**Dr. Babasaheb Ambedkar Technological University**
**(Established as a University of Technology in the State of Maharashtra)**
**(Under Maharashtra Act No. XXIX of 2014)**
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# Detailed Syllabus
# for
# Second Year
# B. Tech. Programme in Information Technology

**Effective from**
**Academic Year 2018-19**
**Approved in the 11th meeting of Academic Council 8th June, 2018**

**Teaching and Evaluation Scheme Second Year B. Tech. (Information Technology)**

| Sr. No. | Course Code | Course title | Weekly Teaching hours | | | Evaluation Scheme | | | Credit | Total Hours |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | L | T | P | MSE | CA | ESE | | |
| **Semester III** | | | | | | | | | | |
| 1 | BTBSC301 | Engineering Mathematics III | 3 | 1 | - | 20 | 20 | 60 | 4 | 4 |
| 2 | BTITC302 | Switching Theory and Logic Design | 2 | 1 | - | 20 | 20 | 60 | 3 | 3 |
| 3 | BTITC303 | Object Oriented Paradigm with C++ | 3 | 1 | - | 20 | 20 | 60 | 4 | 4 |
| 4 | BTCOC304 | Computer Architecture and Organization | 2 | 1 | - | 20 | 20 | 60 | 3 | 3 |
| 5 | BTBSE305A<br>BTITE305B<br>BTITE305C<br>BTHM3402 | **Elective I**<br>A) Advanced Engineering Chemistry<br>B) Programming in Java<br>C) Introduction to Web Technology<br>D) Interpersonal Communication Skills and Self Development for Engineers | 2 | 1 | - | 20 | 20 | 60 | 3 | 3 |
| 6 | BTHM3401 | Basic Human Rights | 2 | - | - | - | - | - | Audit | 2 |
| 7 | BTITL306 | Switching Theory and Logic Design Lab | - | - | 2 | - | 60 | 40 | 1 | 2 |
| 8 | BTITL307 | Object Oriented Paradigm with C++ Lab | - | - | 2 | - | 60 | 40 | 1 | 2 |
| 9 | BTITL308 | Programming Lab (Python) | - | 1 | 2 | - | 60 | 40 | 2 | 3 |
| 10 | BTBSEL309A<br>BTITEL309B<br>BTITEL309C<br>BTHML3402 | **Elective I Lab**<br>A) Advanced Engineering Chemistry Lab<br>B) Programming in Java Lab<br>C) Introduction to Web Technology Lab<br>D) Interpersonal Communication Skills and Self Development for Engineers Lab | - | - | 2 | - | 60 | 40 | 1 | 2 |
| 11 | BTITF310 | Field Training / Internship/Industrial Training Evaluation | - | - | - | - | - | 50 | 1 | - |
| | | **Total** | **14** | **6** | **8** | **100** | **340** | **510** | **23** | **28** |
| **Semester IV** | | | | | | | | | | |
| 1 | BTITC401 | Microprocessors and Microcontrollers | 2 | 1 | - | 20 | 20 | 60 | 3 | 3 |
| 2 | BTITC402 | Data Structures and Applications | 3 | 1 | - | 20 | 20 | 60 | 4 | 4 |
| 3 | BTITC403 | Discrete Structures and Applications | 2 | 1 | - | 20 | 20 | 60 | 3 | 3 |
| 4 | BTITC404 | Internetworking Protocols | 2 | 1 | - | 20 | 20 | 60 | 3 | 3 |
| 5 | BTID405 | Product Design Engineering | 2 | - | - | 20 | 20 | 60 | 2 | 2 |
| 6 | BTBS406A<br>BTITE406B<br>BTITE406C | **Elective II**<br>A) Physics of Engineering Materials<br>B) Organizational Behavior<br>C) Development Engineering | 2 | 1 | - | 20 | 20 | 60 | 3 | 3 |
| 7 | BTITL407 | Microprocessors and Micro-controllers Lab | - | - | 2 | - | 60 | 40 | 1 | 2 |
| 8 | BTITL408 | Data Structures and Applications Lab | - | - | 4 | - | 60 | 40 | 2 | 4 |
| 9 | BTITL409 | Internetworking Protocols Lab | - | - | 2 | - | 60 | 40 | 1 | 2 |
| 10 | BTITF410 | Field Training / Internship/Industrial Training (minimum 4 weeks which can be completed partially in third semester and fourth semester or at one time.) | - | - | - | - | - | 50 | To be evaluated in V Semester | - |
| | | **Total** | **13** | **5** | **8** | **120** | **300** | **530** | **22** | **26** |

**Programme Objectives:**

The program educational objectives for the B. Tech. programme in Information Technology describes accomplishments that graduates are expected to attain within the four years of graduation. Graduates will be able to apply their expertise to contemporary problem solving, be engaged professionally, and have continued to learn and adapt, and have contributed to their organizations through leadership and teamwork. More specifically, the objectives are:

1. PEO1: To enable graduates gain strong skills for employment in multidisciplinary domains driven by IT
2. PEO2: To enable graduates to pursue higher education and research
3. PEO3: To enable graduates to develop entrepreneurship and leadership skills
4. PEO4: To enable graduates to contribute to the society in accordance with highest standards of ethics
5. PEO5: To develop breakthrough solutions enabling transformations in a rapidly changing IT world

**Programme Outcomes:**

The graduates of this programme will be able to demonstrate:

1. PO1: An Understanding of IT architecture, software and hardware concepts, functionalities and applications
2. PO2: An Ability to design, develop and test computer programs involving various algorithms, methodology and programming languages
3. PO3: Competency of business domains and functional processes that employ IT systems and applications
4. PO4: Practical use of communication protocols and their applications in the field of Internet and World Wide Web
5. PO5: Sound understanding of fundamentals of computer as the central enabling platform for information management in 21$^{st}$ century
6. PO6: An Ability to develop, integrate, maintain and innovate software applications deployed in various multi-disciplinary domains
7. PO7: Thought leadership to design and implement practical solutions for global industry needs.
8. PO8: Acumen to embrace and adopt futuristic IT technological developments
9. PO9: Sound knowledge of entrepreneurship traits to succeed
10. PO10: Adoption of practices that are ethical ensuring transparency and accountability
11. PO11: Capability to provide solutions that are socially empowering and environment friendly
12. PO12: Effective communication and collaboration techniques with stakeholders to achieve best results.

| | | | |
|---|---|---|---|
| **Course Title:** | **Engineering Mathematics – III** | **Semester III** | |
| **Course Code** | **BTBSC301** | **Course Type** | **Compulsory** |
| **Prerequisite** | **BTBS201** | **L – T – P** | **3 – 1 – 0** |
| **Stream** | **Basic Science** | **Credits** | **4** |

**Course Objectives:**

1. To provide in depth knowledge of complex numbers
2. To find the solution of differential equations
3. To find an in-depth knowledge of Fourier series analysis of periodic function

**Course Outcomes:**

After learning the course the students should be able:

1. To develop an ability to use characteristics of complex numbers in problem pertaining to electric circuits
2. To develop an acquaintance with the method of finding solution of differential equations
3. To develop an in depth knowledge of vector differentiation and vector integration
4. To develop Fourier series expansion of different periodic functions

**Course Content:**

## UNIT I

**Laplace Transform**

Definition – conditions for existence ; Transforms of elementary functions ; Properties of Laplace transforms - Linearity property, first shifting property, second shifting property, transforms of functions multiplied by $t^n$, scale change property, transforms of functions divided by t, transforms of integral of functions, transforms of derivatives ; Evaluation of integrals by using Laplace transform ; Transforms of some special functions- periodic function, Heaviside-unit step function, Dirac delta function.

## UNIT II

**Inverse Laplace Transform**

Introductory remarks ; Inverse transforms of some elementary functions ; General methods of finding inverse transforms ; Partial fraction method and Convolution Theorem for finding inverse Laplace transforms ; Applications to find the solutions of linear differential equations and simultaneous linear differential equations with constant coefficients.

## UNIT III

**Fourier Transform**

Definitions – integral transforms ; Fourier integral theorem (without proof) ; Fourier sine and cosine integrals ; Complex form of Fourier integrals ; Fourier sine and cosine transforms ; Properties of Fourier transforms ; Parseval's identity for Fourier Transforms.

## UNIT IV

**Partial Differential Equations and Their Applications**

Formation of Partial differential equations by eliminating arbitrary constants and functions; Equations solvable by direct integration; Linear equations of first order (Lagrange's linear equations); Method of

separation of variables – applications to find solutions of one dimensional heat flow equation $\left(\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}\right)$, and two dimensional heat flow equation (i.e. Laplace equation : $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ ).

## UNIT V

**Functions of Complex Variables (Differential calculus)**

Limit and continuity of f(z); Derivative of f(z) ; Analytic functions; Cauchy- Riemann equations in Cartesian and polar forms; Harmonic functions in Cartesian form; Mapping: Translation, magnification and rotation, inversion and reflection , bilinear transformation; Conformal mapping.

## UNIT VI

**Functions of Complex Variables (Integral calculus)**

Cauchy's integral theorem; Cauchy's integral formula; Residues; Cauchy's residue theorem (All theorems without proofs).

**Text Books:**


1. B. S. Grewal, **"*Higher Engineering Mathematics*"**, Khanna Publishers, New Delhi.
2. H. K. Das, Er. RajnishVerma, **"*Higher Engineering Mathematics*"**, S. Chand & CO. Pvt. Ltd., New Delhi.
3. Dr. B. B. Singh, **"A course in Engineering Mathematics (Volume-III)"**, Synergy Knowledge ware, Mumbai.
4. B. V. Ramana, ***"Higher Engineering Mathematics"***, Tata McGraw-Hill Publications, New Delhi.


**Reference Books:**


1. Erwin Kreyszig, **"*Advanced Engineering Mathematics*"**, John Wiley & Sons, New York.
2. Peter O' Neil, ***"A Text Book of Engineering Mathematics"***, Thomson Asia Pvt. Ltd., Singapore.
3. C. R. Wylie, L. C. Barrett, ***"Advanced Engineering Mathematics"***, Tata McGraw-Hill Publishing Company Ltd., New Delhi.
4. C. R. Wylie & L. C. Barrett, ***"Integral Transforms and their Engineering Applications"***, Synergy Knowledge ware, Mumbai.
5. I. N. Sneddon, ***"Integral Transforms"***, Tata McGraw-Hill, New York.


