P	Credits
1.	HSS 101	Communication Skills *	2	1	0	2.5
2.	ECE 102	Basic Electronics Engineering	3	1	0	3.5
3.	BAS 103	Applied Chemistry *	3	1	0	3.5
4.	BAS 105	Applied Mathematics – II	3	1	0	3.5
5.	**First Year Theory Elective**		3	1	0	3.5
6.	MCE 151	Engineering Graphics *	2	4	0	4.0
7.	BAS 153	Applied Chemistry Lab *	0	0	2	1.0
8.	**First Year Practical Elective**		0	0	2	1.0
			16	**9**	**4**	**22.5**
						Total Contact Hours: 29

SECOND SEMESTER (GROUP – B)

Sr. No.	Course No.	Title	L	T	P	Credits
1.	CPE 101	Computer Programming *	3	1	0	3.5
2.	ECE 102	Basic Electronics Engineering	3	1	0	3.5
3.	MCE 102	Manufacturing Processes *	3	0	0	3.0
4.	BAS 105	Applied Mathematics – II	3	1	0	3.5
5.	**First Year Theory Elective**		3	1	0	3.5
6.	CPE 151	Computer Programming Lab *	0	0	2	1.0
7.	MCE 152	Manufacturing Processes Lab *	0	0	3	1.5
8.	ECE 153	Electrical and Electronics Lab *	0	0	2	1.0
9.	**First Year Practical Elective**		0	0	2	1.0
			15	**4**	**9**	**21.5**
						Total Contact Hours: 28

BAS-103, BAS-153, HSS-101, CPE-101, CPE-151, MCE-151, MCE-102, MCE-152 & ECE-153 papers will be taught in both the semesters, offered in such a way that the students study half of these papers in first semester and the remaining half in second semester.

BAS-153, BAS-154, CPE-151, MCE-151, MCE-152 & ECE-153 are practical papers only. There will not be any theory examination for these papers.

List of First Year Theory Electives	BAS 104	Applied Physics – II	ECE-110	Python Programming
List of First Year Practical Electives	BAS 154	Applied Physics – II Lab	ECE-160	Python Programming Lab

Faculty of Engineering
Punjabi University, Patiala

General Instructions to the Paper Setters

B. Tech & Six Year B.Tech-MBA Integrated Program (For following Branches) :-
Electronics & Communication Engineering (ECE) / Electronics & Computer Engineering (ECM) / Mechanical Engineering (ME) / Civil Engineering

Applicable 2016 Batch Onwards

The B. Tech paper structure will be as shown below:

Pattern of Question Paper

TITLE OF SUBJECT (CODE----)
Bachelor of Technology (Branch)
End Semester Exam

TIME ALLOWED: 3 Hour Roll. No……. Maximum Marks: 50
Pass Marks : 20

Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.

Section-A (From Section A of the syllabus)

Q1. .....
Q2. .....
Q3. .....
Q4. .....
Q5 ..... 3x5

Section-B (From Section B of the syllabus)

Q6. .....
Q7. .....
Q8. .....
Q9. .....
Q10. ..... 3x5

Section-C (From whole syllabus)

Q11
a).....
b) .....
c) .....
d) .....
e) .....
f) .....
g) .....
h).....
i).....
j)..... 10x2=20

Note for the paper setter:

1. Total numbers of questions to be set are Eleven (11) as per the above format.
2. There will be FIVE questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts.
3. Section C is compulsory and contains ten (10) sub-parts each of two (2) marks.
4. The maximum limit on numerical problems to be set in the paper is 35% while minimum limit is 20%.
5. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
6. The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
7. Log tables, charts, graphs, Design data tables etc. should be specified, whenever needed.
8. Use of non programmable calculators shall be specified clearly, if required.

HSS--101 COMMUNICATION SKILLS

L	T	P	Credits
2	1	0	2.5

Course Objective:

The objective of the course is to hone the communicative skills of the budding engineers who are expected to be globally competent. It aims at inculcating in them the skills of effective Business communication, Reading, Writing, Listening and Speaking (LSRW) skills in English. It also aims at developing the learners' grammatical competence so as to equip them with appropriate language expressions to communicate effectively in both oral and written contexts.

Section – A

Communication: Process of communication, semantic gap, Types and channels of communication. Significance of communication in a professional organisation.

Reading Skills: Reading purposes, gears, types and effective strategies of reading.

Writing Skills: Elements of effective writing, writing styles, use of homonyms, cloze tests, one word substitution, abbreviations etc.

Business Correspondence: Elements & kinds of business letters; quotations & tenders, Job application, Résumé, Agenda, memorandum, Report writing, e-mail etiquettes.

Section – B

Listening Skills: Process of listening, kinds of listening, barriers to listening, how to become an effective listener and feedback skills.

Grammar: Tenses, words used as different parts of speech,Transformation of sentences, Active and Passive voice, Narration, correction of Sentences

Speaking Skills: Speech Mechanism, articulation of sounds, phonetic transcription, components of effective talk, group discussion, interview skills, conducting meetings, oral presentation skills, types and use of audio visual aids in presentation.

