

**Faculty of Engineering**  
**B.TECH and SIX YEAR INTEGRATED B. TECH-M.B.A. PROGRAM**  
**(COMMON FOR ALL BRANCHES CSE / ECE / ME / CIVIL)**

**(Batch 2016 Onwards)**  
**Session 2016-17**

**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
			<b>15</b>	<b>4</b>	<b>9</b>	<b>21.5</b>
<b>Total Contact Hours: 28</b>						

**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.	HSS 151	Communication Skills Lab *	0	0	2	1.0
7.	MCE 151	Engineering Graphics *	2	4	0	4.0
8.	BAS 151	Applied Physics – I Lab	0	0	2	1.0
9.	BAS 153	Applied Chemistry Lab *	0	0	2	1.0
			<b>16</b>	<b>9</b>	<b>6</b>	<b>23.5</b>
<b>Total Contact Hours: 31</b>						

\* BAS 103, BAS 153, HSS 101, HSS 151, 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, HSS 151, 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**

(Common for B.Tech. in Computer Science Engineering, Electronics and communication Engineering, Mechanical Engineering, Civil Engineering and Six Year Integrated B. Tech-M.B.A. Program.

**Applicable to 2016 Batches**

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

<b>Pattern of Question Paper</b>		
TITLE OF SUBJECT (CODE----)		
Bachelor of Technology (Branch)		
End Semester Exam		
TIME ALLOWED: 3 Hour		Roll. No.....
Maximum Marks: 50		
Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.		
<b>Section-A (From Section A of the syllabus)</b>		
Q1. ....		
Q2. ....		
Q3. ....		
Q4. ....		
Q5. ....		3x5
<b>Section-B (From Section B of the syllabus)</b>		
Q6. ....		
Q7. ....		
Q8. ....		
Q9. ....		
Q10. ....		3x5
<b>Section-C (From whole syllabus)</b>		
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 Scientific calculator should be clearly specified.

**CPE -101 Computer Programming**

L	T	P	Cr
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, 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, Associativity 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**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Section-A**

Kirchhoff's laws and their applications in solving electrical network problems, Star-delta 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, Induction motors (single phase)

**Recommended 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 B.L. Theraja "Basic Electrical Engineering Vol.-I", S.Chand & Company, New Delhi.
5. C.L.Wadhwa "Basic Electrical Engineering", New age international Publishers, New Delhi.

**MCE 102 MANUFACTURING PROCESSES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3.0</b>

**Section – A**

**Introduction:** Common engineering materials and their important mechanical and manufacturing properties. Importance of Manufacturing Processes, General classification 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.

**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, deep drawing operations.

**Section – B**

**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, introduction to multipoint cutting tools.

**Machine Tools:** Introduction to Centre Lathe, parts of a lathe, lathe attachments, operations performed on lathe, work holding in Lathes, introduction to shaping, planning, milling, drilling and allied operations, sawing operations.

**Welding & Allied Joining Processes:** Welding classification, Welding electrodes, functions of flux coatings. Elements of Electric arc, Gas, Resistance and Thermit welding, submerged arc welding. Soldering, Brazing and Braze welding.

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

**Recommended Books**

1. Degramo, Kohser and Black. Materials and Processes in Manufacturing, 8th Edition, Prentice Hall of India, New Delhi.
2. Amstead Ostwald, and Bageman, Manufacturing Processes, John Wiley and sons, N Delhi.
3. Campbell, Principles of Manufacturing, Materials and Processes, Tata Macgraw Hill Company
4. Kalpakjian, S. and Schemid, S.R., Manufacturing Engineering & Technology, Prentice Hall, New York.
5. Groover, M.P., Fundamentals of Modern manufacturing: Materials, Processes and Systems, 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**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Section A**

Simple harmonic motion: Differential equation, 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, Forced oscillations (qualitative ideas only).

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

Fraunhofer 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, dichroism, 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<sub>2</sub> 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.

Postulates of old quantum theory, wave functions and wave packets, time dependent and time independent Schrodinger wave equation, expectation value, application of Schrodinger equation to particle in an infinite potential box, particle in a finite potential well, potential barrier (tunneling effect), linear harmonic oscillator, elementary idea of quantum computing.