**General Instructions:**

1. The tutorial classes in Engineering Mathematics-III are to be conducted batch wise. Each class should be divided into three batches for the purpose.
2. The internal assessment of the students for 20 marks will be done based on assignments, surprise tests, quizzes, innovative approach to problem solving and percentage attendance.
3. The minimum number of assignments should be eight covering all topics.

| | | | |
|---|---|---|---|
| **Course Title:** | **Switching Theory and Logic Design** | **Semester III** | |
| **Course Code** | **BTITC302** | **Course Type** | **Compulsory** |
| **Prerequisite** | **Nil** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Core** | **Credits** | **3** |

**Course Objectives:**

1. To learn numbering systems used in digital world and its representation, arithmetic operations, error detection and correction methods.
2. To learn Boolean algebra, logic gates, logic families, realization of Boolean expressions and minimization techniques.
3. To study the sequential logic circuits design used in synchronous and asynchronous modes.
4. To describe various programmable logic devices.

**Course Outcomes:**

After learning the course the students should be able to:

1. Illustrate theory of Boolean algebra and the underlying features of various numbering systems.
2. Design various combinational & sequential logic circuits.
3. Demonstrate working of flip-flop.

**Course Content:**

**UNIT I**

Number Systems and Codes: Number systems: Binary, Octal, Hexadecimal number systems, Binary arithmetic, Codes: Binary code, Excess-3 code, Gray code, Error detection and correction codes.

**UNIT II**

Boolean algebra and Logic Functions: Boolean algebra: Postulates and theorems, Logic functions, Minimization of Boolean functions using algebra, Karnaugh map and Quine – McClusky methods, Realization using logic gates.

**UNIT III**

Classification of logic families, Characteristics of digital ICs- Speed of operation, power dissipation, figure of merit, fan in, fan out, current and voltage parameters, noise immunity, operating temperatures and power supply requirements, TTL logic, Operation of TTL NAND gate, active pull up, wired AND, open collector output, unconnected inputs, Tri-State logic, CMOS logic, CMOS inverter, NAND, NOR gates, unconnected inputs, wired logic, open drain output, Interfacing CMOS and TTL.

**UNIT IV**

Combinational Functions: Realizing logical expressions using different logic gates, Design of combinational circuits using combinational IC's, Realization of adders and subtractors, Design of code converters, Comparators and decoders, Design of multiplexers, Demultiplexers.

## UNIT V

Introduction to Sequential Circuits: Moore and mealy machines, Introduction to flip-flops like SR, JK, D and T with truth tables, Logic diagrams and timing relationships, Conversion of flip-flops, Excitation table, State tables, Realization of state stables.

## UNIT VI

Programmable Logic Devices: Semiconductor memories, RAM, ROM, EPROM, EEPROM, NVRAM, SRAM, DRAM, PLA, PAL, Memory System design.

**Text Books:**


1. M. M. Mano, ***"Digital Logic and Computer Design"***, Prentice Hall of India Publication, 4th Edition, 2006.
2. R.P. Jain, ***"Modern Digital Electronics"***, Tata McGraw Hill Publication, 4th Edition, 2010.


**Reference Books:**


1. D. P. Leach, A. P. Malvino, G. Saha, ***"Digital Principles and Applications"***, Tata McGraw Hill Publication, 8th Edition, 1993.
2. Comer, ***"Digital Logic & State Machine Design"***, Oxford Universities Press, 3rd Edition, 2014.

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|---|---|---|---|
| **Course Title:** | **Object Oriented Paradigm with C++** | **Semester III** | |
| **Course Code** | **BTITC303** | **Course Type** | **Compulsory** |
| **Prerequisite** | **BTES104** | **L – T – P** | **3 – 1 – 0** |
| **Stream** | **Core** | **Credits** | **4** |

**Course Objectives:**

1. This course focuses on principles of object oriented programming paradigm. The course also includes practice of writing programs in C++ and Java

**Course Outcomes:**

After learning the course, the students should be able:

**1.** To draw the control flow of a program.
**2.** To understand the storage concepts in a simple program.
**3.** To program using basic concepts of OO languages i.e. objects, encapsulation, data hiding etc.
**4.** To program using advanced concepts of OO languages i.e. associations, packages, interfaces, exception handling etc.
**5.** To work with functional, Logic programming paradigms.

**Course Content:**

**UNIT I**

Elements of computer systems, DOS commands and Linux environment, Language processors, Algorithms, Flowcharts, Object-Oriented Programming Paradigm: Benefits, Applications, Object-Oriented Systems Development, Object-Oriented Analysis: Static and dynamic modeling, Object-Oriented Design: Class design and algorithm.

**UNIT II**

Beginning with C++: Tokens, Data types, Operators, Expressions, and Control structures, Array, Functions, Structures and Unions, Class and Objects, specifying a class, Defining member functions, Private member functions, Static data and member functions, Arrays of objects, Friend functions.

**UNIT III**

Constructors and Destructors: Constructor, Parameterized constructors, Multiple constructors in a class, Copy constructors, Dynamic constructors, Destructor. Programming for class diagram and relationship.

**UNIT IV**

Inheritance: Single inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical inheritance, Hybrid inheritance, Virtual base classes, Abstract classes.

**UNIT V**

Polymorphism: Operator overloading, Function overloading, Virtual functions, pure virtual functions, Abstract class, Working with Files: Classes for file stream operations and I/O stream operation,

Opening and closing a file, Detecting end-of-file, More about Open(): File Modes, Sequential input and output operations.

## UNIT VI

Exception Handling: Fundamentals, Types of exceptions, Catching exceptions, Multiple catching, Nested try statements, Uncaught exceptions, Throw and throws, Built-in exceptions, Creating exception subclasses, Using exceptions.

**Text Books:**


1. Robert Lafore, ***"Object Oriented Programming in C++"***, Pearson Education, 4th Edition, 2008.
2. E. Balagurusamy, ***"Object Oriented Programming with C++"***, Tata McGraw Hill Publication, 6th Edition, 2013.


**Reference Books:**


1. J. R. Hubbard, ***"Programming with C++: Schaum's Outlines"***, Tata McGraw-Hill publication, 2005.
2. P. J. Deitel, H.M.Deitel, ***"C++ How to Program"***, Pearson Education, 9th Edition, 2016.

| | | | |
|---|---|---|---|
| **Course Title:** | **Computer Architecture and Organization** | **Semester III** | |
| **Course Code** | **BTCOC304** | **Course Type** | **Compulsory** |
| **Prerequisite** | **Nil** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Core** | **Credits** | **3** |

**Course Objectives:**

1. To understand the structure, functions and characteristics of computer systems.
2. To learn basics of Parallel Computer Architecture.
3. To study hierarchical memory system including cache memories and virtual memory.
4. To identify input / output devices and their data transfer mechanism.

**Course Outcomes:**

After learning the course, the students should be able:

1. To identify components of a computer system, including CPU, memory, and input/output units.
2. To explain instruction types, its execution and interrupt mechanism.
3. To illustrate numerical and character representations in digital logic and floating point arithmetic.

**Course Content:**

**UNIT I**

**Introduction:** Concept of computer organization and architecture, Fundamental unit, Computer function and interconnection, CPU structure and function.

**UNIT II**

**Instruction Sets:** Characteristics, Types of operands, Types of operations, Assembly language, Addressing modes, Instruction format, Types of instruction, Instruction execution, Machine state and processor status, Structure of program, Introduction to RISC and CISC architecture.

**UNIT III**

**Computer Arithmetic:** The arithmetic and logic Unit, Integer representation, Integer arithmetic, Floating point representation, Floating point arithmetic, Introduction of arithmetic co-processor.

**UNIT IV**

**Memory Organization:** Internal Memory: Semiconductor main memory, Error correction, Advanced DRAM organization, Virtual memory systems and cache memory systems, External Memory: Organization and characteristics of magnetic disk, Magnetic tape, Optical memory, RAID, Memory controllers.

**UNIT V**

**Control Unit**: Control unit operation: Micro-operations, Control of the processor, Hardwired implementation, Micro-programmed Control Unit, Basic concepts, Micro-instruction sequencing, Micro-instruction execution, Applications of micro-programming.

**UNIT VI**

**Input/ Output Organization:** External devices, I/O module, Programmed I/O, Interrupt driven I/O,

Direct memory access, I/O channels and processors, External interface.

**Instruction pipe-lining:** Concepts, Parallel processing: Multiple processor organization, Symmetric multiprocessor, Cache coherence and the MESI protocol.

**Text Books:**


1. William Stalling, ***"Computer Organization and Architecture: Designing for Performance"***, 8th Edition, Prentice Hall Publication, 2009.
2. Hayes, ***"Computer Architecture and Organization"***, 3rd Edition, McGraw-Hill Publication, 2012.
3. Zaky, **"*Computer Organization"***, 5th Edition, McGraw-Hill Publication, 2011.


**Reference Books:**


1. Morgan and Hennessy and Patterson, ***"Computer Architecture: A Quantitative Approach"***, 4th Edition, Kaufman Publication, 2007.
2. Morris Mano, ***"Computer System Architecture"***, 3rd Edition, Pearson Education India, 2007.
3. Mostafa Abd-El-Barr, Hesham El-Rewini, ***"Fundamentals of Computer Organization and Architecture"***, 1st Edition, Wiley Publication, 2004.
4. Miles J. Murdocca, Vincent P. Heuring, ***"Computer Architecture and Organization: An Integrated Approach"***, 1st Edition, Wiley Publication, 2007.

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|---|---|---|---|
| **Course Title:** | **Advanced Engineering Chemistry** | **Semester III** | |
| **Course Code** | **BTBSE305A** | **Course Type** | **Elective** |
| **Prerequisite** | **BTBS102** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Basic Science** | **Credits** | **3** |

**Course Objectives:**

1. To introduce this subject of Advanced Engineering Chemistry.
2. To impart the basic and advanced knowledge to the students.
3. To understand, remember and capable to explain and apply this knowledge in the field of Engineering/ Technology.

**Course Outcomes:**

After learning the course, the students should be able:

1. To classify and explain various types of Corrosion and should apply methods to minimize the rate of Corrosion.
2. To apply concepts of Photochemical and Thermal reactions.
3. To explain basic concepts of Polymers, Polymerization.
4. To determine molecular weight of High-Polymer.
5. To apply the basic techniques in Chemistry and capable to explain concept of Solvent Extraction.
6. To explain concept of Thermo Gravimetric Analysis (TGA).