Text and Readings:

1. Lata, Pushp and Sanjay Kumar. *Communication Skills.*2015.OUP India.
2. Raman, Meenakshi, and Sangeeta Sharma. *Technical Communication :Principles and Practice.*2011.OUP India.
3. Rizvi, M. Ashraf.*Effective Technical Communication.*2005.Tata McGraw Hill Education Pvt. Ltd.
4. Lewis,Norman.*Speak Better Write Better English.* 2011.Goyal publishers.
5. Greenbaum,Sidney.*OxfordEnglish Grammar.*2005.Oxford.
6. Martin,Wren.*High School English Grammar and Composition.* 1995.S. Chand & Company Ltd., New Delhi
7. Best,Wilfred D. *The Students' Companion* . Harper collins.

Scheme of Examination:

- English will be the medium of communication.
- The course will carry 100 marks of which 50 marks shall be reserved for Internal Assessment and remaining 50 for External End-semester examination.
- The duration of final written examination of this paper shall be three hours.

Instructions to the External Paper Setter:

- The External Paper will carry 50 marks and would be of three hours duration.The Question Paper will be divided into three Sections, namely Section-A, Section-B and Section-C.There will be FIVE questions in each of the Sections A and B. Each question will be of five (05) marks. However, a question may be segregated into subparts.Section C is compulsory and contains TEN (10) sub-parts each of two (2) marks. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A & B.
- The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.

ECE--102 BASIC ELECTRONICS ENGINEERING

L	T	P	Credits
3	1	0	3.5

Course Objective:
To enhance comprehension capabilities of student through understanding of electronic devices such as Diode, Transistor and FET. The student should also be able to acquire basic knowledge of Digital electronics and communication system.

Section-A

PN junction, Depletion layer, Barrier potential, Forward and reverse bias, Breakdown voltage, PIV, Characteristics of p-n junction diode, knee voltage, load line; and operating Point. Ideal p-n junction diode, junction capacitance, zener diode. Rectifiers and filters-Half wave, centre tap full wave and bridge rectifier, clipping and clamping circuit, voltage regulation.

BJT - Introduction, Basic theory of Qperation of PNP ad NPN transistor, V-I characteristics, CB, CE and CC configuration, Basic BJT Amplifiers. Introductory idea of RC multistage amplifiers. FET-Introduction, V-I characteristics and operation, UJT - Introduction, V-I characteristics and operation.

Section-B

Number Systems: Number systems, Conversions, Number Representations, Demorgan 's Theorem, Boolean Algebra and Arithmetic operations. Binary codes-Grey codes, Excess-3 code, BCD code, symbols and truth tables of NOT Gate, AND Gate, NAND Gate, OR Gate, NOR Gate, EX-OR Gate and EX-NOR Gate.

Introduction to communication system, General block diagram, need for communication, need of modulation and demodulation, Block diagram of radio transmission and reception system and function of each block.

Course Learning Outcomes (CLO):After the completion of the course, the student should be able to:

1. Demonstrate the use of semiconductor diode in various applications.
2. Discuss and explain the working of transistor ,their configuration and application.
3. Recognize and apply the number system and Boolean algebra.
4. Define the communication system and differentiate various modulation techniques.
5. Explain radio transmission and reception.

Text Books:

1. Milliman, J. and Halkias, C.C., Electronic Devices and Circuits, Tata McGraw Hill, 2007.
2. Boylestad, R.L. and Nashelsky, L., Electronic Devices & Circuit Theory, Perason (2009).
3. Digital Design by Morris Mano, PHI, 4th edition, 2008.
4. Digital principles and Applications, by Malvino Leach, TMH, 2011.
5. Electronic Communication Systems by G. Kennedy And B. Davis, Mc Graw Hill, 4th Edition,2006.

Reference Books :

1. Edward Hughe, Electrical Technology, Addison-Wisley, New York.
2. Naidu and S. Kamakshaiah, Introduction to Electrical Engineering Tata McGraw Hills, New Delhi.
3. V. Deltoro, Principle of Electrical Engineering, Tata McGraw Hill, New Delhi.
4. Smith and Dorf, Circuits Devices and Systems, John Wiley and Sons.
5. S Thomas L. Gloyd, Electronics Fundamentals Circuits, Devices Applications, Prentice Hall International Inc.
6. B.P Lathi, Communication systems Engg., Pearsons.

BAS--103 APPLIED CHEMISTRY

L	T	P	Credits
3	1	0	3.5

Course Objective:

The objective of this course is to have good and basic understanding of concepts of chemistry and related problems in the engineering field. The topic like spectroscopy, corrosion, polymers, lubricants, thermodynamics etc is for the development of right attitude, intectual breadth and depth in engineering and also to educate students with strong background. At the end of the course, the students certainly are able to achieve better employment opportunities and other avenues for higher studies.

