Program: B-Tech Integrated (Computer)					**Semester**: IV
Course: Computer Programming-III					**Code**: BTICO04001
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 100 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Pre-Requisite:- Knowledge of Basic Computer Systems

Objectives:

- The course will enable the students to understand the basic concepts of procedural and object oriented programming

Course Outcomes: After Successful completion of this course students will be able to

1. Develop Java program using basic object oriented concept.
2. Design Java programs using concepts of inheritance, packages and interfaces.
3. Evaluate and apply appropriate basic exception handling techniques.
4. Develop Java programs using concepts of string handling.

Detailed Syllabus

Unit	Description	Duration
1.	**Java Fundamentals:** Overview of Java, Using Blocks of code, Lexical Issues, Java Class Libraries , Data Types, Variables and Arrays, Operators, Control Statements.	6
2.	**Classes and Methods:** Class fundamentals, Declaring Objects, Constructors, Methods, Overloading of methods, nested and inner classes, Recursion, Access control, Static and final variables use, using command-line arguments.	7
3.	**Inheritance:** Inheritance Basics, method overriding, using abstract classes, using final with inheritance.	7
4.	**Packages and Interfaces:**	6

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	Packages, Access Protection, Importing packages, Interfaces- Defining an Interface, Implementing Interfaces , Applying Interfaces , Variables in Interfaces, Interfaces Can Be Extended	
5.	**Input/Output:** I/O Basics, The Java I/O Classes and Interfaces, Reading Console Input, Writing Console Output, Print Writer class, Reading using Scanner.	5
6.	**Exploring java.lang and java.util Packages** Java.lang- simple type wrappers, object, math, class. Java.util- collection overview, Collection classes and Interface date, Random, Calendar, Gregorian Calendar	7
7.	**Programs using String Handling :** String Constructors, Special String operators, Character Extraction, String Comparison, Searching Strings and Modifying Strings, StringBuffer class and its methods	7
	Total	**45**

Text Book:

1. E Balagurusamy, "Programming with Java: A Primer", TMH, 4th Edition 2010.

Reference Book:

1. Herbert Schildt, "Java the Complete Reference", TMH, 8th Edition 2013.
2. Poornachandra Sarang, "Java Programming", McGraw Hill 2012.
3. Bruce Eckel, "Thinking in Java", 3rd Edition, Pearson Education, 2006.
4. Ken Arnold, James Gosling, David Holmes, "The Programming Language", Pearson Education, 4th Edition, 2005.

Term Work:

1. Minimum 10 Experiments covering the entire syllabus.
2. Two Tests
3. Two assignments.

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Program: B. Tech. Integrated (EXTC & Computer)				Semester : IV	
Course : Basic Electronics				Code : BTICO04002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 100 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite:
1. Theory of semiconductor materials, their atomic structures and properties.
2. DC circuit analysis, ac fundamentals.

Objectives:
1. Understand the construction, working principle, characteristics and simple applications of basic electronic devices.
2. Understand the application of these devices in making advanced circuits like amplifiers and oscillators.
3. To impart hands-on experience in assembling and testing circuits.
4. Get exposed to inter disciplinary engineering disciplines.

Outcomes: After the successful completion of this course, the student will be able to
1. Identify various types of diodes and illustrate simple circuits with diodes.
2. Explain bipolar junction transistor (BJT), modes of operation and analyze its applications.
3. Describe junction field effect transistor (JFET) and analyze its applications.
4. Design amplifiers and switching circuits using BJT and FET.
5. Describe different types of power amplifiers and oscillators.
6. Illustrate the working of amplifier and oscillator circuits.

Detailed Syllabus:

Unit	Description	Duration
1.	**Diode and its Applications:** Introduction to Semiconductor Diode Theory, DC Analysis and Models of diode, AC Equivalent Circuits of diode. Diode Types: photodiode, Light-Emitting Diode, Schottky Barrier Diode, Zener Diode, Temperature Effects, Understanding Manufacturer's Specifications. Applications: Rectifier Circuits - Half Wave and Full Wave Rectification, Filter circuits, Ripple Voltage and Diode Current. Zener Diode Circuits - Zener diode as voltage regulator. Clipper and Clamper Circuits.	15
2.	**Bipolar Junction Transistor:** Basic Bipolar Junction Transistor, Transistor Structures, NPN Transistor: Forward-active Mode Operation, PNP Transistor:	15

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	Forward-active Mode Operation, Circuit Symbols and Conventions, Current-Voltage Characteristics, Non ideal Transistor Leakage Currents and Breakdown, DC Analysis of Transistor Circuits. Basic Transistor Application: Switch, Amplifier. Bipolar Transistor Biasing – Bias Stability, Fixed Bias, Collector-to-Base Bias, Voltage Divider Bias. Understanding Manufacturer's specifications. BJT amplifier frequency response. Figure of merit of an amplifier.	
3.	**Field Effect Transistor:** Junction Field-Effect Transistor. JFET Biaisng Methods (fixed bias, voltage divider bias and self-bias). FET amplifier frequency response. Figure of merit of an amplifier.	08
4.	**Oscillators:** Positive feedback and basic Principles for Oscillation, Classification of transistor oscillators: Phase-Shift Oscillator, Wien-bridge Oscillator, Colpitts Oscillator, Hartely Oscillator, Crystal Oscillator.	07
	Total	**45**

Text Books:

1. Donald A. Neamen, Electronic Circuit Analysis and Design, McGraw Hill International, 2nd Edition, 2001.
2. David A. Bell, Electronic Devices & Circuits, Prentice Hall India Pvt. Ltd, 5th Edition, 2008.

