# Curriculum and Syllabus for BTech IT

## Under AEC Autonomy

# B.Tech. in Information Technology

## (Effective from 2024-2025 Admission Batch)



# Asansol Engineering College

## (Affiliated to Maulana Abul Kalam Azad University of Technology)

| Sl. No. | Broad Category | Category | Course Code | Course Title | L | T | P | Total | Credits |
|---|---|---|---|---|---|---|---|---|---|
| 1st Year 1st Semester |||||||||| |

| Sl. No. | Broad Category | Category | Course Code | Course Title | Hours per week | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Total | |
| **A. THEORY** |||||||||| |
| 1 | ENGG | Major | IT101 | Programming for Problem Solving | 3 | 0 | 0 | 3 | 3 |
| 2 | ENGG | Minor | EE(IT)101 | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | 3 |
| 3 | SCI | Multidisciplinary | M(IT)101 | Engineering Mathematics - I | 3 | 0 | 0 | 3 | 3 |
| 4 | SCI | Multidisciplinary | PH(IT)101 | Engineering Physics - I | 3 | 0 | 0 | 3 | 3 |
| 5 | HUM | Value Added Course | HU104 | Environmental Science | 2 | 0 | 0 | 2 | 2 |
| 6 | HUM | Value Added Course | HU105 | Indian Knowledge System | 1 | 0 | 0 | 1 | 1 |
| **B. PRACTICAL** |||||||||| |
| 1 | ENGG | Major | IT191 | Programming for Problem Solving Lab | 0 | 0 | 3 | 3 | 1.5 |
| 2 | ENGG | Minor | EE(IT)191 | Basic Electrical and Electronics Engineering Lab | 0 | 0 | 3 | 3 | 1.5 |
| 3 | SCI | Skill Enhancement Course | PH(IT)191 | Engineering Physics - I Lab | 0 | 0 | 3 | 3 | 1.5 |
| 4 | HUM | Ability Enhancement Course | HU(IT)191 | Technical Seminar Presentation | 0 | 0 | 2 | 2 | 1 |
| 5 | ENGG | Skill Enhancement Course | ME(IT)191 | Engineering Graphics and Design Lab | 0 | 0 | 3 | 3 | 1.5 |
| Total of Theory, Practical | | | | | | | | 29 | 22 |

*HUM: Humanities; ENGG: Engineering; SCI: Science*

| Sl. No. | Broad Category | Category | Course Code | Course Title | Hours per week | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Total | |
| **A.THEORY** | | | | | | | | | |
| 1 | ENGG | Major | IT201 | Data Structure and Algorithm | 3 | 0 | 0 | 3 | 3 |
| 2 | SCI | Multidisciplinary | CH(IT)201 | Engineering Chemistry | 2 | 0 | 0 | 2 | 2 |
| 3 | SCI | Multidisciplinary | M(IT)201 | Engineering Mathematics - II | 3 | 0 | 0 | 3 | 3 |
| 4 | HUM | Ability Enhancement Course | HU201 | Professional Communication | 2 | 0 | 0 | 2 | 2 |
| 5 | HUM | Value Added Course | HU202 | Values and Ethics | 2 | 0 | 0 | 2 | 2 |
| 6 | HUM | Value Added Course | HU203 | Constitution of India | 1 | 0 | 0 | 1 | 1 |
| **B. PRACTICAL** | | | | | | | | | |
| 1 | ENGG | Major | IT291 | Data Structure and Algorithm Lab | 0 | 0 | 3 | 3 | 1.5 |
| 2 | SCI | Skill Enhancement Course | CH(IT)291 | Engineering Chemistry Lab | 0 | 0 | 2 | 2 | 1 |
| 3 | HUM | Ability Enhancement Course | HU291 | Professional Communication Lab | 0 | 0 | 2 | 2 | 1 |
| 4 | ENGG | Skill Enhancement Course | ME(IT)291 | Workshop and Manufacturing Practices Lab | 0 | 0 | 3 | 3 | 1.5 |
| Total of Theory, Practical | | | | | | | | 23 | 18 |

**1ˢᵗ Year 2ⁿᵈ Semester**

## 2nd Year 3rd Semester

| Sl. No. | Broad Category | Category | Course Code | Course Title | Hours per week | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Total | |
| **A.THEORY** | | | | | | | | | |
| 1 | ENGG | Major | IT301 | Computer Organization and Architecture | 3 | 0 | 0 | 3 | 3 |
| 2 | ENGG | Minor | IT302 | Analog and Digital Electronics | 3 | 0 | 0 | 3 | 3 |
| 3 | ENGG | Major | IT303 | Formal Language and Automata Theory | 3 | 0 | 0 | 3 | 3 |
| 4 | SCI | Minor | M(IT)301 | Numerical Methods and Statistics | 2 | 0 | 0 | 2 | 2 |
| 5 | SCI | Minor | PH(IT)301 | Engineering Physics - II | 2 | 0 | 0 | 2 | 2 |
| **B.PRACTICAL** | | | | | | | | | |
| 1 | ENGG | Major | IT391 | Computer Organization and Architecture Lab | 0 | 0 | 3 | 3 | 1.5 |
| 2 | ENGG | Minor | IT392 | Analog and Digital Electronics Lab | 0 | 0 | 3 | 3 | 1.5 |
| 3 | ENGG | Minor | IT393 | Python Programming Lab | 0 | 0 | 3 | 3 | 1.5 |
| 4 | HUM | Ability Enhancement Course | HU(IT)391 | Soft Skill and Aptitude | 0 | 0 | 2 | 2 | 1 |
| 5 | SCI | Skill Enhancement Course | PH(IT)391 | Engineering Physics - II Lab | 0 | 0 | 3 | 3 | 1.5 |
| Total of Theory, Practical | | | | | | | | 27 | 20 |

## 2nd Year 4th Semester

| Sl. No. | Broad Category | Category | Course Code | Course Title | L | T | P | Total | Credits |
|---|---|---|---|---|---|---|---|---|---|
| A.THEORY | | | | | | | | | |
| 1 | ENGG | Major | IT401 | Object Oriented Programming Using Java | 3 | 0 | 0 | 3 | 3 |
| 2 | ENGG | Major | IT402 | Software Engineering | 3 | 0 | 0 | 3 | 3 |
| 3 | ENGG | Major | IT403 | Operating System | 3 | 0 | 0 | 3 | 3 |
| 4 | SCI | Minor | M(IT)401 | Discrete Mathematics | 3 | 0 | 0 | 3 | 3 |
| 5 | HUM | Minor | HU401 | Economics for Engineers | 2 | 0 | 0 | 2 | 2 |
| B.PRACTICAL | | | | | | | | | |
| 1 | ENGG | Major | IT491 | Object Oriented Programming Lab | 0 | 0 | 3 | 3 | 1.5 |
| 2 | ENGG | Major | IT492 | Software Engineering Lab | 0 | 0 | 2 | 2 | 1 |
| 3 | ENGG | Major | IT493 | Operating System Lab | 0 | 0 | 3 | 3 | 1.5 |
| 4 | ENGG | Minor | IT494 | R-Programming Lab | 0 | 0 | 2 | 2 | 1 |
| 5 | HUM | Ability Enhancement Course | HU(IT)491 | Seminar and Group Discussion | 0 | 0 | 2 | 2 | 1 |
| 6 | ENGG | Skill enhancement course | HU(IT)495 | IT Workshop Lab (SciLab / MATLAB/ C++) | 0 | 0 | 2 | 2 | 1 |
| Total of Theory, Practical | | | | | | | | 28 | 21 |

| | | | | | Hours per week | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| Sl. No. | Broad Category | Category | Course Code | Course Title | L | T | P | Total | |