Section A

Water & its Treatment: Specifications of water for different uses, Common Impurities of water, Hardness of water: Determination of hardness by complexometric (EDTA) method. Municipal Water Supply: Requisites of drinking water, Steps involved in purification of water; Sedimentation, coagulation, Filtration and Sterilization, Break point Chlorination. Trace elements in water and their permissible limits. Softening of Water: Lime-Soda Method, Permutit (Zeolite) Method and Deionization or Demineralization Method, Boiler troubles & their causes, disadvantages and prevention: Formation of solids (Scale and Sludge), Carry over (Priming and Foaming), Boiler Corrosion and Caustic Embrittlement, BOD and COD,
Desalination of water. Numerical Problems based on hardness and EDTA method and Lime-Soda softening methods.
Corrosion: Corrosion and cause of corrosion, factors effecting corrosion, Types of corrosion, chemical corrosion (Dry) and electrochemical corrosion (Wet) and their mechanism, types of electrochemical corrosion (galvanic, pitting, waterline, differential aeration, soil, passivity, microbiological, stress corrosion and atmospheric corrosion), prevention of corrosion. Pilling- Bedworth rule. Numerical Problems based on Pilling Bedworth rule.
Electrochemistry: Electrolytic conductance, factors affecting conductance, strong and weak electrolytes, Kohlrausch's law, effect of dilution on molar and equivalent conductance, diffusion and Ionic mobility, conductometric titrations, types and its applications, Electrochemical cell, types of electrodes, electrode potential, EMF, Cell reactions, EMF of galvanic cell, electrochemical series & its applications, Nernst's equation, primary (Dry cell) and secondary batteries (Lead storage batteries and Ni -Cd cell), fuel cells(H_2 -O_2). Numericals problems of Kohlrausch's law and molar and
equivalent conductance and EMF and Electrochemical cell.
Lubricants: Classification of lubricants, lubricating oils, semisolid lubricants, solid and synthetic lubricants, properties of lubricating oils (viscosity, flash and fire points, cloud and pour point, mechanical stability and saponification number) and their significance. Numerical of viscosity index.

Section B

UV-Visible spectroscopy: Introduction to molecular spectra, UV-VIS spectroscopy theory, & Instrumentation, types of Electronic transitions, Lambert Beer's Law and its limitations, Auxochrome & Chromophore, Bathochromic, hypsochromic, hyperchromic and hypochromic shifts and effects of conjugation and solvent on transition of organic molecules, Woodward-Fieser Rules for calculating λmax for dienes, application of UV spectroscopy to simple organic molecules, Frank-Condon principle.
IR: Introduction to IR spectroscopy, theory and instrumentation, selection rules, fingerprint region, factors affecting molecular vibrations, applications of IR to simple functional groups (carbonyl, hydroxyl, amine, carboxylic acids). Numericals of Lambert Beer's law.
Chromatography: Basic principle and theory of chromatography, thin layer and column chromatography, gas chromatography, gas-liquid chromatography, gas-solid chromatography, ion exchange and high pressure liquid chromatography, simple applications of chromatography.

Polymers: Classification and physical properties of polymers, Different methods of classification in polymers: addition and condensation polymerization, Determination of number average and weight average molecular masses of polymers, Index of Poydispersity (Polydispersity index), Tacticity of polymers (stereochemistry of polymers), Different types of polymers: Fibre forming, conducting and photochromic polymers; Synthesis and applications of engineering polymers, Preparations, properties and its applications of: silicon polymers, polyurethanes and epoxy resins. Numerical problems of Mn and Mw method.

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. Simple numerical for calculating w, q, ΔE, ΔH and entropy.

Books Recommended

1. Introductory Polymer Chemistry by G.S.Mishra, John Wiley & Sons, New York, 1993.
2. Puri, Sharma and Pathania : Principles of Physical Chemistry, W.H. Freeman & Co, 2008.
3. Applied chemistry by Nidhi Gupta and Rajeev Mall, Kalyani Publishers, New Delhi.
4. Engineering Chemistry by P.C. Jain & Monica Jain Dhanpat Rai Publishers, New Delhi.

Scheme of Examination

1. English will be the medium of instructions and examinations.
2. This course will carry 100 marks of which 50 marks shall be reserved for the internal assessment and remaining 50 Marks for external end semester examination.
3. The duration of final written examination of this paper shall be of three hours.
4. The students shall be declared passed in the paper if he/she secures minimum 40% marks in each of the internal assessment and external examination separately.

Instructions to the External Paper setter

1. The external paper will carry 50 marks and would be of three hours.The question paper will be divided into three sections, namely ,Section- A, Section –B and Section –C. There will be FIVE questions in each of the Sections A and B .Of five(05)marks each. However a question may be segregated into subparts. Section C is compulsory and contains TEN(10) sub-parts each of (2) marks. Candidates will be required to attempt SIX questions by selecting three questions from each Sections A & B.
2. The maximum limit on numerical problems to be set in the paper is, 30%.
3. The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided in the solutions.
4. The paper setter should seal the internal and external envelope properly with signatures and cello tape at proper place.
5. Use of non programmable calculators shall be specified clearly ,if required.