**Recommended Books**

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

**BAS-102 MATHEMATICS-I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Section-A**

**Functions of several variables:** Partial derivatives, Derivatives of composite and implicit functions. Homogeneous functions, Euler's Theorem. Taylor's Theorem. Maxima and Minima, Lagrange's method of multipliers. Multiple integrals.

**Matrix algebra:** Some special matrices (Hermitian matrices, Skew-Hermitian matrices, Unitary matrices, Orthogonal Matrices). Solutions of system of equations. Vector Spaces, subspaces. Linear dependence and independence of vectors. Dimensions and Basis. Linear Transformations and its matrix representation.

**Section-B**

**Improper Integrals:** Improper integrals of first kind, Improper integrals of second kind. Absolute convergence of improper integrals. Improper integrals involving a parameter. Beta and Gamma functions and their convergence.

**Complex Analysis:** Limit, Continuity and Derivatives of complex functions. Analytic functions. CR-equations, Laplace equation. Exponential, Trigonometric, Hyperbolic and Logarithmic functions.

**RECOMENDED BOOKS:**

1. Advanced Engineering Mathematics by R. K. Jain and S. R. K. Iyenger. (Narosa Publishing House).
2. Advanced Engineering Mathematics by E. Kreyzic. (Eighth Edition).

**CPE 151 COMPUTER PROGRAMMING LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**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**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**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.

**MCE 152 MANUFACTURING PROCESSES LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**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**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**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**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>2.5</b>

**Section – A**

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

**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, Resumè, 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.

**Recommended Books**

1. N Sundarajan, Business Communication, Sura College of Competition, Chennai.
2. Asha kaul, Business Communication, prentice hall of India, New Delhi.
3. Matthukutty M Monipaally, Business Communication Strategies, Tata McGraw –Hill Publishing Co., New Delhi
4. M V Rodrigues, Effective Business Communication, Concept Publishing Company, New Delhi
5. Prajapati Prasad, The Functional aspects of Communication Skills, S. K Kataria & Sons; New Delhi
6. Wren & Martin, High School English Grammar and Composition, S. Chand & Company Ltd., New Delhi
7. Wilfred D. Best, The Students' Companion, Harper collins

**ECE 101 BASIC ELECTRICAL ENGINEERING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Section-A**

Kirchhoff's laws and their applications in solving electrical network problems, Star-delta 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, Induction motors (single phase)

**Recommended 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 B.L. Theraja "Basic Electrical Engineering Vol.-I", S.Chand & Company, New Delhi.
5. C.L.Wadhwa "Basic Electrical Engineering", New age international Publishers, New Delhi.

**BAS 101 APPLIED PHYSICS – I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Section A**

Simple harmonic motion: Differential equation, 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, Forced oscillations (qualitative ideas only).

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

Fraunhofer 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, dichroism, 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<sub>2</sub> 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.

Postulates of old quantum theory, wave functions and wave packets, time dependent and time independent Schrodinger wave equation, expectation value, application of Schrodinger equation to particle in an infinite potential box, particle in a finite potential well, potential barrier (tunneling effect), linear harmonic oscillator, elementary idea of quantum computing.

**Recommended Books**

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

**BAS-102 MATHEMATICS-I**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Section-A**

**Functions of several variables:** Partial derivatives, Derivatives of composite and implicit functions. Homogeneous functions, Euler's Theorem. Taylor's Theorem. Maxima and Minima, Lagrange's method of multipliers. Multiple integrals.

**Matrix algebra:** Some special matrices (Hermitian matrices, Skew-Hermitian matrices, Unitary matrices, Orthogonal Matrices). Solutions of system of equations. Vector Spaces, subspaces. Linear dependence and independence of vectors. Dimensions and Basis. Linear Transformations and its matrix representation.

**Section-B**

**Improper Integrals:** Improper integrals of first kind, Improper integrals of second kind. Absolute convergence of improper integrals. Improper integrals involving a parameter. Beta and Gamma functions and their convergence.

**Complex Analysis:** Limit, Continuity and Derivatives of complex functions. Analytic functions. CR-equations, Laplace equation. Exponential, Trigonometric, Hyperbolic and Logarithmic functions.

**RECOMENDED BOOKS:**

1. Advanced Engineering Mathematics by R. K. Jain and S. R. K. Iyenger. (Narosa Publishing House).
2. Advanced Engineering Mathematics by E. Kreyzic. (Eighth Edition).