**3rd Year 5th Semester**

**A.THEORY**

| Sl. No. | Broad Category | Category | Course Code | Course Title | L | T | P | Total | Credits |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ENGG | Major | IT501 | Database Management System | 3 | 0 | 0 | 3 | 3 |
| 2 | ENGG | Major | IT502 | Computer Networking | 3 | 0 | 0 | 3 | 3 |
| 3 | ENGG | Major | IT503 | Design and Analysis of Algorithm | 3 | 0 | 0 | 3 | 3 |
| 4 | ENGG | Major | IT504 | Artificial Intelligence | 3 | 0 | 0 | 3 | 3 |
| 5 | ENGG | Minor | IT505 | A. e-Commerce and ERP<br>B. Mobile Application Development<br>C. Microprocessor and Microcontroller | 2 | 0 | 0 | 2 | 2 |

**B.PRACTICAL**

| Sl. No. | Broad Category | Category | Course Code | Course Title | L | T | P | Total | Credits |
|---|---|---|---|---|---|---|---|---|---|
| 1 | ENGG | Major | IT591 | Database Management System Lab | 0 | 0 | 3 | 3 | 1.5 |
| 2 | ENGG | Major | IT592 | Computer Networking Lab | 0 | 0 | 3 | 3 | 1.5 |
| 3 | ENGG | Major | IT593 | Design and Analysis of Algorithm Lab | 0 | 0 | 2 | 2 | 1 |
| 4 | ENGG | Major | IT594 | Artificial Intelligence Lab | 0 | 0 | 3 | 3 | 1.5 |
| 5 | ENGG | Minor | IT595 | A. E-Commerce and ERP Lab<br>B. Mobile Application Development Lab<br>C. Microprocessor and Microcontroller Lab | 0 | 0 | 2 | 2 | 1 |
| 6 | PRJ | Project | IT581 | Minor Project-I | 0 | 0 | 0 | 2 | 1 |
| Total of Theory, Practical | | | | | | | | 29 | 21.5 |

## 3rd Year 6th Semester

| Sl. No. | Broad Category | Category | Course Code | Course Title | L | T | P | Total | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Hours per week | | | | |
| **A.THEORY** | | | | | | | | | |
| 1 | ENGG | Major | IT601 | Web Technology | 2 | 0 | 0 | 2 | 2 |
| 2 | ENGG | Major | IT602 | Machine Learning | 3 | 0 | 0 | 3 | 3 |
| 3 | ENGG | Major | IT603 | A. Computer Graphics and Multimedia<br>B. Digital Image Processing<br>C. Internet of Things | 3 | 0 | 0 | 3 | 3 |
| 4 | ENGG | Major | IT604 | A. Data Mining and Knowledge Discovery<br>B. Cryptography and Network Security<br>C. Compiler Design | 3 | 0 | 0 | 3 | 3 |
| 5 | ENGG | Minor | IT605 | A. Mobile Computing<br>B. Virtual and Augmented Reality<br>C. Social Network Analysis | 2 | 0 | 0 | 2 | 2 |
| **B.PRACTICAL** | | | | | | | | | |
| 1 | ENGG | Major | IT691 | Web Technology Lab | 0 | 0 | 3 | 3 | 1.5 |
| 2 | ENGG | Major | IT692 | Machine Learning Lab | 0 | 0 | 3 | 3 | 1.5 |
| 3 | ENGG | Major | IT693 | A. Computer Graphics and Multimedia Lab<br>B. Digital Image Processing Lab<br>C. Internet of Things Lab | 0 | 0 | 3 | 3 | 1.5 |
| 4 | | Internship | IT681 | Internship | 0 | 0 | 0 | 0 | 1 |
| 5 | PRJ | Project | IT682 | Minor Project - II | 0 | 0 | 0 | 2 | 1 |
| Total of Theory, Practical | | | | | | | | 24 | 19.5 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| over 4th Year 7th Semester | | | | | | | | | |

**4th Year 7th Semester**

| Sl. No. | Broad Category | Category | Course Code | Course Title | Hours per week | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Total | |
| **A.THEORY** | | | | | | | | | |
| 1 | ENGG | Major | IT701 | A. Cloud Computing<br>B. Internet Technology<br>C. Big Data Analytics<br>D. Pattern Recognition | 3 | 0 | 0 | 3 | 3 |
| 2 | ENGG | Major | IT702 | A. Soft Computing<br>B. Cyber Security<br>C. Wireless Ad hoc Network<br>D. NoSQL Database with MongoDB | 3 | 0 | 0 | 3 | 3 |
| 3 | ENGG | Major | IT703 | A. Advanced Database Management System<br>B. Block Chain Technology<br>C. Advanced Computer Architecture<br>D. Quantum Computing | 3 | 0 | 0 | 3 | 3 |
| 4 | ENGG | Minor | IT704 | A. Digital Forensics<br>B. Modelling and Simulation<br>C. Deep Learning & Neural Networks<br>D. Real Time Systems | 3 | 0 | 0 | 3 | 3 |
| **B.PRACTICAL** | | | | | | | | | |
| 1 | ENGG | Major | IT791 | A. Cloud Computing Lab<br>B. Internet Technology Lab<br>C. Big Data Analytics Lab<br>D. Pattern Recognition Lab | 0 | 0 | 3 | 3 | 1.5 |
| 2 | ENGG | Major | IT792 | A. Soft Computing Lab<br>B. Cyber Security Lab<br>C. Wireless Ad hoc Network Lab<br>D. NoSQL Database with MongoDB Lab | 0 | 0 | 3 | 3 | 1.5 |
| 3 | | Internship | IT781 | Industrial Training / Internship | 0 | 0 | 0 | 0 | 2 |
| 4 | PRJ | Project | IT782 | Major Project-I | 0 | 0 | 0 | 8 | 4 |
| Total of Theory, Practical | | | | | | | | 26 | 21 |