BAS--105 APPLIED MATHEMATICS-II

L	T	P	Credits
3	1	0	3.5

Course Objective:
The main objective is to provide advanced skills to deal with sequence and series, differential equations, Laplace transformations and Fourier series. The knowledge of these skills is essential to solve various electrical and mechanical problems analytically. At the end of the course, students shall be able to solve series solution of differential equations and also able to solve engineering problems based on initial and boundary value problems with the help of Laplace transformations.

Course Content

Section-A

Differential equations: Basic concepts and ideas. Separable Differential Equations, Exact Differential Equations, Integrating Factors, Linear Differential Equations, Bernoulli's Differential Equations, Solution of second order linear Homogeneous equations with constant coefficients, Solution of Non-Homogeneous linear equations with constant coefficients of second order by Method of Variation of Parameters, Method of Undetermined Coefficients; Solution of Euler-Cauchy equations.

Laplace Transforms: Laplace Transform, Laplace Transform of Derivatives, Laplace Transform of Integrals, First Shifting Theorem, Second Shifting Theorem, Inverse Laplace Transform, Convolution Theorem, Solution of Initial Value Problems with constant coefficients and with variable coefficients using Laplace Transform.

Section-B

Probability Distributions: Binomial Distribution, Mean and Variance of Binomial Distribution, Recurrence formula for the Moments of Binomial Distribution, Moment Generating Function of Binomial Distribution; Poisson Distribution, Poisson Distribution as a limiting case of Binomial Distribution, Mean and Variance of Poisson Distribution, Recurrence formula for the Moments of Poisson Distribution, Moment Generating Function of Poisson Distribution; Normal distribution, Mean and Variance of Normal Distribution, Median and Mode of Normal Distribution, Moment Generating Function of Normal Distribution, Normal Distribution as a limiting case of Binomial Distribution.

Infinite Series: Infinite series and their convergence, Tests for Convergence: Comparison Test, D' Alembert Ratio Test, Raabe's Test, Cauchy Root Test, Cauchy Integral Test, Logarithmic Test, Leibnitz Test (all tests without proof), Power Series, Radius of Convergence of Power Series.

RECOMENDED BOOKS:

1. R. K. Jain and S. R. K. Iyenger, Advanced Engineering Mathematics, Narosa Publishing House, New Delhi.
2. E. Kreyzic, Advanced Engineering Mathematics,Johan Wiley & Sons.
3. H. K. Dass, Advanced Engineering Mathematics, S. Chand and Company.
4. B. S. Grewal, Higher Engineering Mathematics, Khanna Publisher.

Scheme of Examination

- English will be the medium of instruction and examination.
- This course will carry 100 marks of which 50 marks shall be reserved for Internal Assessment and remaining 50 marks for external end semester examination.
- The duration of final written examination of this paper shall be of three hours.
- The students shall be declared passed in the paper if he/she secures minimum 40% marks in each of the Internal Assessment and External Examinations separately.

Instructions to the External Paper Setter

- The External Paper will carry 50 marks and would be of three hours. The Question paper will be divided into three Sections, namely Section-A, Section-B and Section-C. There will be FIVE questions in each of the Sections A and B, of five (05) marks each. However, a question may be segregated into subparts. Section C is compulsory and contains TEN (10) sub-parts each of two (2) marks. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A& B.
- The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
- The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.

First Year Theory Elective:

BAS--104 APPLIED PHYSICS – II

L	T	P	Credits
3	1	0	3.5

Course Objective:

The main objective is to provide advanced skills to deal with vector algebra in physics, electromagnetic waves, special theory of relativity, probability & statistics, crystal systems. The knowledge of these skills is essential to apply the laws of physics to various engineering problems. At the end of the course, students will study some advanced forms of materials such as dielectrics, superconductors, nano-materials.

Section A

Scalar and vector fields, Gradient, divergence and curl, Gauss divergence theorem, Stoke's theorem, Poisson's and Laplace equations. Inadequacy of Ampere's law and Maxwell equations (differential and integral form), wave equation for a perfect dielectric medium, transverse nature of em waves, solution of em wave equation for free space conditions, relation between electric and magnetic field vectors, wave equation for conducting media, sinusoidal time variations, wave propagation in dielectric and conducting media, response of medium to em waves, penetration depth, Poynting theorem.
Postulates of special theory of relativity, Galilean transformations, relativity of time and length, Lorentz transformations, relativity of mass, relativistic energy, introductory idea of global positioning system (GPS).