**BAS 103 APPLIED CHEMISTRY**

L	T	P	Credits
3	1	0	3.5

**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<sub>2</sub>-O<sub>2</sub>). 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  $\lambda_{\max}$  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  $M_n$  and  $M_w$  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  $w$ ,  $q$ ,  $\Delta E$ ,  $\Delta H$  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. D. S. Pavia, G.M. Lasmpman and G.S. Kriz : Introduction to spectroscopy, 4th Edition, Thomson learning, Indian Edition 2008.
4. Quantitaive analysis by A.I. Vogel
5. Glasstone, An Introduction to Electrochemistry.
6. J.C Kuericase & J Rajaram, Chemistry in Engineering & Technology, Tata McGraw Hill.
7. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prantice Hall, N.Delhi
8. Engineering Chemistry by P.C. Jain & Monica Jain Dhanpat Rai Publishers, New Delhi.

**HSS 151 COMMUNICATION SKILLS LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

1. Recognizing and articulating speech sounds, mock dialogue/conversation.
2. Making an oral presentation, class seminars, paper reading.
3. Participating in a group discussion.
4. Holding a mock meeting.
5. Developing skills related to Business Correspondence
6. Preparation for participating in a mock interview for a job etc.
7. Developing skills for conducting a meeting; attending telephonic calls.
8. Listening to a recorded conversation and reviewing/discussing its contents and style.

**MCE 151 ENGINEERING GRAPHICS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>2</b>	<b>4</b>	<b>0</b>	<b>4.0</b>

**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. French and Virck, Graphic Science, McGraw Hill Publishers, New York.
3. R. K. Dhawan, A text book of Engineering Drawing, S. Chand and Co. Ltd., New Delhi
4. N. D. Bhatt and V. M. Panchal, Engineering Drawing, Charotar Publication House, Anand
5. M.B. Shah and B.C. Rana, Engineering Drawing, Pearson Education Asia, New Delhi
6. Venugopal, Engineering Drawing and Graphics, New Age International Publishers, New Delhi

**BAS 151 APPLIED PHYSICS – I LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**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.

**BAS 153 APPLIED CHEMISTRY LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**List of Experiments**

1. To determine the strength of a given acid by titrating with N/10 NaOH, conductometrically.
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 solution 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  $\text{Fe}^{2+}$  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 +  $\text{Na}_2\text{CO}_3$ ).
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.

**Faculty of Engineering**  
**B.TECH and SIX YEAR INTEGRATED B. TECH-M.B.A. PROGRAM**  
**(COMMON FOR ALL BRANCHES CSE / ECE / ME / CIVIL)**

(Batch 2016 Onwards)  
Session 2016-17

**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 104	Applied Physics – II	3	1	0	3.5
5.	BAS 105	Applied Mathematics – II	3	1	0	3.5
6.	HSS 151	Communication Skills Lab *	0	0	2	1.0
7.	MCE 151	Engineering Graphics *	2	4	0	4.0
8.	BAS 153	Applied Chemistry Lab *	0	0	2	1.0
9.	BAS 154	Applied Physics – II Lab	0	0	2	1.0
			<b>16</b>	<b>9</b>	<b>6</b>	<b>23.5</b>
<b>Total Contact Hours: 31</b>						

**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 104	Applied Physics – II	3	1	0	3.5
5.	BAS 105	Applied Mathematics – II	3	1	0	3.5
6.	CPE 151	Computer Programming Lab *	0	0	2	1.0
7.	BAS 154	Applied Physics – II 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
			<b>15</b>	<b>4</b>	<b>9</b>	<b>21.5</b>
<b>Total Contact Hours: 28</b>						

\* BAS 103, BAS 153, HSS 101, HSS 151, 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, HSS 151, 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**

(Common for B.Tech. in Computer Science Engineering, Electronics and communication Engineering, Mechanical Engineering, Civil Engineering and Six Year Integrated B. Tech-M.B.A. Program.

**Applicable to 2016 Batches**

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

<b>Pattern of Question Paper</b>	
TITLE OF SUBJECT (CODE----)	
Bachelor of Technology (Branch)	
End Semester Exam	
TIME ALLOWED: 3 Hour	Roll. No.....
Maximum Marks: 50	
Note:- Section C is compulsory. Attempt any six questions selection three questions from each section A & B.	
<b>Section-A (From Section A of the syllabus)</b>	
Q1. ....	
Q2. ....	
Q3. ....	
Q4. ....	
Q5. ....	3x5
<b>Section-B (From Section B of the syllabus)</b>	
Q6. ....	
Q7. ....	
Q8. ....	
Q9. ....	
Q10. ....	3x5
<b>Section-C (From whole syllabus)</b>	
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 Scientific calculator should be clearly specified.