## 4th Year 8th Semester

| Sl. No. | Broad Category | Category | Course Code | Course Title | Hours per week | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Total | |
| **A.THEORY** | | | | | | | | | |
| 1 | ENGG | Major | IT801 | A. Data Sciences<br>B. Business Analytics<br>C. Cluster and Grid Computing<br>D. Distributed Database | 3 | 0 | 0 | 3 | 3 |
| 2 | ENGG | Major | IT802 | A. Human Computer Interaction<br>B. Natural Language Processing<br>C. Distributed Computing<br>D. Information and Coding Theory | 3 | 0 | 0 | 3 | 3 |
| 3 | ENGG | Minor | IT803 | A. Bio-Informatics<br>B. Embedded System<br>C. Human Resource Management<br>D. Computer Vision | 3 | 0 | 0 | 3 | 3 |
| 4 | HUM | Ability Enhancement Course | HU(IT)801 | Principles of Management | 2 | 0 | 0 | 2 | 2 |
| **B.PRACTICAL** | | | | | | | | | |
| 1 | | | IT881 | Grand Viva | 0 | 0 | 0 | 0 | 2 |
| 2 | PRJ | Project | IT882 | Major Project-II | 0 | 0 | 0 | 12 | 6 |
| Total of Theory, Practical | | | | | | | | 23 | 19 |

# Total Credit = 162

# Detailed Syllabus
# of
# 1ˢᵗ Semester

| Sl. No. | Broad Category | Category | Course Code | Course Title | Hours per week | | | | Credits |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Total | |
| **A. THEORY** | | | | | | | | | |
| 1 | ENGG | Major | IT101 | Programming for Problem Solving | 3 | 0 | 0 | 3 | 3 |
| 2 | ENGG | Minor | EE(IT)101 | Basic Electrical and Electronics Engineering | 3 | 0 | 0 | 3 | 3 |
| 3 | SCI | Multidisciplinary | M(IT)101 | Engineering Mathematics - I | 3 | 0 | 0 | 3 | 3 |
| 4 | SCI | Multidisciplinary | PH(IT)101 | Engineering Physics - I | 3 | 0 | 0 | 3 | 3 |
| 5 | HUM | Value Added Course | HU104 | Environmental Science | 2 | 0 | 0 | 2 | 2 |
| 6 | HUM | Value Added Course | HU105 | Indian Knowledge System | 1 | 0 | 0 | 1 | 1 |
| **B. PRACTICAL** | | | | | | | | | |
| 1 | ENGG | Major | IT191 | Programming for Problem Solving Lab | 0 | 0 | 3 | 3 | 1.5 |
| 2 | ENGG | Minor | EE(IT)191 | Basic Electrical and Electronics Engineering Lab | 0 | 0 | 3 | 3 | 1.5 |
| 3 | SCI | Skill Enhancement Course | PH(IT)191 | Engineering Physics - I Lab | 0 | 0 | 3 | 3 | 1.5 |
| 4 | HUM | Ability Enhancement Course | HU(IT)191 | Technical Seminar Presentation | 0 | 0 | 2 | 2 | 1 |
| 5 | ENGG | Skill Enhancement Course | ME(IT)191 | Engineering Graphics and Design Lab | 0 | 0 | 3 | 3 | 1.5 |
| Total of Theory, Practical | | | | | | | | 29 | 22 |

**PAPER NAME: PROGRAMMING FOR PROBLEM SOLVING**
**PAPER CODE: IT101**
**CONTACT: 3:0:0**
**TOTAL CONTACT HOURS: 36**
**CREDIT: 3**

**Prerequisites:** Number system, Boolean Algebra

**Course Outcome:**

After completion of the course students will be able to

| CO1 | Understand and differentiate among different programming languages for problem solving. |
|-----|------------------------------------------------------------------------------------------|
| CO2 | Describe the way of execution and debug programs in C language. |
| CO3 | Define, select, and compare data types, loops, functions to solve mathematical and scientific problem. |
| CO4 | Understand the dynamic behaviour of memory by the use of pointers. |
| CO5 | Design and develop modular programs using control structure, selection structure and file. |

**CO–PO Mapping:**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | 2 | 1 | 1 | -- | -- | 2 | -- | -- | -- | -- | 1 |
| CO2 | 2 | 2 | 3 | 1 | -- | -- | 2 | -- | -- | -- | -- | 2 |
| CO3 | 2 | 2 |  | -- | -- | -- | -- | -- | -- | -- | -- | 2 |
| CO4 | 3 | 2 | 1 | -- | -- | -- | -- | -- | -- | -- | -- | 3 |
| CO5 | 3 | 3 | 3 | -- | -- | -- | -- | -- | -- | -- | -- | 3 |

**Course Content:**

**Module-1: Fundamentals of Computer: [9L]**

History of Computer, Generation of Computer, Classification of Computers, Basic structure of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output devices. Number System: basic of Binary, Octal, Decimal and Hexadecimal number systems; Representation and interchanging of number in different number systems. Introduction to complements system, Representation of signed and unsigned numbers in singed magnitude singed 1's complement system and signed 2's complement system. Arithmetic– Addition and Subtraction (using1'scomplementand2'scomplement). Representation of Characters-ASCII Code Basics of Compiler, Interpreter and Assembler Problem solving – Basic concept of Algorithm. Representation of algorithm using flow chart and pseudo code. Some basic examples.

**Module-2: Introduction to C Programming: [5L]**

Overview of Procedural vs Structural language; History of C Programming Language. Variable and Data Types: The C characterise identifiers. And keywords, data type & sizes, variable names, declaration, statements. Operators & Expressions: Arithmetic operators, relational operators, logical operators, increment and decrement operators, bitwise operators, assignment operators, conditional operators, special operators-type conversion, C expressions, precedence and associativity. Input and Output: Standard input and output, formatted output–print f, formatted input scan f.

**Module-3: Branch and Loop: [5L]**

Branching: Concept of Statement and Blocks in C, Simple if, if -else, nested if-else and if-else ladder. Switch Case: break and continue; switch-case, concept of go to and labels. Loops - while, for, do while

**Module-4: Program Structures [4L]**

Function: Basics of Functions, function types, function prototypes, formal and actual parameter, function calling, functions returning values, functions not returning values. Recursion and Recursive Function. Storage Class in C: Storage Class-auto, external, static and register storage class, scope rules and life time of variables C pre-processor: Pre-processing directive and macro, parameterized macro.

**Module-5: Array and Pointer [7L]**

Arrays: One dimensional arrays, Two-dimensional arrays, Passing an array to a function Pointers: Pointers, Pointer andArray, Pointer and functions. Strings: Character array and string, array of strings, Passing a string to a function, String related functions, Pointer and String. Dynamic memory allocation: Malloc, calloc, realloc and free with example.

**Module-6: Structures, Unions and Enum [3L]**

Basic of structures, arrays of structures, structures and pointers, bit fields. Basics of union and enum, difference between structure and union.

**Module-7: File in C [3L]**

Files handling- opening and closing a file in different mode, formatted and unformatted files, Command line arguments, f open, f close, f get c, f put c, f print f, f scan f function.