Section B

Crystal systems, lattice parameters, closed pack structures, packing fraction for SC, BCC, FCC and hexagonal close pack structure, diamond structure, Miller indices, Bragg's law and structure determination based on XRD techniques (qualitative ideas), crystal defects (zero, one, two and three dimensions).
Semiconductors: Energy band theory of solids (qualitative idea), semiconductors, intrinsic and extrinsic semiconductors, electrical properties of semiconductors, effect of temperature on semiconductors, p-n junction diode, Zener diode, tunnel diode, photo diode, photovoltaic effect, Light emitting diode
Superconductors: Effects of magnetic field, Meissner effect, critical currents, Type-I & II superconductors, Entropy and Specific heat, Isotope effect, Cooper pair and BCS theory (qualitative ideas), Applications of superconductors.

Recommended Books:

1. Berkley physics course Volume-II; Electricity & Magnetism (Indian edition).
2. Electromagnetic waves and radiating systems by Jordan and Balmain (PHI, India)
3. Solid state Physics by O.P. Pillia (New Age International)
4. Physics for Engineering Applications by S. Puri (Narosa Publishers).

Scheme of Examination

- English will be the medium of instruction and examination.
- This course will carry 100 marks of which 50 marks shall be reserved for Internal Assessment and remaining 50 marks for external end semester examination.
- The duration of final written examination of this paper shall be of three hours.
- The students shall be declared passed in the paper if he/she secures minimum 40% marks in each of the Internal Assessment and External Examinations separately.

Instructions to the External Paper Setter

- The External Paper will carry 50 marks and would be of three hours. The Question paper will be divided into three Sections, namely Section-A, Section-B and Section-C. There will be FIVE questions in each of the Sections A and B, of five (05) marks each. However, a question may be segregated into subparts.Section C is compulsory and contains TEN (10) sub-parts each of two (2) marks. Candidates will be required to attempt SIX questions by selecting three Questions from each Sections A& B.
- The maximum limit on numerical problems to be set in the paper is 35%.
- The paper setter shall provide detailed marking instructions and solutions to numerical problems for evaluation purpose in the separate white envelopes provided for solutions.
- The paper setters should seal the internal & external envelope properly with signatures & cello tape at proper place.
- Use of non-programmable calculator shall be specified clearly if required.

First Year Theory Elective:

ECE--110 PYTHON PROGRAMMING

L	T	P	Credits
3	1	0	3.5

Course Objectives:

- Develop a basic understanding of the Python programming language.
- Learn various object types.
- Learn Numpy module for scientific computing.
- Learn to work with various type of data and convert it into meaningful information.
- Learn to visualize the data.

SECTION – A

Introduction to Python: Python features, Type basics (Integer numbers, Complex numbers, Boolean numbers), Functions (Basic functions, local variables, global variables, variable scope, lambda functions), Loops, Flow Control Structures, Shared references, classes & objects.

Object types: Lists (Basic list operations, List iteration and comprehension, indexing, slicing, matrices), Dictionaries (Basic dictionary operations), Tuples (Basic tuple operations).

NumPybasics: Arithmetic with Numpy Arrays, Reshaping Arrays, Indexing, Slicing, Vectors and Matrices, Solving a Linear System.

SECTION – B

Pandas: Creating Series objects, Series attributes (index, values, dtype, isunique, ndim, shape, size), Series methods (sort_values, sort_index, count, describe, idxmax, idxmin, value_counts, head, tail), inplace parameter, Data Frame, Read data from csv file, Extracting columns from dataframe, Dataframe methods (sort_values, sort_index, astype, loc and iloc), Delete rows and columns from a dataframe, Broadcasting, Handling values (Null, Missing, Duplicate and Categorical), import excel file into pandas.

Visualization: Using Matplotlib package, Creating Figures and Subplots, Creating charts (Line Chart, Scatter Chart, Bar chart, Pie chart, Box plot), Labels, Titles, Legends.

Recommended Books

1. Mark Lutz, “Learning Python”, 5th edition, O’Reilly.
2. Zed Shaw, “Learn Python the hard way”, 3rd edition, Pearson.
3. Eli Bresseert, “Scipy and Numpy”, O’Reilly.
4. William Mckinney, “Python for Data Analysis:Data wrangling with Pandas, NumPy, and Ipython”, 2nd edition, O’Reilly.
5. Phuong Vo.T.H, “Python: Data Analytics and Visualization”, Packt.

MCE--151 ENGINEERING GRAPHICS

L	T	P	Credits
2	4	0	4.0

Course Objective:

The objective of this course is to inculcate good understanding of basic fundamentals of engineering graphics in the students. This course is aimed at to make the student understand visual science in the form of technical graphics. General instructions related to Theory of Orthographic Projection of points, lines, planes and solids as per the BIS codes prevalent to drawing practice will be introduced initially. Section of solids, intersection and development of surfaces, isometric projection and orthographic projection of simple solids/blocks will further upgrade the basic understanding and visualization of geometrical objects and to certain extent the machine parts.

At the end of the course, the students should be able to - (1) acquire knowledge of different conventions and methods of engineering drawing, (2) understand dimensioned projections, (3) learn how to create two-dimensional images of objects using first angle orthographic projection, (4) learn how to create isometric, perspective and auxiliary projections.