**Course Content:**

**UNIT I**

**Corrosion and its Control:**
Introduction, Fundamental reason, Electrochemical Corrosion, Direct Chemical Corrosion, Factors affecting the rate of corrosion, types of corrosion-Galvanic, Pitting Corrosion, Stress corrosion, methods to minimize the corrosion- Proper design, Cathodic and Anodic protection.

**UNIT II**

**Photochemical and Thermal Reactions**
Introduction, Laws of Photochemistry, Measurement of absorbed intensity, Quantum yield or efficiency, Jablonski Diagram, Photosynthesis reaction of Hydrogen Bromide, Brief discussion on Thermal Reactions- Cope Rearrangement.

**UNIT III**

**Polymers**
Introduction, Nomenclature of polymers, types of polymerisation, molecular weight determination by osmotic pressure and viscosity method. Plastic and its classification, Constituents of Plastic, Moulding of plastic by Injection method.

**UNIT IV**

**Reaction Mechanism and Reaction Intermediates**
Introduction of reaction mechanism, Brief introduction of reactivity of substrate (Inductive effect,

Mesomeric effect, Electromeric Effect, Hyperconjugative effect), Bond fission: Homolytic and Heterolytic bond fission, Reaction Intermediates: Carbocation( Structure, Stability and applications), Carbanion ( Structure, Stability and applications).

**Rearrangement reactions**:

Intramolecular Rearrangement: Isomerisation, Beckmann Rearrangement, Benzidine Rearrangement
Intermolecular Rearrangement: Orton Rearrangement, Diazoamino Rearrangement

## UNIT V

**Spectroscopy**

Brief introduction to spectroscopy, UV – Visible Spectroscopy: Laws of absorption, instrumentation and application. IR spectroscopy: introduction, theory, instrumentation and application. Brief discussion on NMR Spectroscopy, AAS (Atomic Absorption Spectroscopy)

## UNIT VI

**Instrumental Methods of Analysis**

Introduction to Chromatography, Types of Chromatography (Adsorption and partition chromatography), Thin Layer Chromatography, Gas Chromatography – introduction, theory, instrumentation. Brief discussion of Thermo gravimetric analysis (TGA).

**Text Books:**


1. Bhal and Bhal, ***"Advance Organic Chemistry"***, S. Chand & Company, New Delhi, 1995.
2. Jain P.C & Jain Monica, ***"Engineering Chemistry"***, Dhanpat Rai & Sons, New Delhi, 1992.Bhal & Tuli, ***"Text book of Physical Chemistry",*** S. Chand & Company, New Delhi, 1995.
3. Chatwal Anand, **"Instrumental Methods of Analysis"**, Himalaya Publication.
4. Rakesh K. Parashar, V.K. Ahluwalia, "***Text Book of Organic Chemistry***".


**Reference Books:**


1. Finar I.L., ***"Organic Chemistry (Vol. I & II)"***, Longman Gr. Ltd & English Language Book Society, London.
2. Barrow G.M., ***"Physical Chemistry"***, McGraw-Hill Publication, New Delhi.
3. Shikha Agarwal, ***"Engineering Chemistry- Fundamentals and Applications"***, Cambridge Publishers, 2015.
4. O. G. Palanna, ***"Engineering Chemistry"***, Tata McGraw-Hill Publication, New Delhi.
5. WILEY, ***"Engineering Chemistry"***, Wiley India, New Delhi, 2014.
6. Willard, Dean, Merrit, ***"Instrumental Methods of Analysis"***, McGraw - Hill.
7. Glasstone, ***"Physical Chemistry"***.
8. Peter Atkins, ***"Physical Chemistry"***, W.H. Freeman & Co. 9$^{th}$ Edition, 2009.

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|---|---|---|---|
| **Course Title:** | **Programming in Java** | **Semester III** | |
| **Course Code** | **BTITE305B** | **Course Type** | **Elective** |
| **Prerequisite** | **BTES104** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Professional Core** | **Credits** | **3** |

**Course Objectives:**

1. Understand fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
2. Understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
3. Be able to use the Java SDK environment to create, debug and run simple Java programs.

**Course Outcomes:**

After learning the course, the students should be able to:

1. Know the structure and model of the Java programming language.
2. Use the Java programming language for various programming technologies.
3. Develop software in the Java programming language (application).

## UNIT I

**Introduction to Java**

Fundamentals of Object-oriented Programming, Evolution of Java, Overview of Java Language: Data types in Java, Operators and expressions, Decision Making and Branching: Control Statements such as If Else, Do statement, For statement, The Else if ladder, Jumps in loops, Labelled loops, While repetition statement, Switch statement, Break and continue statement, Arrays, Strings and Vectors: Creating one dimensional and multidimensional array, Strings, Vectors, Wrapper classes, Enumerated types, Annotations.

## UNIT II

**Object Oriented Programming**

Classes , Objects And Methods: Defining class , Methods, Creating objects , Accessing Class members, Static Methods , Finalize Methods, Visibility Control, Method overloading, Method Overriding, Recursion. Interfaces, Constructors and finalizes Methods.

## UNIT III

**Packages and Applet Programming**

Java API Packages, Using System Packages, Naming conventions, Creating Packages and Jar Files, Accessing and using a package, Hiding Classes, Applet Programming.

## UNIT IV

**Multithreading**

Creating threads, Extending Thread Class, Stopping and Blocking a thread, Life cycle of a thread, Using thread method, Thread exceptions, Implementing the Run able interface, Interthread communication.
Managing Errors and Exceptions: Types of errors, Exceptions, Syntax of exception handling code,

Multiple catch statements, Throwing your own exception, Using exceptions for debugging.

## UNIT V

**Graphics Programming**

The Graphics class, Lines and Rectangles, Circles, Arc and ellipses, Polygons, Drawing Bar charts, AWT Package and Swings.

## UNIT VI

**Managing Files & I/O Handling**

Files and Streams, Stream classes, Byte Stream Classes , Character Stream Classes, Using Streams, Reading / writing bytes and characters , Interactive Input and Output, Other Stream classes.

**Text Books**


1. E. Balagurusamy, **"*Programming with Java – A Primer*"**, Tata – McGraw-Hill Publication, 4th Edition, 2010.
2. Steven Holzner et al. **"*Java 2 Programming*"**, Black Book, Dreamtech Press, 2009.


**Reference Books**


1. H.M. Deitel, P.J. Deitel, **"*Java - How to Program*"**, PHI Publication, 6th Edition, 2005.
2. Bruce Eckel, **"*Thinking in Java*"**, PHI Publication.
3. Patric Naughton, Michael Morrison, **"*The Java Handbook*"**, McGraw Hill Publication.
4. Tim Lindholm, Frank Yellin, Bill Joy, Kathi Walrath, **"*The Java Virtual Machine Specification*"**, Addison Wesley Publication.

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|---|---|---|---|
| **Course Title:** | **Introduction to Web Technology** | **Semester III** | |
| **Course Code** | **BTITE305C** | **Course Type** | **Elective** |
| **Prerequisite** | **Nil** | **L – T – P** | **2 – 1– 0** |
| **Stream** | **Professional Core** | **Credits** | **3** |

**Course Objectives:**

1. Overview of modern Web technologies.
2. To use different web scripting technology.
3. To understand web hosting, server type, debugging, and performance driven application development.
4. To understand user interface and awareness of real-world knowledge.

**Course Outcomes:**

1. To understand World Wide Web and latest trends in web-development.
2. Real world knowledge of design and development.
3. Design and development of web application with all industrial standards.
4. Awareness of web hosting, server type, debugging.

## UNIT I

Introduction to World Wide Web, Features of web, HTTP, Web Servers, Introduction to Scripting Language, Browser, Integrated Development Environment.

## UNIT II

**HTML:** Introduction to HTML, Basics of HTML, Formatting and fonts, Commenting code, HTML heading, Block element, Inline element, Comment, Attributes, Hyperlink, Lists, Tables, Images, Forms, Meta tags, Character entities, Frames sets.

## UNIT III

**Advance HTML:** Overview and features of HTML5, Includes External File, Responsive Layout with Media Queries, Marquee, Semantic Tags, HTML Symbol, URL Encode, Cashing, Video Tags, Audio Tags, Image Maps.

## UNIT IV

**CSS:** Introduction To CSS, Selector, Basic Syntax And Structure, Padding, Margin, Manipulating Texts, Display, Height, Width, Border, Color, Fonts, Positioning Using CSS, Overview And Features Of CSS3.

## UNIT V

**PHP:** Introduction to PHP, Features of PHP, Basics of PHP, Syntax, Variable, Printing Output, Array, String, Function, Data types, Operator, Loops, Conditional Statement, Introduction To Advance PHP, Form Processing, Files, PHP Cookies, PHP Sessions, Constant, PHP Magic Function, PHP Global Variable, Error Handling, Exception, Connection with Database, Curd Operation in PHP.

## UNIT VI

Web Hosting, Debugging and Unit Testing, Browser Compatibility.

**Text Book**

1. Snehal Joglekar, **"*HTML and CSS- Web Technologies*"**, Nirali Prakashan, 2013.

**Reference Books**

1. Thomas Powell, **"*HTML & CSS: The Complete Reference*"**, 5th Edition, McGraw Hill Publication.
2. Steven Holzner, **"*PHP: The Complete Reference*"**, 1st Edition, McGraw Hill Publication.

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|---|---|---|---|
| **Course Title:** | **Interpersonal Communication Skills and Self Development for Engineers** | **Semester III** | |
| **Course Code** | **BTHM3402** | **Course Type** | **Elective** |
| **Prerequisite** | **BTHM204** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Humanities, Social Science and Management** | **Credits** | **3** |

**Course Objectives:**

1. To build the skills like team building so that they can work efficiently in groups.
2. To provide knowledge of conflict management while working in large organizations.
3. To develop management skills required in routine work environment.
4. To polish the personality of the learners in order to make them good leaders and employees.

**Course Outcomes:**

1. Learners will acquire interpersonal communication skills.
2. Learners will develop the ability to work independently.
3. Learners will develop the qualities like self-discipline, self-criticism and self-management.
4. Learners will have the qualities of time management and discipline.