**Textbook:**

- **Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill**
- **KanetkarY.-LetusC,BPBPublication,15$^{th}$Edition**

**Reference Books:**

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
- **K R Venugopal & S R Prasad – MASTERING C, TMH, 2nd Edition**

**PAPER NAME: BASICS ELECTRICAL AND ELECTRONICS ENGINEERING**
**PAPER CODE: EE(IT)101**
**CONTACT: 3:0:0**
**TOTAL CONTACT HOURS: 36**
**CREDIT: 3**

**Pre-requisite:** Basic 12th standard Physics and Mathematics, Concept of components of electric circuit.

**Course Outcome:**

After completion of the course students will be able to

| CO1 | Apply fundamental concepts and circuit laws to solve simple DC electric circuits |
|------|------|
| CO2 | To solve simple ac circuits in steady state |
| CO3 | Impart the knowledge of Basic Electronics Devices and ICs. |
| CO4 | Analyze the simple electronics circuits |

**CO–PO Mapping:**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
|     |     |     |     |     |     |     |     |     |     |      |      |      |
| CO1 | 3   | 3   | 2   | 1   | -   | -   | -   | -   | -   | -    | 2    | 2    |
| CO2 | 3   | 3   | 2   | 1   | -   | -   | -   | -   | -   | -    | 2    | 2    |
| CO3 | 3   | 2   | 2   | 1   | -   | -   | -   | -   | -   | -    | 1    | 2    |
| CO4 | 2   | 3   | 2   | 1   | -   | -   | -   | -   | -   | -    | 2    | 1    |

**Course Content:**

**MODULE 1: Elementary Concepts of Electric Circuits [6L]**
DC Circuits: Circuit Components: Conductor, Resistor, Inductor, Capacitor – Ohm's Law - Kirchhoff's Laws – Independent and Dependent Sources – Simple problems- Nodal Analysis, Mesh analysis with independent sources only (Steady state) Introduction to AC Circuits and Parameters: Waveforms, Average value, RMS Value, Instantaneous power, real power, reactive power and apparent power, power factor – Steady state analysis of RLC circuits (Simple problems only)

**MODULE 2: Electrical Machine [8L]**
Transformer: Magnetic materials, BH characteristics, ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. DC Machines: Brief idea on constructional features, classifications, working principle of both motor and generator. Simple problems on Voltage equation.

**MODULE 3: Fundamentals of Semiconductor Devices [6L]**
Introduction to Semiconductor: Concept of energy band diagram; Comparison among metal, insulator, semiconductor; Semiconductors-classifications and Fermi energy level; Charge neutrality and Mass-Action law in semiconductor; Current flow in semiconductor due to drift & diffusion process; Einstein relation.

**MODULE 4: PN Junction Diode [4L]**
Principle of operation; V-I characteristics; principle of avalanche & Zener breakdown; Junction resistances and capacitances; V-I characteristics of Zener diode.

**MODULE 5: Bipolar Junction Transistors [4L]**
PNP and NPN structures; Principle of operation; Current gains in CE, CB and CC mode; input and output characteristics; Biasing & Stability Analysis-Concept of Fixed Bias, Collector to base Bias & voltage divider bias.

**MODULE 6: Introduction to IC [8L]**
Integrated circuit-Basic idea, classifications, advantages, disadvantages; OPAMP(IC741)- Pin configuration and equivalent circuit; Characteristics of OPAMP(IC741); Inverting & Non-Inverting Amplifier; Adder, Subtractor, Differentiator & Integrator Circuit.

**Textbooks:**
- A Textbook of Electrical Technology - Volume I (Basic Electrical Engineering) & Volume II (Ac & DC Machines)-B. L Theraja & A.K. Teraja, S. Chad,23rd Edition, 1959
- D. Chattopadhyay, P.C Rakshit, "Electronics Fundamentals and Applications", New Age International (P) Limited Publishers, Senenth Edition,2006
- Basic Electrical & Electronics Engineering by J.B. Gupta , S.K. Kataria & Sons,2013
- Basic Electrical and Electronics Engineering-I by Abhijit Chakrabarti and Sudip Debnath, McGraw Hill, 2015
- M. S. Sukhija and T. K. Nagsarkar, Basic Electrical and Electronics Engineering, Oxford University Press,2012.
- DP Kothari and IJ Nagrath, "Basic Electrical & Electronics Engineering", Tata McGraw Hill,2020.

**Reference Books**
- DC Kulshreshtha, "Basic Electrical Engineering",Tata McGrawHill,2010.
- T.K. Nagsarkar, M.S. Sukhija, "Basic Electrical Engineering", Oxford Higher Education.
- Hughes, "Electrical and Electronic Technology", Pearson Education".
- Parker and Smith, "Problems in Electrical Engineering", CBS Publishers and Distributors.
- Anant Agarwal, Jeffrey Lang, Foundations of Analog and Digital Electronic Circuits, Morgan Kaufmann Publishers, 2005.
- Bernard Grob, Basic Electronics, McGraw Hill.
- Chinmoy Saha, Arindham Halder and Debarati Ganguly, Basic Electronics- Principles and Applications, Cambridge University Press, 2018.

**PAPER NAME: ENGINEERING MATHEMATICS- I**
**PAPER CODE: M(IT)101**
**CONTACT: 3:0:0**
**TOTAL CONTACT HOURS: 36**
**CREDIT: 3**

**Pre-requisite:** Basic 12th standard Mathematics

**Course Outcome:**

After completion of the course students will be able to

| CO1 | Recall the properties related to matrix algebra and calculus. |
|-----|---------------------------------------------------------------|
| CO2 | Determine the solutions of the problems related to matrix algebra and calculus. |
| CO3 | Apply the appropriate mathematical tools of matrix algebra and calculus for the solutions of the problems. |
| CO4 | Analyze different engineering problems linked with matrix algebra and calculus. |

**CO–PO Mapping:**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 2    |
| CO2 | 3   | 2   | -   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO3 | 3   | 2   | 2   | -   | -   | -   | -   | -   | -   | -    | -    | 1    |
| CO4 | 2   | 3   | 1   | 2   | -   | -   | -   | -   | -   | -    | -    | 1    |

**Course Content:**

**Module I: Liner Algebra [11L]**
Echelon form and normal (canonical) form of a matrix; Inverse and rank of a matrix; Consistency and inconsistency of system of linear equations, Solution of system of linear equations; Eigenvalues and eigenvectors; Diagonalization of matrix, Cayley-Hamilton theorem.

**Module II: Single Variable Calculus [5L]**
Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; Concept of sequence and series, Power series; Taylor's series.

**Module III: Multivariable Calculus (Differentiation) [13L]**
Function of several variables; Concept of limit, continuity and differentiability; Partial derivatives, Total derivative and its application; chain rules, Derivatives of implicit functions Euler's theorem on homogeneous function; Jacobian; Maxima and minima of functions of two variables.