**HSS 101 COMMUNICATION SKILLS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>2</b>	<b>1</b>	<b>0</b>	<b>2.5</b>

**Section – A**

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

**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, Resumè, 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.

**Recommended Books:**

1. N Sundarajan, Business Communication, Sura College of Competition, Chennai.
2. Asha kaul, Business Communication, prentice hall of India, New Delhi.
3. Matthukutty M Monipaally, Business Communication Strategies, Tata McGraw –Hill Publishing Co., New Delhi
4. M V Rodrigues, Effective Business Communication, Concept Publishing Company, New Delhi
5. Prajapati Prasad, The Functional aspects of Communication Skills, S. K Kataria & Sons; New Delhi
6. Wren & Martin, High School English Grammar and Composition, S. Chand & Company Ltd., New Delhi
7. Wilfred D. Best, The Students' Companion, Harper collins

**ECE 102 BASIC ELECTRONICS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**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 Operation of PNP and NPN transistor, V-I characteristics, CB, CE and CC configuration, Basic BJT Amplifiers. Introductory idea of multistage & feedback amplifiers. Biasing- Base bias, emitter feedback bias, collector voltage divider bias junction

FET- Introduction, V-I characteristics and operation, MOSFET- 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, Error detection and correction codes. Introduction and truth tables, Flip Flops and the truth tables; R-S, J-K, D and T. Introduction to Encoders, Decoders, Multiplexers, Demultiplexer, Application of Encoders, Decoders, MUX, DEMUX.

Introduction to communication system, General block diagram, need for communication, need of modulation, Modulation-AM FM,PM. Comparison of AM and FM. Demodulation or Detector- AM detector, FM detector. Block diagram of radio transmission and reception system and function of each block.

**Note for paper setter:** This paper is common to all branches. So basic introductory concepts have been covered.

**Recommended 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

**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<sub>2</sub>-O<sub>2</sub>). 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  $\lambda_{\max}$  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  $M_n$  and  $M_w$  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  $w$ ,  $q$ ,  $\Delta E$ ,  $\Delta H$  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. D. S. Pavia, G.M. Lasmpman and G.S. Kriz : Introduction to spectroscopy, 4th Edition, Thomson learning, Indian Edition 2008.
4. Quantitaive analysis by A.I. Vogel
5. Glasstone, An Introduction to Electrochemistry.
6. J.C Kuericase & J Rajaram, Chemistry in Engineering & Technology, Tata McGraw Hill.
7. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prantice Hall, N.Delhi
8. Engineering Chemistry by P.C. Jain & Monica Jain Dhanpat Rai Publishers, New Delhi.

**BAS 104 APPLIED PHYSICS – II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**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), conditions at a boundary surface, 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, concept of simultaneity, relativity of time and length, Lorentz transformations, velocity transformations, relativity of mass, relativistic momentum and energy, introductory idea of global positioning system (GPS).

**Section B**

Concept of probability, Macro-states and micro-states, Phase space, Classification of statistics, Maxwell-Boltzmann statistics and its application to an ideal gas, Quantum statistics: Bose-Einstein statistics and its application to black body radiation spectrum, Fermi-Dirac statistics, electron density of states and Fermi energy. Crystal systems, lattice parameters, closed pack structures, Miller indices, crystals directions and planes, diamond structure, Bragg's law and structure determination based on XRD techniques (qualitative ideas). Dielectric materials: Different polarisation mechanisms, Clausius-Mosotti relation, temperature and frequency effects, electric breakdown, ferroelectrics. Superconductors: Effects of magnetic field, Meissner effect, critical currents, Type-I & II superconductors, Entropy and Specific heat, Isotope effect, London equations, Cooper pair and BCS theory (qualitative ideas), Applications of superconductors. Elementary ideas of nano-particles (Fullerenes, carbon nano tubes, porous silicon and aerogels).