## UNIT I

**Development of Proficiency in English**

Speaking skills, Feedback & questioning technique, Objectivity in argument (Both one on one and in groups), 5 Ws & 1 H & 7 Cs for effective Communication, Imbibing Etiquettes and manners, Study of different pictorial expressions of non-verbal communication and their analysis

## UNIT II

**Self Management**

Self Management, Self Evaluation, Self discipline, Self criticism, Recognition of one's own limits and deficiencies, dependency, etc.

Self Awareness, Self Management, Identifying one's strengths and weaknesses, Planning & Goal setting, Managing self-emotions, ego, pride,- Leadership & Team Dynamics

## UNIT III

**Time Management Techniques**

Practice by game playing and other learning strategies to achieve the set targets Time Management Concept, Attendance, Discipline & Punctuality, Acting in time, Quality /Productive time.

## UNIT IV

**Motivation/ Inspiration**

Ability to shape and direct working methods according to self-defined criteria, Ability to think for oneself, Apply oneself to a task independently with self-motivation,

**Motivation techniques: Motivation** techniques based on needs and field situations

## UNIT V

**Interpersonal Skills Development**

Positive Relationship, Positive Attitudes, Empathies: comprehending others' opinions, points of views, and face them with understanding, Mutuality, Trust, Emotional Bonding, Handling Situations (Interview), Importance of interpersonal skills

## UNIT VI

**Effective Computing Skills**

Designing an effective Presentation: Contents, appearance, themes in a presentation, Tone and Language in a presentation, Role and Importance of different tools for effective presentation

**Reference books:**


1. Mitra, Barun, **"*Personality Development and Soft Skills"***, Oxford University Press, 2016.
2. Ramesh, Gopalswamy, **"*The Ace of Soft Skills: Attitude, Communication and Etiquette for Success"***, Pearson Education, 2013.
3. Covey, Stephen R., **"*Seven Habits of Highly Effective People: Powerful Lessons in Personal Change"***.
4. Osenberg Marshall B., **"*Nonviolent Communication: A Language of Life"***.

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|---|---|---|---|
| **Course Title:** | **Basic Human Rights** | **Semester III** | |
| **Course Code** | **BTHM3401** | **Course Type** | **Audit** |
| **Prerequisite** | **Nil** | **L – T – P** | **2 – 0 – 0** |
| **Stream** | **Humanities, Social Science and Management** | **Credits** | **Audit** |

**Course Objectives:**

**1.** To work for ensuring that basic human rights are respected everywhere.
**2.** To cooperate to avoid compromising on human rights for economic or political expediency.
**3.** To recognize democratic institutions as a fundamental human right.
**4.** To work towards the sovereignty and self-determination of entities with historical, cultural and ecological identity.
**5.** To actively engage with the Government of India and other countries to promote human rights education.
**6.** To bring diplomatic and commercial pressures on regimes that violates human rights, to ensure that they respect the basic rights of their citizens.
**7.** To keep the interests of disempowered communities foremost in all dealings with countries in which human rights violations occur.
**8.** To develop a more distinctive and effective role for the International Court of Justice in the field of human rights.
**9.** To promote a culture for educating the citizenry that cultivation and promotion of human rights culture is the sine qua non for the smooth functioning of the organs of a democratic State and for the kind of development that results into overall development of the society.
**10.** To train the young men and women for facing the challenges of the pluralistic society and the rising conflicts and tensions in the name of particularistic loyalties to caste, religion, region and culture.
**11.** To study the effect of draconian laws and unlawful use of State's machinery and force by the enforcement agencies.

**Course Outcomes:**

After learning the course, the students should be able to:

1. Appreciate the importance of the values of human rights.
2. Strengthen respect for human rights and fundamental freedoms and respect others caste, religion, region and culture.
3. Know about regional, national, state, and local law that reinforces international human rights law.
4. Understand being able to use global, regional, national, and local human rights instruments and mechanisms for the protection of human rights.
5. Be aware of rights as Indian citizen.
6. Understand the importance of groups and communities in the society.
7. Realize the philosophical and cultural basis and historical perspectives of human rights.
8. Make students aware of their responsibilities towards the nation.

**Course Content:**

## UNIT I

Introduction: Magna Carta, English bill of rights, American/French declaration, Universal declaration of human rights: Background, Content and relevance, Theories/Justification/Perspectives on Human Rights, Natural, Moral, Legal and human rights, Natural rights, Positivist, Liberal, Marxist, Feminist, Asian perspectives.

## UNIT II

Debates: Universality of rights, Rights vs. duties, Individual vs. group rights, Civil and political rights vs. social, The notion of rights in various religious traditions (Hindu, Muslim, Buddhist traditions), Western Influence (especially the impact of the British rule), National freedom movement, The roles of Gandhi, Ambedkar and Nehru.

## UNIT III

Constitutional provisions (especially fundamental rights vs. directive principles of state policy and emergency), Intergovernmental Organization, The United Nations (study of specific UN agencies related to human rights), Regional instruments.

## UNIT IV

International NGO - Amnesty international: It's working and impact on India, Case studies of selected national NGOs, Case studies of selected regional NGOs, The government: Role of some of its agencies including the army, Police and paramilitary forces.

## UNIT V

National Human Rights Commission of India - Background, Structure and functioning, International humanitarian law, International refugee law, The judiciary including public interest litigation, The medical profession and human rights, The role of the media in human rights.

## UNIT VI

Some Issues in Human Rights : Violence and terrorism, Women's rights, Child rights, Dalit rights, Minority rights, Tribal rights, Refugee rights, Capital punishment, Euthanasia, Rights of the elderly, Gay Rights.

**Text Books**


1. D. D. Basu, V. R. Manohar, B. P. Banerjee, S.A. Khan, ***"Introduction to the Constitution of India"***, 20th Edition, Lexis Nexis Butterworths publication, 2008.
2. A. R. Desai, ***"Violation of Democratic Rights in India"***, Bombay Popular Prakashan.

**Reference Books:**


1. M. Mohanty, P. N. Mukherji, O. Tornquist, ***"People's Rights: Social Movements and the State in the Third World"***, New Delhi, Sage Publications, 1998.
2. Nanda, P. Ved, J. R. Scarritt, G. W. Shepherd, ***"Global Human Rights: Public Policies Comparative Measures and NGO Strategies"***, Boulder Westview Press Inc., 1981.
3. Nirmal, J. Chiranjivi, ***"Human Rights in India: Historical, Social and Political Perspectives"***, New Delhi, Oxford University Press, 2000.
4. Kothari, Smitu, Harsh Sethi, ***"Rethinking Human Rights: Challenges for Theory and Action"***, Lokayan, Delhi, 1991.
5. A. J. M. Milne, ***"Human Rights and Human Diversity: An Essay in the Philosophy of Human Rights"***, New York State University of New York Press, 1986.

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|---|---|---|---|
| **Course Title:** | **Switching Theory and Logic Design Lab** | **Semester III** | |
| **Course Code** | **BTITL306** | **Course Type** | **Compulsory** |
| **Prerequisite** | **Nil** | **L – T – P** | **0 – 0 – 2** |
| **Stream** | **Core** | **Credits** | **1** |

**Lab Experiments Objective:**

1. Implement Flip-Flops, Multiplexer and De-multiplexer, Counters and arithmetic operations

**Lab Experiments List:**

1. Study of basic and Universal gates
2. Implementation of Boolean functions using Gates
3. Implementation of following code conversions:
    a) Binary to gray
    b) Gray to binary
    c) Excess –3 to BCD
    d) BCD to Excess –3.
4. Implementation of half adder, full adder
5. Implementation of half subtractor, full subtractor
6. Implementation of K-map examples
7. Implementation of Quine- McClusky examples
8. Implementation of Multiplexer and Demultiplexer
9. Implementation of BCD adder using 4 bit adder IC
10. Study of flip flops:
    a) RS flip-flop
    b) D flip-flop
    c) T flip-flop
    d) J-K flip-flop

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|---|---|---|---|
| **Course Title:** | **Object Oriented Paradigm with C++ Lab** | **Semester III** | |
| **Course Code** | **BTITL307** | **Course Type** | **Compulsory** |
| **Prerequisite** | **BTES107L** | **L – T – P** | **0 – 0 – 2** |
| **Stream** | **Core** | **Credits** | **1** |

**Lab Experiments Objective:**

1. Programming using C++

**Lab Experiments List:**

1. Raising a number n to a power p is the same as multiplying n by itself p times. Write a function called power () that takes a double value for n and an int value for p, and returns the result as double value. Use a default argument of 2 for p, so that if this argument is omitted, the number will be squared. Write a main () function that gets values from the user to test this function.

2. A point on the two-dimensional plane can be represented by two numbers: an X coordinate and a Y coordinate. For example, (4,5) represents point 4 units to the right of the origin along the X axis and 5 units up the Y axis. The sum of two points can be defined as a new point whose X coordinate is the sum of the X coordinates of the points and whose Y coordinate is the sum of their Y coordinates. Write a program that uses a structure called point to model a point. Define three points, and have the user input values to two of them. Then set the third point equal to the sum of the other two, and display the value of the new point. Interaction with the program might look like this:

   Enter coordinates for P1: 3 4
   Enter coordinates for P2: 5 7
   Coordinates of P1 + P2 are: 8, 11

   Create the equivalent of a four-function calculator. The program should request the user to enter a number, an operator, and another number. It should then carry out the specified arithmetical operation: adding, subtracting, multiplying, or dividing the two numbers. (It should use a switch statement to select the operation). Finally, it should display the result. When it finishes the calculation, the program should ask if the user wants to do another calculation. The response can be Y or N. Some sample interaction with the program might look like this:

   Enter first number, operator, second number: 10/ 3
   Answer = 3.333333
   Do another (Y/ N)? Y
   Enter first number, operator, second number 12 + 100
   Answer = 112
   Do another (Y/ N)? N

3. A phone number, such as (212) 767-8900, can be thought of as having three parts: the area code (212), the exchange (767) and the number (8900). Write a program that uses a structure to store

these three parts of a phone number separately. Call the structure phone. Create two structure variables of type phone. Initialize one, and have the user input a number for the other one. Then display both numbers. The interchange might look like this:

Enter your area code, exchange, and number: 415 555 1212
My number is (212) 767-8900
Your number is (415) 555-1212

Create two classes DM and DB which store the value of distances. DM stores distances in meters and centimeters and DB in feet and inches. Write a program that can read values for the class objects and add one object of DM with another object of DB. Use a friend function to carry out the addition operation. The object that stores the results maybe a DM object or DB object, depending on the units in which the results are required. The display should be in the format of feet and inches or meters and centimeters depending on the object on display.