**Module IV: Multivariable Calculus (Integration) [7L]**
Double Integral, Triple Integral; Change of order in multiple integrals; Line Integral, Surface Integral, Volume Integral. Change of variables in multiple integrals.

**Text Books:**
- Grewal, B.S., Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
- Kreyszig, E., Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.

**Reference Books:**
- Guruprasad, S. A text book of Engineering Mathematics-I, New age International Publishers.
- Ramana, B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
- Veerarajan, T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
- Bali, N.P. and Goyal, M., A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

- Thomas, G.B. and Finney, R.L., Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
- Apostol, M., Calculus, Volumes 1 and 2 (2nd Edition), Wiley Eastern, 1980.
- Kumaresan, S., Linear Algebra - A Geometric approach, Prentice Hall of India, 2000.
- Poole, D., Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
- Bronson, R., Schaum's Outline of Matrix Operations. 1988.
- Piskunov, N., Differential and Integral Calculus, Vol. I & Vol. II, Mir Publishers, 1969.

**PAPER NAME: ENGINEERING PHYSICS- I**
**PAPER CODE: PH(IT)101**
**CONTACT: 3:0:0**
**TOTAL CONTACT HOURS: 36**
**CREDIT: 3**

**Pre-requisite:** Basic 12th standard Mathematics and Physics

**Course Outcome:**

After completion of the course students will be able to

| CO1 | Explain basic principles of laser, optical fiber and holography. |
|---|---|
| CO2 | Understand the properties of Nano material and semiconductor. |
| CO3 | Analyze different crystallographic structures according to their co-ordination number and packing factors. |
| CO4 | Analyze the structure, function and characteristics of different storage devices. |
| CO5 | Justify the need of a quantum mechanics as remedy to overcome limitations imposed by classical physics. |

**CO–PO Mapping:**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 3 | 3 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | 2 |
| **CO2** | 3 | 3 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | 2 |
| **CO3** | 3 | 3 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | 1 |
| **CO4** | 3 | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- | -- | 2 |
| **CO5** | 3 | 3 | 3 | 2 | 2 | -- | -- | -- | -- | -- | -- | 1 |

**Course Content:**

**Module 1: Modern Optics [12L]**
Laser: Concepts of various emission and absorption processes, Einstein A and B coefficients and equations, working principle of laser, metastable state, population inversion, condition necessary for active laser action, optical resonator, illustrations of Ruby laser, He-Ne laser, Semiconductor laser, applications of laser, related numerical problems. Fibre optics-Principle and propagation of light in optical fibers (Step index, Graded index, single and multiple modes) - Numerical aperture and Acceptance angle, Basic concept of losses in optical fiber, related numerical problems.
Holography-Theory of holography, viewing of holography, applications

**Module 2: Solid State Physics [6L]**
Crystal Structure: Structure of solids, amorphous and crystalline solids (definition and examples), lattice, basis, unit cell, Fundamental types of lattices –Bravais lattice, simple cubic, fcc and bcc lattices, Miller indices and miller planes, co-ordination number and atomic packing factor, Bragg's equation, applications, numerical problems. Semiconductor: Physics of semiconductors, electrons and holes, metal, insulator and semiconductor, intrinsic and extrinsic semiconductor, p-n junction.

**Module 3: Quantum Mechanics [8L]**
Quantum Theory: Inadequacy of classical physics-concept of quantization of energy, particle concept of electromagnetic wave (example: photoelectric and Compton Effect; no derivation required, origin of modified

and unmodified lines), wave particle duality; phase velocity and group velocity; de Broglie hypothesis; Davisson and Germer experiment, related numerical problems. Quantum Mechanics: Concept of wave function, physical significance of wave function, probability interpretation; normalization of wave functions-Qualitative discussion; uncertainty principle, relevant numerical problems, Introduction of Schrödinger wave equation (only statement).

## Module 4: Physics of Nanomaterials [4L]
Reduction of dimensionality, properties of nanomaterials, Quantum wells (two dimensional), Quantum wires (one dimensional), Quantum dots (zero dimensional); Quantum size effect and Quantum confinement. Carbon allotropes. Application of nanomaterials (CNT, graphene, electronic, environment, medical).

## Module 5: Storage and display devices [6L]
Different storage and display devices-Magnetic storage materials, Hard disc (examples related to computers compared with semiconductor storage viz. Pendrive), Operation and application of CRT, CRO, Liquid crystal display (LCD), LED, OLED, Plasma display, Thin film transistor display).

**Text Books:**
- Refresher courses in physics (Vol. 1, Vol. 2 & Vol. 3)-C. L. Arora (S. Chand Publishers).
- Engineering Physics (Vol. 1, Vol. 2)-S.P. Kuila (S. Chand Publishers).
- Perspective & Concept of Modern Physics -Arthur Baiser (Publisher: MaGrawhill )
- Principles of engineering physics – Md. N Khan and S Panigrahi (Cambridge University Press).
- Concepts of Modern Engineering Physics-A. S. Vasudeva. (S. Chand Publishers)
- Engineering Physics (Vol. 1, Vol. 2)-S.P. Kuila (S. Chand Publishers).
- Physics Volume 1&2 - Haliday, Resnick & Krane, Publisher: Wiley India).
- Engineering Physics-B. K. Pandey And S. Chaturvedi (Publisher: Cengage Learning, New Delhi).

**Reference Books**
**Modern Optics:**
- A text book of Light-Brijlal & Subhramanium, ( S. Chand publishers).
- Optics-Ajay Ghatak (TMH)

**Solid State Physics:**
- Solid state physics- S. O. Pillai.
- Introduction to solid state physics-Kittel (TMH).

**Quantum Mechanics:**
- Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House).
- Quantum mechanics -A.K. Ghatak and S Lokenathan

**Physics of Nanomaterials**
- Introduction to Nanotechnology, B.K. Parthasarathy.
- Introduction to Nanoscience and Nanotechnology, An Indian Adaptation-Charles P. Poole, Jr., Frank J. Owens.

**Storage and display devices**
- Optics-B.D. Gupta (Books and Allied Pvt. Ltd.).
- Solid state physics, solid state devices and electronics by C. M. Kachhava.