Section-A

Lines, Lettering, Dimensioning, Scales; Reference and Auxiliary Planes; Systems of Orthographic Projections; Projection of Points and Lines; True length of lines and their true angles of inclination with the reference planes; Projection of Planes and their true shape.
Polyhedral and Solids of Revolution; Projection of Solids in simple positions: Axis parallel to both the reference planes, parallel or perpendicular to one and inclined to the other or inclined to both the reference planes.
Section of solids: Section Planes, Sections and projection of sections on the reference planes; True shape of sections of simple solids.

Section-B

Development of lateral surfaces of simple solids such as cubes, prisms, cylinders, pyramids, cones, spheres etc. Intersection of lateral surfaces of simple solids penetrating into one another; Projection of lines/curves of intersection/interpenetration on the reference planes.
Isometric axes, lines and planes; Isometric scale; Drawing/Sketching isometric view of planes, plane figures and simple solids from orthographic projections; Conversion of pictorial view of simple solids into orthographic projections.

Recommended Books:

1. P.S. Gill, A Text Book of Engineering Drawing (Geometrical Drawing), S.K. Kataria & Sons, New Delhi.
2. Dhananjay A. Jolhe, Engineering Drawing with an Introduction to Autocad, Tata McGraw Hill, New Delhi
3. M.B. Shah and B.C. Rana, Engineering Drawing, Pearson Education Asia, New Delhi
4. Basant Agrawal and C.M. Agrawal, Engineering Drawing, Tata McGraw Hill, New Delhi
5. French and Virck, Graphic Science, McGraw Hill Publishers, New York.
6. R. K. Dhawan, A text book of Engineering Drawing, S. Chand and Co. Ltd., New Delhi
7. N. D. Bhatt and V. M. Panchal, Engineering Drawing, Charotor Publication House, Anand
8. Venugopal, Engineering Drawing and Graphics, New Age International Publishers, New Delhi.

BAS--153 APPLIED CHEMISTRY LAB

L	T	P	Credits
0	0	2	1.0

Course Objective:

The objectives of this paper is to develop the skill to identify the problem, analyze and solve it. Learn how to cope up and upgrade with the continuous flow of new technologies and also to educate students with strong background so that they will fulfill the needs and expectations of scientific and industrial communities.

List of Experiments

1. To determine the strength of a given acid by titrating with N/10 NaOH, conductometerically.
2. To determine the strength of a given acid by titrating with N/10 NaOH, pH metrically.
3. To verify Beer's law and to find the concentration of an unknown solut- ion using colorimeter/ Uv-Vis spectrophotometer.
4. To estimate the strength of the given HCl solut ion by titrating with N/10 NaOH potentiometrically using Quinhydrone as the indicator electrode.
5. To determine the amount of Fe^{2+} ions in the given sample of Mohr salt provided with N/20 oxalic acid.
6. To determine the composition of a mixture of acid (HCl + Oxalic acid).
7. To determine the composition of a mixture of bases (NaOH + Na_2CO_3).
8. To determine the copper content in a given sample Iodometrically.
9. Preparation of Urea/formaldehyde and Phenol/formaldehyde resin.
10. To determine the total hardness of water by EDTA method.
11. Determination of coefficient of viscosity of given liquid by using Ostwald viscometer.
12. Determine the CMC of a soap/surfactant by conductometric measurements.
13. Analysis of organic compounds (Aspirin) by Gas Chromatography.

Scheme of Examination

1. English will be the medium of intstructions and examinations.
2. This course will carry 100 marks of which 50 marks shall be reserved for the internal assessment and remaining 50 marks for external end semester examination.
3. The duration of final written examination of this paper shall be of two hours.
4. The students shall be declared passed in the paper if he/she secures minimum 40% marks in aggregates.

CPE--101 Computer Programming

L	T	P	Credits
3	1	0	3.5

Section A

Number System: Bit, Byte, Binary, Decimal, Hexadecimal and Octal System, Conversion from one System to another.
Binary Arithmetic: Addition, Subtraction and Multiplication.
Introduction to Computer Language: Machine Language, Assembly Language, Higher Level Language, Assembler, Compiler, Interpretter.
Introduction to Operating System: Batch Systems, Multiprogramming, Time sharing Systems, Real Time Systems, Network Operating System and Distributed Operating System.

Introduction to C: Concepts of Procedure oriented programming, Character Set, Identifiers, Keywords and Data types and storage classes.
Operators and Expressions: Arithmetic, Unary, Logical, Relational, Assignment and Conditional Operator, Associatively and Precedence of Operators
Control Structures: If, while, do-while and for loop, Nested Control Structure, Switch-case, break and Continue statements

Section B

Arrays: Single Dimensional, Multidimensional Arrays and Pointers, String reading/writing
Functions: Types of Functions, Call by Value and Call by reference, Recursion, Structures. File processing: Opening and closing data files, simple writing and reading in unformatted data files.