4. Create a class rational which represents a numerical value by two double values-NUMERATOR and DENOMINATOR. Include the following public member Functions: constructor with no arguments (de-fault), constructor with two arguments, void reduce () that reduces the rational number by eliminating the highest common factor between the numerator and denominator.

   Overload + operator to add two rational numbers
   Overload - operator to enable input through cin
   Overload * operator to enable output through cout
   Write a main ( ) to test all the functions in the class.

5. Consider the following class definition:

```
class father {
protected age;
public;
father (int x) {age = x;}
virtual void iam()
{
cout<<“I AM THE FATHER ” ;
cout << “My age is : ” <<age<< endl;}
};
```

Derive the two classes son and daughter from the above class and for each, define iam () to write similar but appropriate messages. You should also define suitable constructors for these classes. Now, write a main() that creates objects of the three classes and then calls iam ( ) for them. Declare pointer to father. Successively, assign addresses of objects of the two derived classes to this pointer and in each case, call iam () through the pointer to demonstrate polymorphism in action.

6. Write a program that creates a binary file by reading the data for the students from the terminal. The data of each student consist of roll number, name (a string of 30 or lesser number of characters) and marks.

7. A hospital wants to create a database regarding its indoor patients. The information to store include

    Name of the patient
    Date of admission
    Disease
    Date of discharge

    Create a structure to store the date (year, month and date as its members). Create a base class to store the above information. The member function should include functions to enter information and display a list of all the patients in the database. Create a derived class to store the age of the patients. List the information about all the patients to store the age of the patients. List the information about all the pediatric patients (less than twelve years in age).

8. Imagine a tollbooth with a class called toll Booth. The two data items are a type Unsigned Int to hold the total number of cars, and a type double to hold the total amount of money collected. A constructor initializes both these to 0. A member function called payingCar ( ) increments the car total and adds 0.50 to the cash total. Another function called nopayCar( ), increments the car total but adds nothing to the cash total. Finally, a member function called display() displays the two totals i.e. total cars and total cash. Include a program to test this class. This program should allow the user to push one key to count a paying car, and another to count a nonpaying car. Pushing the ESC key should cause the program to print out the total cars and total cash and then exit.

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|---|---|---|---|
| **Course Title:** | **Programming Lab (Python)** | **Semester III** | |
| **Course Code** | **BTITL308** | **Course Type** | **Compulsory** |
| **Prerequisite** | **BTES107L** | **L – T – P** | **0 – 1 – 2** |
| **Stream** | **Core** | **Credits** | **2** |

**Lab Experiments Objective:**

1. To learn Python programming

**Lab Experiments List:**

1. Program to find the union of two lists.
2. Program to find the intersection of two lists.
3. Program to remove the "i" th occurrence of the given word in a list where words repeat.
4. Program to remove all tuples in a list of tuples with the USN outside the given range.
5. Program to count the occurrences of each word in a given string sentence.
6. Program to check if a substring is present in a given string.
7. Program to map two lists into a dictionary.
8. Program to count the frequency of words appearing in a string using a dictionary.
9. Program to create a dictionary with key as first character and value as words starting with that character.
10. Program to find the length of a list using recursion.
11. Program to read a file and capitalize the first letter of every word in the file.
12. Program to read the contents of a file in reverse order.
13. Program to create a class in which one method accepts a string from the user and another prints it.
14. Program to create a class and get all possible subsets from a set of distinct integers.

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|---|---|---|---|
| **Course Title:** | **Advanced Engineering Chemistry Lab** | **Semester III** | |
| **Course Code** | **BTBSEL309A** | **Course Type** | **Elective** |
| **Prerequisite** | **BTBS108L** | **L – T – P** | **0 – 0 – 2** |
| **Stream** | **Basic Science** | **Credits** | **1** |

**List of Experiments: (Perform any 8 – 9 Experiments)**

1. To determine λmax of given solutions.
2. To Verify Beer's Lambert's law.
3. Experiments on Paper and Thin Layer Chromatography. (two experiments)
4. Determination of rate of corrosion of metal.
5. Experiments related with Organic Chemistry. ( three experiments)
6. Experiments on pH metry.
7. Experiments on Conductometry.
8. Experiments on Flame Photometry.
9. Experiments on Solvent Extraction.
10. Estimation of Metals from Solution/ Alloys. (two experiments)
11. Synthesis of materials by various techniques. (two experiments)

**Reference Books:**


1. A. Sethi, "***Systematic experiments in Chemistry***", New Age International Publication, New Delhi.
2. A. I. Vogel, "***Practical Inorganic Chemistry"***, ELBS Publication.
3. S. S. Dara, ***"Practical in Engineering Chemistry"***.
4. A. I. Vogel, "***Practical Organic Chemistry***", ELBS Publication.

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|---|---|---|---|
| **Course Title:** | **Programming in Java Lab** | **Semester III** | |
| **Course Code** | **BTITEL309B** | **Course Type** | **Elective** |
| **Prerequisite** | **BTES107L** | **L – T – P** | **0 – 0 – 2** |
| **Stream** | **Professional Core** | **Credits** | **1** |

**List of Experiments:**

1. To create simple application to access data base using JDBC.
2. To read and write the files.
3. To implement polymorphism and method overriding in java.
4. To write programs implementing exception handling.
5. To write programs to illustrate interfaces in java.
6. To write programs to create package in java.
7. To design multi threaded programs in java.
8. To write programs to manipulate strings.
9. To write programs to draw various shapes using java applets.

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|---|---|---|---|
| **Course Title:** | **Introduction to Web Technology Lab** | **Semester III** | |
| **Course Code** | **BTITEL309C** | **Course Type** | **Elective** |
| **Prerequisite** | **Nil** | **L – T – P** | **0 – 0 – 2** |
| **Stream** | **Professional Core** | **Credits** | **1** |

**List of Experiments:**

1. Download XAMPP or WAMPP server, IDE, browsers to run HTML program.
2. Develop page to display fruits list with different color with heading on top of the page and link each fruit with fruit description page.
3. Develop using semantic element, page having menu bar in header section.
4. Develop user personal info form using HTML5 input control and decorate with CSS.
5. Develop responsive page layout using media queries.
6. Write a PHP program to print list of user info using array.
7. Write a PHP program to fetch user info from MYSQL database.
8. Write a PHP program to perform crud operation.
9. Write a PHP function to check palindrome string.
10. Write a PHP program using for loop to add all the integers between 0 and 30 and display the total.
11. Create a script to construct the pyramid of asterisk ('*') using nested for loop.
12. Write a program to calculate factorial of a number using for loop.
13. Write a program which will count the specific characters in the text.
14. Debug web site using developer tools, inspect element.

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|---|---|---|---|
| **Course Title:** | **Interpersonal Communication Skills and Self Development for Engineers Lab** | **Semester III** | |
| **Course Code** | **BTHML3402** | **Course Type** | **Elective** |
| **Prerequisite** | **BTHM209L** | **L – T – P** | **0 – 0 – 2** |
| **Stream** | **Humanities, Social Science and Management** | **Credits** | **1** |

**List of Experiments:**

1. General etiquettes and manners
2. Team building and group dynamics
3. Presentation Skills
4. Conducting meetings
5. Leadership Development
6. Skills in dealing with difficult people/situations
7. Persuasive writing
8. Negotiation skills
9. Conflict Resolution
10. Y-O-U-R-N-M-A-M-E Activity

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|---|---|---|---|
| **Course Title:** | **Microprocessors and Microcontrollers** | **Semester IV** | |
| **Course Code** | **BTITC401** | **Course Type** | **Compulsory** |
| **Prerequisite** | **BTCOC304** | **L – T – P** | **2– 1 – 0** |
| **Stream** | **Core** | **Credits** | **3** |

**Course Objectives:**

1. To understand 8086 microprocessor Architecture.
2. To understand design aspects of I/O and Memory Interfacing circuits.
3. To acquaint with instruction set and logic required to build assembly language programs.
4. To learn micro-controller architecture, its instruction set and interfaces.

**Course Outcomes:**

After learning the course the students should be able:

1. To design and implement programs on 8086 microprocessor.
2. To design I/O circuits and Memory Interfacing circuits.
3. To exhibit knowhow on micro-controller interfaces & programming.
4. To experiment with MCS51 and PIC18 micro-controller.

**Course Content:**

**UNIT I**

Intel 8086/8088 Microprocessor Family: Architecture and organization of 8086/8088 microprocessor family, Instruction set, Assembly language programming, Introduction to mixed language programming using C and Assembly language, 8086 family minimum and maximum mode operation, Timing diagram for 8086 family, Detailed study of maximum mode connection: Study of 8288 bus controller, 8086 interrupt structure.

**UNIT II**

8086 Instruction Set and Programming: Addressing modes, Instruction Set, ALP, Mixed language programming, Stacks, Strings, Procedures, Macros, Timers, Counters and delay, Programming examples using DOS and BIOS Interrupts, Device drivers programming.

**UNIT III**

8086 Interrupt System: 8086 Interrupt structure, Types and applications: Study of Interrupt Controller 8259A and Interrupt Priority Management using 8259A.

**UNIT IV**

Memory System Design and I/O Interfacing: Interfacing SRAM, ROM and DRAM to 8086, Address decoding and Timing Considerations, I/O interfacing in 8086: Serial communication interface includes Synchronous and Asynchronous, Protocols, Parallel communication interface includes I/O Mapped I/O, Memory Mapped I/O, and Handshaking Signals, 8087 Math Co-processor: Study of architecture of 8087, Floating point coprocessor, Data types supported by 8087, Host and coprocessor interface, Assembly language Programming for 8086 - 8087 based systems.

## UNIT V

Intel MCS 51 Family: Introduction to Single chip microcontrollers of Intel MCS 51 family, Architectural and operational features, Instruction set, CPU timing and machine cycles, Interrupt structure and priorities, Internal Timer / counters, Serial interface, Connection of external memory, Power saving modes, Interfacing of 8051 with EPROM, Programming for EPROM versions, 8051 variation.