**PAPER NAME: ENVIRONMENTAL SCIENCE**
**PAPER CODE: HU104**
**CONTACT: 2:0:0**
**TOTAL CONTACT HOURS: 24**
**CREDIT: 2**

**Pre-requisite:** Basic 12th standard Science Knowledge.

**Course Outcome:**

After completion of the course students will be able to

| CO1 | Able to understand the natural environment and its relationships with human activities. |
|---|---|
| CO2 | The ability to apply the fundamental knowledge of science and engineering to assess environmental and health risk. |
| CO3 | Ability to understand environmental laws and regulations to develop guidelines and procedures for health and safety issues. |
| CO4 | Acquire skills for scientific problem-solving related to air, water, noise & land pollution. |

**CO–PO Mapping:**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 2 | 2 | 3 | - | - | 2 | 3 | 3 | - | - | 1 | 2 |
| CO2 | 3 | 3 | 3 | 1 | 1 | 2 | 3 | 3 | - | - | 1 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 1 | 2 | 3 | 3 | - | - | 1 | 2 |
| CO4 | 1 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | - | - | 1 | 2 |

**Course Content:**

**Module 1: Resources and Ecosystem [6L]**
Resources: Types of resources, resistance to resources, Human resource, Population Growth models: Exponential Growth, logistic growth.
Ecosystem: Components of ecosystem, types of ecosystem, Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems, Food chain, Food web.
Energy and Environment: Conventional energy sources, coal and petroleum, Green energy sources, solar energy, tidal energy, geothermal energy, biomass

**Module 2: Environmental Degradation [9L]**
Air Pollution and its impact on Environment: Air Pollutants, primary & secondary pollutants, Criteria pollutants, Smog, Photochemical smog and London smog, Greenhouse effect, Global Warming, Acid rain, Ozone Layer Depletion.
Water Pollution and its impact on Environment: Water Pollutants, Oxygen demanding wastes, heavy metals, BOD, COD, Eutrophication, Hardness, Alkalinity, TDS and Chloride, Heavy metal poisoning and toxicity.
Land Pollution and its impact on Environment: Solid wastes, types of Solid Waste, Municipal Solid wastes, hazardous wastes, bio- medical wastes, E-wastes.
Noise Pollution and its impact on Environment: Types of noise, Noise frequency, Noise pressure, Noise intensity, Noise Threshold limit, Effect of noise pollution on human health.

**Module 3: Environmental Management [6L]**
Environmental Impact Assessment: Objectives of Environmental management, Components of Environmental Management, Environmental Auditing, Environmental laws and Protection Acts of India
Pollution Control and Treatment: Air Pollution controlling devices, Catalytic Converter, Electrostatic Precipitator, etc., Waste Water Treatment, Noise pollution control.
Waste Management: Solid waste management, Open dumping, Land filling, incineration, composting, E-waste management, Biomedical Waste management.

**Module 4: Disaster Management [3L]**

Study of some important disasters: Natural and Man-made disasters, earthquakes, floods drought, landside, cyclones, volcanic eruptions, tsunami, Global climate change. Terrorism, gas and radiations leaks, toxic waste disposal, oil spills, forest fires.

Disaster management Techniques: Basic principles of disasters management, Disaster Management cycle, Disaster management policy, Awareness generation program

**Text Books:**
- Basic Environmental Engineering and Elementary Biology, Gourkrishna Dasmohapatra, Vikas Publishing.
- Basic Environmental Engineering and Elementary Biology, Dr. Monindra Nath Patra & Rahul Kumar Singha, Aryan Publishing House.
- Textbook of Environmental Studies for Undergraduate Courses, Erach Barucha for UGC, Universities Press

**Reference Books:**
- A Text Book of Environmental Studies, Dr. D.K. Asthana & Dr. Meera Asthana, S.Chand Publications.
- Environmental Science (As per NEP 2020), Subrat Roy, Khanna Publisher

**PAPER NAME: INDIAN KNOWLEDGE SYSTEM**
**PAPER CODE: HU105**
**CONTACT: 1:0:0**
**TOTAL CONTACT HOURS: 12**
**CREDIT: 1**

**Pre-requisite:** Basic 12th standard Science Knowledge.

**Course Outcome:**

After completion of the course students will be able to

| CO1 | To recall & state thought process of social setting in ancient India to identify the roots anddetails of some contemporary issues faced by Indians. |
|-----|---|
| CO2 | The students are able to identify & inspect the importance of our surroundings& culture todesign & formulate sustainable developmental solutions. |
| CO3 | To develop the ability to understanding the issues related to 'Indian' culture, tradition and its composite character to apply the same in the socio-technological developments in present scenario. |
| CO4 | The students are able to relate & assess Indian Knowledge System in the health care, architecture, agriculture & other systems. |

**CO–PO Mapping:**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | - | - | 2 | 3 | - | 3 | - | 2 | 3 | 1 | - | 2 |
| CO2 | - | - | 2 | - | - | 3 | 3 | 2 | 3 | 3 | - | |
| CO3 | - | - | 2 | - | - | 3 | 3 | 1 | 3 | 1 | - | 2 |
| CO4 | | | 2 | | | 3 | 3 | 2 | 3 | | | |

**Course Content:**

**Module-1: [3L]**
An overview of Indian Knowledge System (IKS): Importance of Ancient Knowledge - Definition of IKS - Classification framework of IKS - Unique aspects of IKS. The Vedic corpus: Vedas and Vedangas - Distinctive features of Vedic life. Indian philosophical systems: Different schools of philosophy.

**Module-2: [3L]**
Salient features of the Indian numeral system: Importance of decimal representation - The discovery of zero and its importance - Unique approaches to represent numbers.
Highlights of Indian Astronomy: Historical development of astronomy in India.

**Module-3: [3L]**
Indian science and technology heritage : Metals and metalworking - Mining and ore extraction –Physical structures in India - Irrigation and water management - Dyes and painting technology - Surgical Techniques - Shipbuilding

**Module-4: [3L]**
Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, Traditional Knowledge in agriculture, Traditional societies depend on it for their food and healthcare needs.

**Text Book:**
- Introduction to Indian knowledge system: concepts and applications-Mahadevan B.Bhat, Vinayak Rajat, Nagendra Pavana R.N.,PHI

**Reference Books:**
- Traditional Knowledge system in India, Amit Jha, Atlantic Publishers
- S. N. Sen and K. S. Shukla, History of Astronomy in India, Indian National Science Academy, 2nd edition, New Delhi, 2000

**PAPER NAME: PROGRAMMING FOR PROBLEM SOLVING LAB**
**PAPER CODE: IT191**
**CONTACT: 0:0:3**
**CREDIT: 1.5**

**Prerequisites:** Number system, Boolean Algebra

**Course Outcome:**

After completion of the course students will be able to

| CO1 | Apply the conception of data type, variable declaration to solve the problem. |
|---|---|
| CO2 | Analyze the conception of data handling to solving problem and identify and correct syntax errors / logical errors as reported during compilation time and run time. |
| CO3 | Create program using Arrays, Pointers, Structures, Union and Files. for solving different problem both recursive and non-recursive method |

**CO-PO Mapping:**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 3 |
| CO2 | 3 | 3 | 3 | -- | -- | -- | -- | -- | -- | -- | -- | 3 |
| CO3 | 2 | 2 | 2 | 2 | 2 | -- | -- | -- | -- | -- | -- | 3 |

**Module-1:** Familiarization with some basic commands of DOS and Linux. File handling and Directory structures, file permissions, creating and editing simple C program in different editor and IDE, compilation and execution of C program. Introduction to Code block.