Object Oriented Concepts: Comparison between C and C++, structure of C++ Program, Basic Input/Output statements, introduction to Classes and Objects, creating a class and object, accessing class members (private, public), C++ Fundamentals Concepts (Definition with example) of : Encapsulation, Function Overloading, Single level Inheritance, Polymorphism and Friend Functions.

Note: This subject is common to all branches. Only basics of C++ is covered

Recommended Books:

1. E. Balagurusamy, “Programming in C”, Tata McGraw Hill
2. Yashwant Kanetkar, “Let Us C”, BPB
3. B. Ram, “Computer Fundamentals”, Wiley
4. P.K.Sinha, “Computer Fundamentals”.
5. V. Rajaraman, “ Fundamentals of Computers”, PHI
6. Brain W. Kernigha and Dennis M. Richie: The C Programming Language, PHI
7. Robert Lafore, “Turbo C++”
8. E. Balagurusamy, “Programming in C++”, Tata McGraw Hill

MCE--102 MANUFACTURING PROCESSES

L	T	P	Credits
3	0	0	3.0

Course Objective:

The objective of this course is to have a good understanding the basic concepts of manufacturing via engineering materials, casting, machining, forming, joining, welding and assembly, enabling the students to develop a basic knowledge of the mechanics, operation and limitations of basic machining tools. The course also introduces the concept of basic carpentry operations.

At the end of the course, the students should be able to - (1) demonstrate the capability of selecting suitable manufacturing processes to manufacture the products optimally, (2) ability to clear basic fundamental concepts of machining, welding, casting, forming processes (3) selecting or suggesting suitable manufacturing processes to achieve the required products with the aim of avoiding material and time wastage.

Section – A

Introduction: Common engineering materials and their important mechanical and manufacturing properties. General classification of manufacturing processes, Importance of manufacturing processes, economics and selection of manufacturing processes.

Metal Casting**:** Principles of metal casting, casting terminology, Patterns, their functions, types, materials and pattern allowances, Characteristics of molding sand, Types of sand molds, Types of cores, chaplets and chills; their materials and functions. Casting Defects, their causes and remedies.

Machining Processes: Principles of metal cutting, cutting tool materials and applications, types of single point cutting tools. Geometry of single point cutting tool. Cutting fluids and their functions, types of cutting fluids, selection of cutting fluids.

Machine Tools: Introduction to Centre Lathe, parts of a lathe, lathe attachments, Operations performed on lathe, work holding devices in Lathes.

Section – B

Introduction to shaper and planner machines, their operations. Introduction to multipoint cutting tools. Introduction to milling and milling operations, Drilling and allied operations, Sawing operations.

Welding & Allied Joining Processes: Welding classification, types of welding electrodes,functions of flux and types of welding joints. Elements of Electric arc, Gas, Resistance and Thermit welding.Soldering, Brazing and Braze welding, Submerged arc welding (SAW). Applications of various welding processes. Welding defects, their causes and remedies.

Metal Forming and Shearing: Hot and cold working, Types of Forging processes. Rolling, Wire drawing and extrusion processes, drawing, bending, spinning, stretching, embossing and coining. Die and punch operation, shearing, piercing and blanking, notching, lancing, bending and deep drawing operations.

Carpentry Operations: Woods and their types, seasoning of wood, types of joints.

Recommended Books

1. Degramo, Kohser and Black. Materials and Processes in Manufacturing, 8thEdition, Prentice Hall of India, New Delhi.
2. Amstead Ostwald, and Bageman, Manufacturing Processes, John Wiley and sons, New Delhi.
3. Campbell, Principles of Manufacturing, Materials and Processes, Tata Macgraw HillCompany
4. Kalpakjian, S. and Schemid, S.R., Manufacturing Engineering & Technology,Prentice Hall, New York.
5. Groover, M.P., Fundamentals of Modern manufacturing: Materials, Processes andSystems, John Wiley and Sons Inc., New York.
6. B. S. Raghuwanshi, Workshop Technology (Part – I & II), DhanpatRai and Co., New Delhi.
7. Singh, Manufacturing Technology, Pearson Education Asia, New Delhi.
8. Khanna, O.P. and Lal, M., A Text Book of Production Technology, DhanpatRaiPublication, New Delhi.

CPE--151 COMPUTER PROGRAMMING LAB

L	T	P	Credits
0	0	2	1.0

List of Experiments

1. Experiencing DOS internal and external commands.
2. Introducing 'C' language basics such as data types, variables, constants etc.
3. Working with operators (Arithmetic, logical and relational).
4. Write a program showing input and output functions.
5. Write a program to illustrate decision control structures.
6. Write program using looping control structures.
7. Write applications based on one and two dimensional arrays.
8. Working with pointers.
9. Write a program showing array and pointer relationship.
10. Illustrate functions and recursion.
11. Show the use of pointers in functions.
12. Write a program to show the use of functions with arrays.
13. Write a program based on structure and using union.
14. Use the pointer to point to structure.
15. Use the structures with functions.
16. Illustrate the file handling.
17. Write program to illustrate C++ program structure.
18. Write program to illustrate the use of classes and objects.
19. Write program to illustrate the concept of inheritance.
20. Write program to illustrate the concept of polymorphism.