## UNIT VI

Introduction to the PIC18 Microcontroller: Overview of the PIC18 MCU, The PIC18 Memory Organization, The PIC18 CPU Register, The PIC18 Pipelining, PIC18 Instruction Format, Addressing Modes, A Sample of PIC18 Instruction, Overview of the 8-Bit MCU Market.

**Text Books:**


1. Douglas Hall, ***"Microprocessors and Interfacing: Programming and Hardware"***, Tata McGraw-Hill, 2nd Edition.
2. Han-Way Huan, ***"An Introduction to Software and Hardware Interfacing"***, Delmar Cengage Learning, 2nd Edition, 2006.


**Reference Books:**


1. Peter Norton, ***"IBM PC, Assembly Language programming"***, BPB publication.
2. John Uffenback, ***"8086/8088 Interfacing, Programming and Design"***, Prentice Hall of India Publication.
3. A. K. Ray, K. M. Bhurchandi, ***"Advanced Microprocessors and Peripherals"***, Tata McGraw Hill, 2000.
4. John Uffenback**, *"8086/8088 Interfacing, Programming and Design"*,** Prentice Hall of India Publication.

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|---|---|---|---|
| **Course Title:** | **Data Structures and Applications** | **Semester IV** | |
| **Course Code** | **BTITC402** | **Course Type** | **Compulsory** |
| **Prerequisite** | **BTITC303** | **L – T – P** | **3 – 1 – 0** |
| **Stream** | **Core** | **Credits** | **4** |

**Course Objectives:**

1. To assess how the choice of data structures and algorithm design methods affects the performance of programs.
2. To choose the appropriate data structure and algorithm design method for a specified application.
3. To solve problems using data structures such as linear lists, stacks, queues, hash tables, binary trees, heaps, tournament trees, binary search trees, and graphs and writing programs for these solutions.
4. To solve problems using algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, branch and bound and writing programs for these solutions.

**Course Outcomes:**

After learning the course, the students should be able:

1. To write neat code by selecting appropriate data structure and demonstrate a working solution for a given problem.
2. To think of all possible inputs to an application and handle all possible errors properly.
3. To analyze clearly different possible solutions to a program and select the most efficient one.
4. To write an application requiring an effort of at least 1000 lines of code to demonstrate a good working solution.
5. To demonstrate the ability to write reusable code and abstract data types in C, using object-based way of thinking.

**Course Content:**

**UNIT I**

Introduction to Data Structures and Analysis of Algorithms: Need of data structures, Types of data structures, Recursion, ADT (Abstract Data Types), Basics of algorithm, Analysis of algorithm through time complexity and space complexity, Asymptotic notations, Pseudo code analysis, Recurrence relations and solving recurrences using substitution, Recursion tree and master method.

**UNIT II**

Stack and Queue: Stack: Representation, Stack operation, Application. Queue: Representation, Queue operation, Circular and priority queue, Applications.

**UNIT III**

Linked list: Operation on linked list, Linked stacks and Queues, Array implementation of linked list, Linked list using dynamic variable, doubly linked list, Circular linked list.

**UNIT IV**

Binary Tree: Basic tree concept, Binary tree operations, Binary tree representation, Binary tree traversals, Binary search tree and operations, Balanced tree: AVL trees and operations, Applications of binary trees, implementing priority queue using binary heap data structure.

## UNIT V

Graphs: Basics concepts of graphs, Representation of graphs, Graph traversals BFS and DFS, Minimum spanning tree algorithms: Kruskal's algorithm and Prim's algorithm, Applications of graphs.

## UNIT VI

Searching Techniques and Hashing: Linear search and binary search, Hashing: Direct-address tables, Hash tables, Open addressing, Perfect Hashing, Sorting techniques: Various sorting methods and their time complexity analysis: Insertion sort, Selection sort, Merge sort, Quick sort, Heap sort.

**Text Books:**


1. E. Horowitz, D. Mehta, S. Sahni, ***"Fundamentals of Data Structures in C++"***, Silicon Press, 2nd Edition, 2008.
2. R.S. Bichkar, ***"Programming with C and Data structures"***, Universities Press, 1st Edition, 2014.


**Reference Books:**


1. Goodrich, Tamassia, "***Data Structures and Algorithm in Java***", Wiley publication, 6th Edition, 2014.
2. T. H. Cormen, C. E. Leiserson, R. L. Rivest, C. Stein, "***Introduction to Algorithms***", MIT Press, 3rd Edition, 2009.
3. Y. Langsam, M. J. Augenstein and A. M. Tanenbaum, "***Data structures using Java***", Pearson Education, 2003.
4. J. Murach, "***Murach's Java Programming***", Shroff Publishers, 4th Edition, 2012.
5. V. Goyal, L. Goyal, P. Kumar, "***A Simplified Approach to Data Structures***", Shroff Publishers, 1st Edition, 2014.

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|---|---|---|---|
| **Course Title:** | **Discrete Structures and Applications** | **Semester IV** | |
| **Course Code** | **BTITC403** | **Course Type** | **Compulsory** |
| **Prerequisite** | **Nil** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Core** | **Credits** | **3** |

**Course Objectives:**

1. To develop a foundation of set theory concepts, notation and applications.
2. To inculcate the habit of logical and mathematical thinking and its application to computer science and IT.
3. Understand logic, basic counting principles, relations, induction, sequences and summations.
4. To be able to present a coherent and mathematically accurate argument.
5. To understand the theory of graphs and algebraic structures and their applications.

**Course Outcomes:**
After learning the course the students should be able:

1. To perform operations on various discrete structures such as sets functions, relations, and sequences.
2. To solve problems using counting techniques, permutation and combination, recursion and generating functions
3. To construct and verify correctness of a Boolean expression using K-Maps and truth tables.
4. To use graphs as tools to visualize and simplify Problems.
5. To solve problems using algebraic structures (Rings, Monoids and Groups).

**Course Content:**

**UNIT I**

The Foundations: Sets theory and its applications sets, Set operations, Laws of set theory, Power sets, Partitions, Multi-sets, Cardinality, Principle of inclusion and exclusion, Algebra of sets and duality, Applications of sets: Problems on set operations and principle of inclusion-exclusion, Logics and proofs, Propositional logic, Propositional equivalences, Propositional algebra, Basic logical operations, De Morgan's laws, Predicates and quantifiers, Nested quantifiers, Rules of inference, Proof methods and strategy, Applications of logic: Translating English statements into propositions, Boolean searches in web pages, Bit operations.

**UNIT II**

Induction, Sequences and Summations: Induction and recursion: Mathematical induction, Strong induction, Recursive definitions, Re-cursive algorithms, Applications: Proofs using mathematical induction, Program correctness, Well formed formula, Functions, Sequences and summations, Definition and types of functions: Injective, subjective and bijective , Composition, Identity and inverse of function, Re-cursively defined functions, Applications of functions, Job scheduling problem, Countability of rational numbers.

## UNIT III

Basic Counting Principles: Permutations, Combinations, Binomial coefficients, Generalized permutations and combinations, Combinations and permutations with repetition, Generating permutations and combinations, Recurrence relation, Solving linear recurrence relations with constant coefficients, Applications of counting principles, Pigeonhole principle and its applications.

Relations: Properties of binary relations, Closure of relations, Warshall's algorithm, Equivalence relations and partitions, Partial ordering relations and lattice application of relations: N-ary relations and their applications, Databases and relations.

## UNIT V

Graph Theory: Basic terminology, Multi graphs and weighted graphs, Paths and circuits, Shortest path in weighted graph, Hamiltonian and Euler paths and circuits, Factors of a graph, Shortest path algorithm, Traveling salesman problem, Transport networks, Special types of graphs and applications: Job assignment, LAN, Interconnection networks for parallel computation, Mesh networks, Graph coloring and applications.

## UNIT VI

Algebraic Structures: Algebraic systems, Groups, Semi groups, Monoid, Subgroups, Permutation groups, Codes and group codes, Isomorphism and automorphisms, Homomorphism, Fermat's little theorem, Polynomial rings, Applications of groups.

**Text Books:**


1. K. H. Rosen, ***"Discrete Mathematics and Its Applications"***, Tata McGraw Hill Publication, 7th Edition, 2012.
2. J. P. Tremblay, R. Manohar, ***"Discrete Mathematical Structures with Applications to Computer Science"***, 1st Edition, McGraw Hill Publication, 2001.


**Reference Books:**


1. B. Kolman, R. Busby, S. Ross, ***"Discrete Mathematical Structures"***, Pearson Education, 6th Edition, 2009.
2. R. K. Bisht, H. S. Dhami, ***"Discrete Mathematics"***, Oxford University Press, 2015.

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|---|---|---|---|
| **Course Title:** | **Internetworking Protocols** | **Semester IV** | |
| **Course Code** | **BTITC404** | **Course Type** | **Compulsory** |
| **Prerequisite** | **Nil** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Core** | **Credits** | **3** |

**Course Objectives:**

1. To understand the basic concepts of TCP/IP Architecture.
2. To Understand Network Layer and Applications.
3. To learn UDP and TCP applications.
4. To learn Transport Layer Reliability.

**Course Outcomes:**

After learning the course, the students should be able:

**1.** To compare and contrast TCP and UDP in terms of the application that uses them.
**2.** To design network-based applications using the socket mechanism.
**3.** To work with IPv4 addresses in terms of subnetting and supernetting.
**4.** To setup a host and network in terms of IP addressing.

**Course Content:**

## UNIT I

**Introduction and Underlying Technologies** : ARPANET, Birth of the Internet, Transmission Control Protocol/Internetworking Protocol (TCP/IP) , MILNET , CSNET , NSFNET ,ANSNET, The Internet Today ,World Wide Web, Time Line, Growth of the Internet, Protocols and Standards, Standards Organizations: Internet Standards Internet Administration.

**The OSI Model and the TCP/IP Protocol Suite:**

Protocol Layers: Hierarchy Services, The OSI Model: Layered Architecture , Layer-to-Layer Communication, Encapsulation, Layers in the OSI Model, TCP/IP Protocol Suite: Comparison between OSI and TCP/IP Protocol Suite, Layers in the TCP/IP Protocol Suite, Addressing: Physical Addresses, Logical Addresses, Port Addresses, Application-Specific Addresses, Wired Local Area Networks: IEEE Standards, Frame Format, Addressing, Ethernet Evolution, Standard Ethernet, Fast Ethernet, Gigabit Ethernet, Ten-Gigabit Ethernet.