**Module-2:** Problem based on

    a) Basic data types
    b) Different arithmetic operators.
    c) Print f( ) and scan f( ) functions.

**Module-3:** Problem based on conditional statements using

    a) if-else statements
    b) different relational operators
    c) different logical operators

**Module-4:** Problem based on

    a) **for** loop
    b) **while** loop
    c) **do-while** loop

**Module-5:** Problem based on

    a) How to write a menu driven program using **switch-case** statement
    b) How to write a function and passing values to a function
    c) How to write a **recursive function.**

**Module-6:** Problem based on

    a) How to use **array (both I-Dand2-D).**
    b) How to pass an **array** to a **function.**

**Module-7:** Problem based on manipulation of strings in different way.
**Module-8:** Problem based on

    a) How to handle compound variables in C

    b) How to handle file in C

    c) How to use command line argument in C

**Textbook:**

- Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
- KanetkarY.-LetusC,BPBPublication,15<sup>th</sup>Edition

**Reference Books:**

- Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India
- K R Venugopal & S R Prasad – MASTERING C, TMH, 2nd Edition

**PAPER NAME: BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB**
**PAPER CODE: EE(IT)191**
**CONTACT: 0:0:3**
**CREDIT: 1.5**

**Prerequisites:** Number system, Boolean Algebra

**Course Outcome:**

After completion of the course students will be able to

| CO1 | To Analyze a given network by applying KVL and KCL. |
|---|---|
| CO2 | To Examine the Operation of DC Motor. |
| CO3 | To Examine the Operation of Basic Electronics Devices and ICs. |
| CO4 | To design simple electronics circuits. |

**CO-PO Mapping:**

|     | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|
| CO1 | 3 | 2 | 3 | 2 | - | 2 | - | - | 2 | - | 2 | 3 |
| CO2 | 3 | 3 | 2 | 3 | - | 2 | - | - | 3 | - | 2 | 2 |
| CO3 | 3 | 2 | 2 | 3 | - | 2 | - | - | 2 | - | 3 | 3 |
| CO4 | 3 | 3 | 2 | 2 | - | 2 | - | - | 3 | - | 2 | 3 |

**List of Experiments: -**
1. Familiarization with different passive and active electrical & electronic components.
2. Familiarization with different Electrical & Electronics Instruments.
3. Verification of KVL and KCL.
4. Forward and reversal of DC shunt motor.
5. Speed control of DC shunt motor.
6. Study of the P-N junction diode V-I characteristics (Forward & Reverse Bias).
7. Study of the Characteristics of Zener diode (Forward & Reverse Bias).
8. Study of the Input and Output characteristics of BJT in CE mode.
9. Determination of offset voltage, offset current & bias current of OPAMP(IC741).
10. Determination of CMRR and slew rate of OPAMP(IC741).
11. Determination of inverting and non-inverting gain of OPAMP(IC741).
12. Extramural Experiment.

**Textbooks:**
- Handbook of Laboratory Experiments in Electronics Engineering Vol. 1, Author Name: A.M. Zungeru, J.M. Chuma, H.U. Ezea, and M. Mangwala, Publisher -Notion Press Electronic Devices and Circuit Theory by Robert Boylestad Louis Nashelsky,7th Edition, Prentice Hall Experiments Manual for use with Grob's Basic Electronics 12th Edition by Wes Ponick, Publisher-McGraw Hill, 2015.
- Laboratory Manual for 'Fundamentals of Electrical & Electronics Engineering': A handbook for Electrical & Electronics Engineering Students by Manoj Patil (Author), Jyoti Kharade (Author), 2020.
- The Art of Electronics, Paul Horowitz, Winfield Hill,Cambridge University Press, 2015.
- A Handbook of Circuit Math for Technical Engineers, Robert L. Libbey CRC Press, 05-Jun- 1991.

**Reference Books:**
- Basic Electrical and Electronics Engineering, Author:S. K. Bhattacharya, Publisher: Pearson Education India,2011
- Practical Electrical Engineering
- By Sergey N. Makarov, Reinhold Ludwig, Stephen J. Bitar, Publisher: Springer International Publishing, 2016

**PAPER NAME: TECHNICAL SEMINAR PRESENTATION**
**PAPER CODE: HU(IT)191**
**CONTACT: 0:0:2**
**CREDIT: 1**

**Prerequisites:** Number system, Boolean Algebra

**Course Outcome:**

After completion of the course students will be able to

| CO1 | Able to develop advanced verbal and nonverbal communication skills through Power Point presentation. |
|---|---|
| CO2 | Able demonstrate interpersonal skills through Group Discussion both for organizational communication and campus recruitment drive. |
| CO3 | Able to recognize and apply the knowledge of public speaking. |
| CO4 | Able to be industry ready professionals by various personality development programs. |
| CO5 | Understand and write a detailed technical report as per organizational needs. |

**CO-PO Mapping:**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CO1 | 3 | - | 3 | - | 3 | 2 | - | - | 3 | 3 | 1 | 3 |
| CO2 | 3 | 3 | - | - | - | 3 | - | - | 3 | 3 | - | 3 |
| CO3 | 2 | 2 | 2 | - | - | 2 | 1 | - | 3 | 3 | 1 | 3 |
| CO4 | 2 | - | - | - | 1 | 3 | - | - | 3 | 3 | 1 | 3 |
| CO5 | 1 | 2 | - | - | 2 | 2 | - | 2 | 3 | 3 | 1 | 3 |

**Module 1: Presentation**
- Teaching Presentation as a Skill
- Speaking Strategies and Skills
- Media and Means of Presentation
- Extended Practice and Feedback

**Module 2: Effective Presentation**
- Rules of making micro presentation.
- Assignment on micro presentation.
- Need for expertise in oral presentation.
- Assignment on Oral presentation.
- Macro Presentation in Groups.

**Module 3: Writing a Technical Report**
- Organizational Needs for Reports and types
- Report Formats
- Report Writing Practice Sessions and Workshops

**Module 4: Speaking Skills**
- The Need for Speaking: Content and Situation-based speaking
- Public Speaking Activities: [Just a Minute, Paired Role Play, Situational Speaking Exercises]
- The Pragmatics of Speaking—Pronunciation practice and learner feedback.