MCE--152 MANUFACTURING PROCESSES LAB

L	T	P	Credits
0	0	3	1.5

List of Experiments

1. Machine Shop: Six in one job in Machine Shop (involving turning, step cutting, threading, grooving, taper turning, knurling, drilling and tapping).
2. Fitting Shop: L – Cutting from square piece in fitting shop (involving squaring, L – cutting and squaring, drilling, tapping, reaming)
3. Sheet Metal Shop: Layout marking, cutting/shearing, bending in box shape with drilling and Riveting
4. Carpentry Shop: Cross and Lap joints, T – Joint
5. Welding Shop: Butt Welding / Gas welding, Soldering.
6. Foundry Shop: Moulding of Flange, Moulding of Core and casting of pipe.
7. Smithy Shop: Poker, Circular Ring.

ECE--153 ELECTRICAL AND ELECTRONICS LAB

L	T	P	Credits
0	0	2	1.0

Objective: The educational objective of the **Electrical and Electronics Lab** is to provide student the basic engineering knowledge by way of electrical and electronic devices and components.

List of Experiments

1. Identification and familiarization with the basic tools used in lab.
2. Familiarization and testing of Resistance, Capacitor & Inductors.
3. To study various types of switches such as normal/miniature toggle, slide, push button, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multiway Master Mains Switch.
4. To study various types of protective devices such as Wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, and thermal fuse, single/multiple circuit breakers, over and under current relays.
5. To get familiar with the working knowledge of the measuring instruments: a) Ammeter & Voltmeter b) Cathode ray oscilloscope (CRO) c) Multimeter (Analog and Digital)
6. To get familiar with the working knowledge of the following instruments: a) Signal generator b) Function generator c) Power supply.
7. Familiarization and testing of Diode, BJT & FET.
8. Use of diode as half wave and full wave rectifier.
9. To verify Kirchhoff's laws.
10. Verification of truth tables of logic gates.
11. Fabrication of Printed Circuit Board.
12. To learn soldering and desoldering techniques.

First Year Practical Elective:

BAS--154 APPLIED PHYSICS – II LAB

L	T	P	Credits
0	0	2	1.0

Course Objective:

The aim of Applied Physics – II Lab is to make the theoretical concepts more clear to the students through experiments. In the course of lab, students will learn the various phenomena related to electrical properties of matter such as determining the energy band gap of a semiconductor, studying the p-n junction and Zener diode characteristics, Hall effect, hysteresis loop, inverse square law of light using photocell etc. The experiments so conducted will be helpful to students in solving their engineering problems.

List of Experiments

1. To determine Planck's Constant using photocell apparatus.
2. To determine the velocity of Ultrasonics in water.
3. To find the Energy Band Gap of a semiconductor using Four Probe Method.
4. To study the Hall Effect and measure Charge Density and Carrier Mobility.
5. To find the e/m ratio by long Solenoid method.
6. To study the p-n junction characteristics.
7. To study the Zener diode characteristics.
8. To study the Hysteresis loses for a given sample using a Loop Tracer.
9. To determine the beam spot size and intensity distribution for a He -Ne Laser.
10. To verify the Inverse Square Law of light using photocell.

Scheme of Examination

- English will be the medium of instruction and examination.
- This course will carry 100 marks of which 50 marks shall be reserved for Internal Assessment and remaining 50 marks for external end semester examination.
- The duration of final written examination of this paper shall be of two hours.
- The students shall be declared passed in the paper if he/she secures minimum 40% marks in the Internal Assessment and end semester external examinations collectively.

Instructions to the Paper Setter

- The External Paper will carry 50 marks and would be of two hours.

Use of non-programmable calculator shall be specified clearly if required.

First Year Practical Elective:

ECE--160 PYTHON PROGRAMMING LAB

L	T	P	Credits
0	0	2	1.0

Objective: The educational objective of **Python Programming Lab** is to provide student the basic programming knowledge and skill by the way of giving small programs.

List of Experiments:

1. Write a program to calculate the average of numbers in a given List.
2. Write a program to remove duplicate items from the List.
3. Write a program to sum all the items in a dictionary.
4. Write a program to create a function that finds the product of List elements. Also do the same operation using lambda functions.
5. Write a program to create a numpy array and retrieve the value from it using array index and slicing. Also reshape the 1-D array into 2-D array.
6. Write a program to extract data from a csv and excel file.
7. Write a program to select columns and rows from a data frame.
8. Write a program to handle missing data in a data frame using pandas library.
9. Write a program to plot a scatter graph for the data contained in two lists.
10. Write a program to create various charts for the given data.