## UNIT II

**Wireless LANS:** IEEE, MAC Sublayer, Addressing Mechanism, Bluetooth, Point-to-Point WANS, DSL Technology, Cable Modem, ATM, Connecting devices: Repeaters, Bridges and Routers.

**Introduction to Network Layer:** Switching: Packet Switching, Circuit Switching, Packet Switching at Network Layer, Network Layer Services, Other Network Layer Issues.

**IPv4 Addresses,** Address Space Notation, Range of Addresses, Operations, Classful Addressing: Classes, Classes And Blocks, Two-Level Addressing, Three-Level Addressing: Subnetting, Supernetting, Classless Addressing: Variable-Length Blocks, Two-Level Addressing, Block Allocation, Special Addresses: Special Blocks, Special Addresses in Each block, NAT, Address Translation, Translation Table.

## UNIT III

**Delivery and Forwarding of IP Packets**: Delivery: Direct Delivery, Indirect Delivery, Forwarding: Forwarding Based on Destination Address, Forwarding Based on Label, Structure of a Router: Components.

**Internet Protocol Version 4(IPv4):** Datagrams, Fragmentation, Maximum Transfer Unit (MTU), Fields Related to Fragmentation, Options: Format, Option Types, Checksum: Checksum Calculation at the Sender, Checksum Calculation at the Receiver, Checksum in the IP Packet, IP PACKAGE : Header-Adding Module, Processing Module, Queues, Routing Table, Forwarding Module, MTU Table, Fragmentation Module, Reassembly Table, Reassembly Module

**Address Resolution Protocol (ARP):** Address Mapping: Static Mapping, Dynamic Mapping, The ARP Protocol: Packet Format, Encapsulation, Operation, Proxy ARP, ARP Package: Cache Table, Queues, Output Module, Input Module, Cache-Control Module.

## UNIT IV

**Internet Control Message Protocol (ICMP):** Messages: Message Format, Error Reporting Messages, Query Messages, Checksum, Debugging Tools: Ping, Traceroute, ICMP Package: Input Module, Output Module.

**Unicast Routing Protocols** (RIP, OSPF, and BGP), Static versus Dynamic Routing Tables, Routing Protocol, Intra- And Inter-Domain Routing, Distance Vector Routing :Bellman-Ford Algorithm, Distance Vector Routing Algorithm, Count to Infinity, RIP: RIP Message Format, Requests and Responses Timers in RIP, RIP Version, Encapsulation , Link State Routing: Building Routing Tables, OSPF, Areas, Metric Types of Links, Graphical Representation OSPF Packets, Link State Update Packet, Other Packets, Encapsulation, Path Vector Routing: Reachability , Routing Tables, BGP: Types of Autonomous Systems, Path Attributes, BGP Sessions, External and Internal BGP, Types of Packets, Packet Format, Encapsulation.

## UNIT V

**Introduction to Transport Layer**: Transport-Layer Services: Process-to-Process communication, Addressing: Port Numbers, Encapsulation and Decapsulation , Multiplexing and Demultiplexing, Flow Control, Error Control , Combination of Flow and Error Control, Congestion Control, Connectionless and Connection-Oriented Services.

**User Datagram Protocol (UDP)**: User Datagram, UDP Services: Process-to-Process Communication, Connectionless Services, Flow Control, Error Control, Congestion Control, Encapsulation and Decapsulation, Queuing, Multiplexing and Demultiplexing, Comparison between UDP and Generic Simple Protocol, UDP Applications: UDP Features, Typical Applications, UDP Package: Control-Block Table, Input Queues, Control-Block Module, Input Module, Output Module.

## UNIT VI

**Transmission Control Protocol (TCP):** TCP Services: Process-to-Process Communication, Stream Delivery Service, Full-Duplex Communication, Multiplexing and Demultiplexing, Connection-Oriented Service, Reliable Service. TCP Features: Numbering System, Flow Control, Error Control, Congestion Control, Segment: Format, Encapsulation, A TCP Connection: Connection Establishment, Data Transfer, Connection Termination, Connection Reset, State Transition Diagram, Scenarios ,Windows in TCP ,Send Window, Receive Window, Flow Control : Opening and Closing Windows, Shrinking of Windows, Silly Window Syndrome, Error Control :Checksum, Acknowledgment, Retransmission, Out-

of-Order Segments, Data Transfer in TCP, Some Scenarios, Congestion Control : Congestion Window, Congestion Policy, TCP Timers: Retransmission Timer, Persistence Timer, Keepalive Timer, Time-Wait Timer, TCP Package: Transmission Control Blocks (TCBs), Timers, Main Module, Input Processing Module, Output Processing Module.

**Text Books:**


1. Douglas E. Comer, **"*Internetworking with TCP/IP: Principles, Protocols and Architecture*"**, Volume 1, 6th Edition, PHI publication, 2013.
2. Behrouz A. Forouzan, **"*TCP-IP Protocol Suite*"**, 4th Edition, McGraw Hill publication, 2010.


**Reference Books:**


1. Comer, **"*Internetworking with TCP-IP"***, Volume 3, 5th Edition, Pearson publication, 2013.
2. W. Richard Stevens, **"*UNIX Network Programming: Interprocess Communications*"**, Volume 2, 2nd Edition, PHI publication, 1999.
3. William Stalling, **"*SNMP, SNMPv2, SNMPv3, and RMON 1 and 2*"**, 2nd Edition, Pearson education publication, 2001.
4. Hunt Craig, **"*TCP-IP Network Administration*"**, 3rd Edition, O'Reilly publication, 2002.
5. Loshin, Harwurt, **"*TCP-IP Cleanly Explained*"**, BPB publication.

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| **Course Title:** | **Product Design Engineering** | **Semester IV** | |
| **Course Code** | **BTID405** | **Course Type** | **Compulsory** |
| **Prerequisite** | **Nil** | **L – T – P** | **2 – 0 – 0** |
| **Stream** | **Interdisciplinary** | **Credits** | **2** |

**Course Outcomes:**

After completing this programme, participants will be able to:

1. Create simple mechanical designs.
2. Create documents for knowledge sharing.
3. Manage own work to meet requirements.
4. Work effectively with colleagues.
5. Maintain a healthy, safe and secure working environment.
6. Provide data/information in standard formats.
7. Develop their knowledge, skills and competence.

**Course Content:**

**UNIT I**

Creating simple products and modules Document Creation and Knowledge Sharing

**UNIT II**

Self and work Management

**UNIT III**

Team Work and Communication

**UNIT IV**

Managing Health and Safety

**UNIT V**

Data and Information Management

**UNIT VI**

Learning and Self Development

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| **Course Title:** | **Physics of Engineering Materials** | **Semester III** | |
| **Course Code** | **BTBS406A** | **Course Type** | **Elective** |
| **Prerequisite** | **BTBS202** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Basic Science** | **Credits** | **3** |

**Course Objectives:**

1. To impart the basic and advanced knowledge to the students.
2. To understand, remember and capable to explain and apply this knowledge in the field of Engineering/ Technology.

**Course Outcomes:**

After learning the course, the students should be able:

1. To explain the concepts of Crystallography, X -rays, Conducting Materials, Magnetic Materials.

**Course Content:**

**UNIT I**

Crystallography: Crystal directions and planes, Diatomic Crystal (CsCl, NaCl, Diamond, $BaTiO_3$) Crystal imperfection, Point defects, Line defects, Surface and Volume defects, Structure properties relationship, structure determination by X-ray diffraction.

**UNIT II**

Magnetic Materials: Origin of magnetization using atomic theory, classification of magnetic materials and properties, Langevin's theory of Dia, Para and ferromagnetism, Soft and Hard magnetic materials and their uses, Domain theory of ferromagnetism, Hysteresis loss, Ant ferromagnetic and Ferromagnetic materials, Ferrites and Garnets, magnetic bubbles, magnetic recording.

**UNIT III**

Conducting and Superconducting Materials: Band theory of solids, Classical free electron theory of metals, Quantum free electron theory, Density of energy states and carrier concentration, Fermi energy, Temperature and Fermi energy distribution, Superconductivity, Factor affecting Superconductivity, Meissner effect, Type-I and Type-II superconductors, BCS theory, Josephson effect, High temperature superconductors, Application of superconductors ( Cryotron, magnetic levitation)

**UNIT IV**

Semiconducting Materials: Band structure of semiconductor, Charge carrier concentration, Fermi level and temperature, Electrical conductivity, Hall effect in semiconductors, P-N junction diode, Preparation of single crystals, LED, Photovoltaic Cell

**UNIT V**

Dielectric Materials: Dielectric constant and polarizability, types of polarization, temperature and frequency dependences of Dielectric parameter, internal fields in solids, Clausius-Mosotti equation, dielectric loss, dielectric breakdown, ferroelectric, pyroelectric and piezoelectric materials, applications of dielectric materials

## UNIT VI

Nano Materials: Introduction and properties, synthesis of nanomaterials, Carbon Nano Tubes, Characterization techniques of nanomaterials- SEM, TEM, EDAX, FMR, XRD. Applications of nanomaterials.

**Text Books:**


1. C. Kittle, **"*Introduction to Solid state Physics*"**.
2. C. M. Srivastava, C. Srinivasan, **"*Science of Engineering Materials and Carbon Nanotubes*"**.
3. A. J. Dekker, **"*Solid State Physics*"**.


**Reference Books:**


1. V. Raghavan, **"*Material Science and Engineering*"**.
2. A. J. Dekker, **"*Electrical Engineering Materials*"**.

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| **Course Title:** | **Organizational Behavior** | **Semester IV** | |
| **Course Code** | **BTITE406B** | **Course Type** | **Elective** |
| **Pre-requisite** | **Nil** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Humanities, Social Science and Management** | **Credits** | **3** |

**Course Objectives:**

1. To explore the organization as a micro-social system - a medium to facilitate and improve the interpersonal relationships in the context of organizational functioning.

**Course Outcomes:**

1. Students will become more self aware and will have identified areas of development for long term effectiveness.
2. Students will understand the role that individuals play collectively to perform in organizations.

**Course Content:**

## UNIT I

Introduction to Organizational Behavior: Definition of organization and behavior, Historical Development of OB, Human relations movement, Impact of technology on organizational behavior.