**Text / Reference Books:**
- Technical communication By Meeenakshi Raman and Sangeeta Sharma; Oxford Publication.

**PAPER NAME: ENGINEERING GRAPHICS AND DESIGN LAB**
**PAPER CODE: ME(IT)191**
**CONTACT: 0:0:3**
**CREDIT: 1.5**

**Prerequisites:** Basic Knowledge of Geometry

**Course Outcome:**

After completion of the course students will be able to

| CO1 | Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings |
|---|---|
| CO2 | Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements |
| CO3 | Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts |
| CO4 | Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development. |

**CO-PO Mapping:**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | -- | 1 | 2 | -- | 1 | -- | -- | 1 | -- | -- | 1 |
| **CO2** | 3 | -- | 2 | 2 | -- | 1 | -- | -- | 1 | 1 | -- | 1 |
| **CO3** | 2 | 2 | 2 | 1 | -- | 2 | -- | -- | 1 | -- | -- | 1 |
| **CO4** | 1 | -- | 2 | 2 | 2 | 2 | -- | -- | 1 | 1 | -- | 1 |

**Basic Engineering Graphics:**
Principles of Engineering Graphics; Orthographic Projection; Descriptive Geometry; Drawing Principles; Isometric Projection; Surface Development; Perspective; Reading a Drawing; Sectional Views; Dimensioning & Tolerances; True Length, Angle; intersection, Shortest Distance.

**Introduction to Engineering Drawing:**
Principles of Engineering Graphics and their significance, Usage of Drawing instruments, lettering, Conic sections including Rectangular Hyperbola (General method only); Cycloid, Epicycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

**Orthographic & Isometric Projections:**
Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes on inclined Planes - Auxiliary Planes; Projection of Solids inclined to both the Planes- Auxiliary Views; Isometric Scale, Isometric Views of lines, Planes, Simple and compound Solids; Conversion of Isometric Viewsto Orthographic Views and Vice- versa.

**Sections and Sectional Views of Right Angular Solids:**
Drawing sectional views of solids for Prism, Cylinder, Pyramid, Cone and project the true shape of the sectioned surface, Auxiliary Views; Development of surfaces of Right Regular Solids - Prism, Pyramid, Cylinder and Cone;Draw sectional orthographic views of objects from industry and dwellings (foundation to slab only).

**Computer Graphics:**
Engineering Graphics Software; -Spatial Transformations; Orthographic Projections; Model Viewing; Co-ordinate Systems; Multi-view Projection; Exploded Assembly; Model Viewing; Animation; Spatial Manipulation; Surface Modeling; Solid Modeling.

**Overview of Computer Graphics:**
Demonstration of CAD software [The Menu System, Toolbars (Standard, Properties, Draw, Modify and Dimension), Drawing Area (Background, Crosshairs, Coordinate System), Dialog boxes and windows, Shortcut menus (Button Bars), Zooming methods, Select and erase objects].

**CAD Drawing, Customization, Annotations, layering:**
Set up of drawing page including scale settings, ISO and ANSI standards for dimensioning and tolerance; Using various methods to draw straight lines, circles, applying dimensions and annotations to drawings; Setting up and use of Layers, changing line lengths (extend/lengthen); Drawing sectional views of solids; Drawing annotation, CAD modeling of parts and assemblies with animation, Parametric and nonparametric solid, surface and wireframe modeling,Part editing and printing documents.

**Demonstration of a simple team design project:**
Illustrating Geometry and topology of engineered components: creation of engineering models and their presentation in standard 2D blueprint form and as 3D wire-frame and shaded solids; Meshed topologies for engineering analysis and tool-path generation for component manufacture, use of solid-modeling software for creating associative models at the component and assembly levels.

**Text Books:**
- Bhatt N.D., Panchal V.M. & Ingle P.R, (2014), Engineering Drawing, Charotar Publishing House
- K. Venugopal, Engineering Drawing + AutoCAD, New Age International publishers

**Reference Books:**

- Pradeep Jain, Ankita Maheswari, A.P. Gautam, Engineering Graphics & Design, Khanna Publishing House.
- Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication.
- Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
- Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers.

**PAPER NAME: ENGINEERING PHYSICS -I  LAB**
**PAPER CODE: PH(IT)191**
**CONTACT: 0:0:3**
**CREDIT: 1.5**

**Prerequisites: Knowledge of Physics up to 12th standard.**

**Course Outcome:**

After completion of the course students will be able to

| | |
|---|---|
| **CO1** | Demonstrate experiments allied to their theoretical concepts. |
| **CO2** | Conduct experiments using LASER, Optical fiber. |
| **CO3** | Participate as an individual, and as a member or leader in groups in laboratory sessions actively. |
| **CO4** | Analyse experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiment. |
| **CO5** | Design solutions for real life challenges. |

**CO-PO Mapping:**

| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO1** | 2 | 3 | 2 | 3 | 3 | -- | -- | -- | -- | -- | -- | 1 |
| **CO2** | 2 | 3 | 2 | 3 | 3 | -- | -- | -- | -- | -- | -- | 2 |
| **CO3** | 2 | 3 | 2 | 3 | 3 | -- | -- | -- | -- | -- | -- | 2 |
| **CO4** | 2 | 2 | 3 | 2 | 3 | -- | -- | -- | -- | -- | -- | 2 |
| **CO5** | 2 | 2 | 3 | 2 | 3 | -- | -- | -- | -- | -- | -- | 1 |

General idea about Measurements and Errors (One Mandatory):
i) Error estimation using Slide calipers/ Screw-gauge/travelling microscope for one experiment.
Experiments on Classical Physics (Any 4 to be performed from the following experiments ):

- Study  of Torsional oscillation of Torsional pendulum & determination of time using various load of the oscillator.
- Determination of Young's moduli of different materials.
- Determination of Rigidity moduli of different materials.
- Determination of wavelength of light by Newton's ring method.
- Determination of wavelength of light by Laser diffraction method.
- Optical Fibre-numerical aperture, power loss.

Experiments on Quantum Physics (Any 2 to be performed from the following experiments):
- Determination of Planck's constant using photoelectric cell.
- Verification of Bohr's atomic orbital theory through Frank-Hertz experiment.
- Determination of Stefan's Constant.
- 10.Study of characteristics of solar cell.

Perform atleast one of the following experiments:
- Determination of Q factor using LCR Circuit. 12.Study of I-V characteristics of a LED/LDR

**In addition it is recommended that each student should carry out at least one experiment beyond the syllabus/one experiment as Innovative experiment.

Probable experiments beyond the syllabus:
- Study of dispersive power of material of a prism.
- Study of viscosity using Poiseuille's capillary flow method/using Stoke's law.

- Determination of thermal conductivity of a bad/good conductor using Lees-Charlton / Searle apparatus.
- Determination of the angle of optical rotation of a polar solution using polarimeter.
- Any other experiment related to the theory.

**Text Books**
- Vibration, Waves and Acoustics- Chattopadhyay and Rakshit Classical & Modern
- A text book of Light- K.G. Mazumder & B.Ghosh (Book & Allied Publisher)
- Introduction to Quantum Mechanics-S. N. Ghoshal (Calcutta Book House)
- Solid State Physics and Electronics-A. B. Gupta and Nurul Islam (Book & Allied Publisher)
- Practical Physics by Chatterjee & Rakshit (Book & Allied Publisher)
- Practical Physics by K.G. Mazumder (New Central Publishing)
- Practical Physics by R. K. Kar (Book & Allied Publisher)