**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).

**BAS-105 MATHEMATICS-II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Section-A**

**Differential Equations:** Basic concepts and ideas. Separable Differential Equations, Exact Differential Equations, Integrating Factors, Linear Differential Equations, Bernoulli's Differential Equations, Homogeneous linear equations of second order, Euler-Cauchy equations. Wronskian. Solution by Undetermined Coefficients and Variation of Parameters. Higher order linear Differential Equations, Higher order homogeneous equations with constants coefficients. Higher order non-homogeneous equations.

**Sequence and Series:** Infinite sequences, Real sequences, complex sequences and sequences of functions, Cauchy convergence criterion. Infinite series and their convergence. Power series, Taylor series and Laurent series.

**Section-B**

**Series Solutions of Differential Equations:** Power series method; Legendre's Equation. Legendre's Polynomial  $P_n(x)$ . Orthogonal Functions. Frobenius Methods; Bessel's Equation.

**Laplace Transform and Fourier Series:** Laplace Transform, Inverse Laplace Transform. Linearity Property, Unit step functions. First and Second Shifting Theorem. Transform of Derivatives and Integrals. Dirac delta function. Convolution Theorem. Application of Laplace Transform to solve Differential Equations, System of Differential Equations, Integral Equations. Fourier Series, Euler formula. Change of intervals. Fourier Series of Even and Odd functions. Half-Range series expansion.

**RECOMENDED BOOKS:**

1. Advanced Engineering Mathematics by R. K. Jain and S. R. K. Iyenger. (Narosa Publishing House).
2. Advanced Engineering Mathematics by E. Kreyzic. (Eighth Edition).

**HSS 151 COMMUNICATION SKILLS LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

1. Recognizing and articulating speech sounds, mock dialogue/conversation.
2. Making an oral presentation, class seminars, paper reading.
3. Participating in a group discussion.
4. Holding a mock meeting.
5. Developing skills related to Business Correspondence
6. Preparation for participating in a mock interview for a job etc.
7. Developing skills for conducting a meeting; attending telephonic calls.
8. Listening to a recorded conversation and reviewing/discussing its contents and style.

**MCE 151 ENGINEERING GRAPHICS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>2</b>	<b>4</b>	<b>0</b>	<b>4.0</b>

**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. French and Virck, Graphic Science, McGraw Hill Publishers, New York.
3. R. K. Dhawan, A text book of Engineering Drawing, S. Chand and Co. Ltd., New Delhi
4. N. D. Bhatt and V. M. Panchal, Engineering Drawing, Charotar Publication House, Anand
5. M.B. Shah and B.C. Rana, Engineering Drawing, Pearson Education Asia, New Delhi
6. Venugopal, Engineering Drawing and Graphics, New Age International Publishers, New Delhi

**BAS 153 APPLIED CHEMISTRY LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**List of Experiments**

1. To determine the strength of a given acid by titrating with N/10 NaOH, conductometrically.
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 solution 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<sup>2+</sup> 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<sub>2</sub>CO<sub>3</sub>).
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.

**BAS 154 APPLIED PHYSICS – II LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**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 losses 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.

**CPE -101 Computer Programming**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
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, 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, Associativity 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 102 BASIC ELECTRONICS ENGINEERING**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**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 Operation of PNP and NPN transistor, V-I characteristics, CB, CE and CC configuration, Basic BJT Amplifiers. Introductory idea of multistage & feedback amplifiers. Biasing- Base bias, emitter feedback bias, collector voltage divider bias junction

FET- Introduction, V-I characteristics and operation, MOSFET- 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, Error detection and correction codes. Introduction and truth tables, Flip Flops and the truth tables; R-S, J-K, D and T. Introduction to Encoders, Decoders, Multiplexers, Demultiplexer, Application of Encoders, Decoders, MUX, DEMUX.

Introduction to communication system, General block diagram, need for communication, need of modulation, Modulation-AM FM,PM. Comparison of AM and FM. Demodulation or Detector- AM detector, FM detector. Block diagram of radio transmission and reception system and function of each block.

**Note for paper setter:** This paper is common to all branches. So basic introductory concepts have been covered.

**Recommended 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

**MCE 102 MANUFACTURING PROCESSES**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3.0</b>

**Section – A**

**Introduction:** Common engineering materials and their important mechanical and manufacturing properties. Importance of Manufacturing Processes, General classification 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.

**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, deep drawing operations.

**Section – B**

**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, introduction to multipoint cutting tools.

**Machine Tools:** Introduction to Centre Lathe, parts of a lathe, lathe attachments, operations performed on lathe, work holding in Lathes, introduction to shaping, planning, milling, drilling and allied operations, sawing operations.