Organizational Design: Key factors in organizational design, Types of organizational design, Need and significance of a sound organizational design, Organizational Structures - traditional and contemporary structures.

## UNIT II

Organizational Culture: Meaning and dimensions, Role of founders' values and vision in creating and sustaining culture, Types of organizational cultures, Impact of culture on image and performance of the organization, Organizational Communication - Tool and Techniques, Johari window transactional analysis, Lateral thinking, Brain storming, Delphi technique, Power of grapevine and other informal communication techniques.

## UNIT III

Groups and Organizations: Groups and Teams, Group Dynamics - Groups versus teams, Nature and types of groups and teams, Five stages of group/team development, Determinants of group behavior, Typical teams in organizations.
Leadership: Leadership as a concept and its essence, Leaders versus managers, Blake and Mouton's managerial grid, Hersey and Blanchard's situational leadership, Transactional versus Transformational leadership, Women as leaders, Leadership in entrepreneurial and family business, organizations.

## UNIT IV

Foundations of Individual Behavior: Factors affecting individual behavior - personal, environmental and organizational, Nature and Determinants of Personality, Personality Traits - Big Five, Locus of Control, Self-esteem, Type A/ Type B Personality, Risk Taking, Machiavellianism, Self Monitoring,

Personality and OB
Motivation: Power and purpose of motivation, Theories of motivation - Locke's goal setting theory, Vroom's expectancy theory, Porter and Lawler's model, Adam's equity theory, McClelland's theory of needs, Motivational Techniques – Job design/enlargement /enrichment / rotation, Managing rewards - Job status based rewards, Competency based rewards, performance based rewards, Empowerment and Self Managed Teams.

## UNIT V

Work Related Attitudes, Values and Perception: Meaning and definitions, Factors influencing perception Social and Person perception, When perception fails, Perception and OB.
Organizational Outcomes: Power and Politics, Power - Dynamics, Sources and Tactics, Politics - Essence, Types of political activities, Ethics of power and politics.

## UNIT VI

Conflicts and Negotiations, Nature of conflict, Functional and Dysfunctional conflict, Conflict resolution and negotiations, Managing conflict during change initiatives.
Stress: Meaning and definition, Work stress model, Sources of stress, Stress Management - Individual and organizational strategies, Impact of stress on performance.

**Text books:**


1. Uma Sekaran, **"*Organization Behaviors"***, McGraw Hill Company, New Delhi, 2011.
2. LM Prasad, ***"Organization Behavior"***, S. Chand and Co. Ltd, New Delhi, 2008.
3. Nair, Banerjee, Agarwal, **"*Organization Behavior"***, Prgathi Prakashan, New Delhi, 2006.


**Reference books:**


1. Rosy Joshi and Sashi K Gupta, **"*Organization Behaviors"***. Kalyani publishers, New Delhi, 2005.
2. S.S. Khanka, **"*Organization Behavior"***, S. Chand and Co. Ltd, New Delhi, 2008.
3. Fred Luthans, **"*Organizational Behavior"*,** McGraw Hill Book Co., 2005.

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| **Course Title:** | **Development Engineering** | **Semester IV** | |
| **Course Code** | **BTITE406C** | **Course Type** | **Elective** |
| **Pre-requisite** | **Nil** | **L – T – P** | **2 – 1 – 0** |
| **Stream** | **Interdisciplinary** | **Credits** | **3** |

**Course Objectives:**

1. Development Engineering prepares students to develop, pilot, and evaluate technological interventions designed to improve human and economic development within complex, low-resource settings.
2. Students can include topics related to the application of technology to address the needs of people living in poverty.

**Course Outcomes:**

After learning the course, the students should be able:

**1.** To understand the core disciplines issues in development.
**2.** To understand certifications.
**3.** To understand the planning of developing of rural areas.

**Course Content:**

**UNIT I**

Introduction to Development Engineering: Introduction to development engineering, need of development engineering, core disciplines and concept, major issues in development, urban development, rural development, socioeconomic development, scientific social research, formulation of research problem, field work and data collection, report drafting.

**UNIT II**

Design of Sustainable Communities: Concept and development of sustainable communities, Sustainable design principles, Building regulations, Codes and standards – ANSI, ASTM, ASHRAE, Approval process, Green buildings – green building techniques-energy solutions, Site solutions, Exterior and interior solutions, Certification – BREEAM, GRIHA, NAHB, LEED, IGBC.

**UNIT III**

Town/City Planning: Town Planning, History of town planning in India, Characteristics of city/town, Town planning at national, Regional and local levels, Planning standards, Master plan, Site layout and development, Zoning and density control, Green belt, Slum redevelopment, Smart city planning, Introduction to city planning, Infrastructure elements of smart city planning, Dimensions of smart cities global standards and performance benchmark, Smart solutions e-governance, Waste management, Water management, Energy management, Urban mobility, Citizen services, Other services such as telemedication and education, Trade facilitation, Skill development, GIS for Planning.

## UNIT IV

Planning and Development of Rural Areas: District administration, District Planning, Introduction to various sectors of rural areas such as drinking water, Waste water treatment, Electricity, Public transport, Irrigation, Sanitation and cooking energy, Issues and challenges associated with these sectors, People's participation and role in development of rural areas, Various schemes and policies floated by state and central government – phases in the schemes; life cycle costing of these schemes.

## UNIT V

GeoInformatics for Planning and Development: Introduction to GeoInformatics, Advantages, Benefits and limitations, Interdisciplinary applications, Data extraction, Use of GeoInformatics for planning, Mapping and preparation of layouts.

## UNIT VI

Development aspects: Urban and Rural: Planning and designing of a model town / city and using Auto-CAD and/or GIS, Visit to a village or small town – The project will be carried out in groups, Problem faced by the villagers pertaining to various sectors or existing schemes, Define the need, method, Tools and techniques for development, Deliver technology based solution.

**Text Books**


1. Chand M. and Purr U.K., ***"Regional Planning in India"***, Allied Publisher, New Delhi, 1983.
2. Kaiser E. J., et.al, ***"Urban Land use Planning"***, 4th Edition Urbana, University of Illinois Press.
3. Sundaram K. V., ***"Geography Planning"***, Concept Publishing Co., New Delhi.
4. Ayyar C.P.V., ***"Town Planning in Early South India"***, Mittal Publications, Delhi.
5. Reeder, Hoboken, ***"Guide to green building rating systems"***, John Wiley and Sons Inc.
6. Longley, et.al, ***"Geographic Information Systems and Science"***, John Wiley and Sons, New York.
7. Desai V., ***"Rural Development of India"***, Himalaya Publishing House, Mumbai.
8. Rau S. K., ***"Global Search for Rural Development"***, NIRD, Hyderabad.


**Reference Books:**


1. Institute of Town Planners, India, Ministry of Urban Affairs and Employment, Government of India, New Delhi, UDPFI Guidelines, 1996.
2. Miles R. Simon, 1970, ***"Metropolitan Problems"***, Methuen Publications, Canada.
3. B.I.S., 1980, ***"National Building Code of India"***, ISI, New Delhi.
4. ANSI/ASHRAE/USGBC/IES Standard 189.1, Standard for the Design of High – Performance Green Buildings Except Low-Rise Residential Buildings.
5. ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings.

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|---|---|---|---|
| **Course Title:** | **Microprocessors and Microcontrollers Lab** | **Semester IV** | |
| **Course Code** | **BTITL407** | **Course Type** | **Compulsory** |
| **Prerequisite** | **Nil** | **L – T – P** | **0 – 0 – 2** |
| **Stream** | **Core** | **Credits** | **1** |

**Lab Experiments Objective:**

1. To learn assembly language.
2. To program microprocessor and microcontroller for arithmetic operations.
3. To interface microprocessor and microcontroller with I/O devices.

**Lab Experiments List:**

1. 8085 and 8086 kit familiarization and basic experiments
2. Arithmetic operation of 16 bit binary numbers
3. Programming exercise: sorting, searching and string
4. Interfacing with A/D and D/A converters
5. Interfacing with stepper motors
6. Keyboard interfacing to 8086
7. 8255 interface to 8086
8. Assembly language programming of 8051
9. Timer programming of 8051, using interrupts
10. LCD interfacing to 8051 – project

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| **Course Title:** | **Data Structures and Applications Lab** | **Semester IV** | |
| **Course Code** | **BTITL408** | **Course Type** | **Compulsory** |
| **Prerequisite** | **BTITL307** | **L – T – P** | **0 – 0 – 4** |
| **Stream** | **Core** | **Credits** | **2** |

**Lab Experiments Objective:**

**1.** To implement all linear and non-linear data structures in C++/Java.

**Lab Experiments List:**

1. To implement a character stack data type and use it to reverse a string
2. To implement an integer stack data type that grows on demand
3. To write a program using appropriate stacks for evaluating an infix expression with parenthesis
4. To write a program, using a queue data type, to simulate a bank where customers are served on a first-come-first-serve basis
5. To write one program for each of the following operations with singly linked lists:
   Concatenate two linked list and create third one
   Free all nodes in a linked list
   Reverse a linked list
   Given two linked list, create a third list which is set-intersection of the elements in the two.
6. To delete every third element from the linked list
7. To copy a given linked list into another (new) list
8. To implement a queue using a doubly linked list
9. To write the following recursive functions for a singly-linked NULL-terminated list: insert(), traverse(), search()

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| **Course Title:** | **Internetworking Protocols Lab** | **Semester IV** | |
| **Course Code** | **BTITL409** | **Course Type** | **Compulsory** |
| **Prerequisite** | **Nil** | **L – T – P** | **0 – 0 – 2** |
| **Stream** | **Core** | **Credits** | **1** |

**Lab Experiments List:**

1. Conversion of IP addresses
   (e.g. I/P: 10.24.164.254 O/P: 00001010.00011000.10000000.11111110 and I/P:binary dotted O/P: decimal dotted)
2. Introduction to Wireshark
3. Wireshark Lab: Ethernet and ARP
4. Wireshark Lab: IP
5. Wireshark Lab: ICMP, study of ping and traceroute command
6. Wireshark Lab: UDP
7. Wireshark Lab: TCP
8. Study of ftp, telnet tools and network configuration files
9. DHCP server configuration
10. Socket programming for UDP and TCP.