**Welding & Allied Joining Processes:** Welding classification, Welding electrodes, functions of flux coatings. Elements of Electric arc, Gas, Resistance and Thermit welding, submerged arc welding. Soldering, Brazing and Braze welding.

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

**Recommended Books:**

1. Degramo, Kohser and Black. Materials and Processes in Manufacturing, 8th Edition, Prentice Hall of India, New Delhi.
2. Amstead Ostwald, and Bageman, Manufacturing Processes, John Wiley and sons, N Delhi.
3. Campbell, Principles of Manufacturing, Materials and Processes, Tata Macgraw Hill Company
4. Kalpakjian, S. and Schmid, S.R., Manufacturing Engineering & Technology, Prentice Hall, New York.
5. Groover, M.P., Fundamentals of Modern manufacturing: Materials, Processes and Systems, 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 104 APPLIED PHYSICS – II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**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), conditions at a boundary surface, 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, concept of simultaneity, relativity of time and length, Lorentz transformations, velocity transformations, relativity of mass, relativistic momentum and energy, introductory idea of global positioning system (GPS).

**Section B**

Concept of probability, Macro-states and micro-states, Phase space, Classification of statistics, Maxwell-Boltzmann statistics and its application to an ideal gas, Quantum statistics: Bose-Einstein statistics and its application to black body radiation spectrum, Fermi-Dirac statistics, electron density of states and Fermi energy.

Crystal systems, lattice parameters, closed pack structures, Miller indices, crystals directions and planes, diamond structure, Bragg's law and structure determination based on XRD techniques (qualitative ideas).

Dielectric materials: Different polarisation mechanisms, Clausius-Mosotti relation, temperature and frequency effects, electric breakdown, ferroelectrics.

Superconductors: Effects of magnetic field, Meissner effect, critical currents, Type-I & II superconductors, Entropy and Specific heat, Isotope effect, London equations, Cooper pair and BCS theory (qualitative ideas), Applications of superconductors.

Elementary ideas of nano-particles (Fullerenes, carbon nano tubes, porous silicon and aerogels).

**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).

**BAS-105 MATHEMATICS-II**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>3</b>	<b>1</b>	<b>0</b>	<b>3.5</b>

**Section-A**

**Differential Equations:** Basic concepts and ideas. Separable Differential Equations, Exact Differential Equations, Integrating Factors, Linear Differential Equations, Bernoulli's Differential Equations, Homogeneous linear equations of second order, Euler-Cauchy equations. Wronskian. Solution by Undetermined Coefficients and Variation of Parameters. Higher order linear Differential Equations, Higher order homogeneous equations with constants coefficients. Higher order non-homogeneous equations.

**Sequence and Series:** Infinite sequences, Real sequences, complex sequences and sequences of functions, Cauchy convergence criterion. Infinite series and their convergence. Power series, Taylor series and Laurent series.

**Section-B**

**Series Solutions of Differential Equations:** Power series method; Legendre's Equation. Legendre's Polynomial  $P_n(x)$ . Orthogonal Functions. Frobenius Methods; Bessel's Equation.

**Laplace Transform and Fourier Series:** Laplace Transform, Inverse Laplace Transform. Linearity Property, Unit step functions. First and Second Shifting Theorem. Transform of Derivatives and Integrals. Dirac delta function. Convolution Theorem. Application of Laplace Transform to solve Differential Equations, System of Differential Equations, Integral Equations. Fourier Series, Euler formula. Change of intervals. Fourier Series of Even and Odd functions. Half-Range series expansion.

**RECOMENDED BOOKS:**

1. Advanced Engineering Mathematics by R. K. Jain and S. R. K. Iyenger. (Narosa Publishing House).
3. Advanced Engineering Mathematics by E. Kreyzic. (Eighth Edition).

**CPE 151 COMPUTER PROGRAMMING LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**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 154 APPLIED PHYSICS – II LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**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 losses 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.

**MCE 152 MANUFACTURING PROCESSES LAB**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**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**

<b>L</b>	<b>T</b>	<b>P</b>	<b>Credits</b>
<b>0</b>	<b>0</b>	<b>2</b>	<b>1.0</b>

**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.  
To learn soldering and desoldering techniques.