Reference Books:

1. Donald Schilling & Charles Belove, "Electronic Circuits Discrete and Integrated", McGraw Hill International, 3rd edition, 1989.
2. Martin Roden, Gordon Carpenter, William Wieserman, "Electronic Design", Shroff. Publishers, 4th edition, 2002.
3. Robert Boylestad& Louis Nashelsky, "Electronic Devices & Circuit Theory", Pearson Education India - 9th Edition, 2007.
4. B.L. Theraja, "Fundamentals of Electrical Engineering and Electronics", S. Chand & Co., 2nd Edition, 2004.

Term Work:

1. At least ten laboratory experiments
2. Two term tests
3. Assignments based on the whole syllabus, duly recorded and graded.

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Program: B. Tech. Integrated (Computer)					**Semester:** IV
Course : Data Structures					**Code :** BTICO04003
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 100 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms**
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Computer Programming –I(BTIAB02005), Computer Programming-II (BTICO03001)

Objectives: To provide knowledge of data structures and its type

Course Outcomes: After successful completion of this course, students will be able to

1. Explain concept of ADT and recursion
2. Implement linear data Structures
3. Implement non-linear data structures
4. Differentiate various searching and sorting algorithms

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Data Structures:** Introduction to theory of data structures, Data representation, Abstract data types, Data types, Arrays, Structures, Concept of Recursion, Recursive programs Comparison of Recursive and Iterative Programs.	7
2.	**Linear Data Structures:** Singly Linked Lists, Double linked list, Stacks, Queues, Circular queues, Priority queues, Applications of Linear data structures.	12
3.	**Non - Linear Data Structures : Trees -** Binary Tree , Traversals, Binary Search Tree operations, Threaded Binary Tree, Application of trees: Huffman Algorithm, Expression Trees, BTree Searching	8
4.	**Non-linear Data structures : Graphs-** Basic definitions, Representation of graphs in memory, Graph traversal – Breadth first search and Depth First search , Application of graphs – Shortest path, minimum spanning tree	6

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5.	**Sorting and Searching**: **Sorting:** Basic definitions, Bubble sort, Selection sort, Insertion sort and Radix sort and their efficiency. **Searching:** Basic search techniques: sequential searching, Efficiency of sequential searching, binary search, Hashing Methods , Collision Resolution	12
	Total	45

Text Books:

1. Reema Thareja, Data Structures using C, Oxford University press.
2. Seymour Lipschutz, "Data Structures", Schaum's Outlines, Tata McGRaw Hill, 2006

Reference Books:

1. Richard F. Gillberg, Behrouz A. Forouzen "Data Structures – A Pseudo Approach with C " Cengage Publication

Term Work:
Minimum 10 experiments based on syllabus
Minimum 2 class tests
As per department and ICA norms - Practical exam will be conducted.

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Mukesh Patel School of Technology Management & Engineering

Program: B. Tech. Integrated (Computer)				Semester: IV	
Course: Engineering Mathematics-II				Code: BTICO04004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)	Term End Examinations (TEE) Theory (3 Hrs, 100 Marks)
3	0	2	4	Marks Scaled to 50	Marks Scaled to 50

Objectives:

- To provide an understanding of Matrices and differential equations in technical subjects.
- To impart knowledge of Beta & Gamma functions and double integrals, its applications to solve engineering problems.

Outcomes: After completion of the course, students would be able to :

- Solve system of linear equations
- Evaluate problems using Beta and Gamma functions
- Analyse suitable method to solve differential equations
- Relate the concepts of double integral to solve engineering problems.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	**Matrices:** Rank of a matrix, Rank by Normal form and Echelon form, Reduction of a matrix A to normal form PAQ, Linear dependence and independence of rows and columns of a matrix over real field. **Applications:** Solving system of linear homogeneous and non-homogeneous equations using Cramer's rule, matrix inversion method, reduction to echelon form.	12
2.	**Beta and Gamma functions:** Definition of Beta and Gamma functions and their properties; Relation between Beta and Gamma functions; Duplication formula.	08
3.	**Ordinary Differential Equations:** Definition of differential equation, order and degree of differential equation, formulation of differential equation. **Solution of differential equation of first order and first degree:** Variable separable method, reducible to variable separable method, Homogeneous differential equation, reducible to homogeneous differential equation, exact differential equation and those which can be reduced to exact form using integrating factor (four rules), Linear differential equations, Bernoulli's differential equation.	15

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	Solution of Linear differential equations of higher order with constant coefficients: Complementary functions, Particular integrals of the differential equations of the type $f(D)y = X$ where $X = e^{ax}, \sin(ax+b), \cos(ax+b), x^m, e^{ax}V(x), xV(x)$. Applications of differential equations in modelling: First-order Equations, Free Mechanical Oscillations, Forced Mechanical Oscillations.	
4.	**Double Integration:** Double integration in cartesian and polar co-ordinates, evaluation of integrals over a given region, change of order of integration, change of co-ordinate system, application of double integration to compute area, mass of a lamina and volume.	10
	Total	**45**

Text Books:

1. Robert Wrede (2010), Murray Spiegel, *Schaum's Outline of Advanced Calculus, Third Edition.*
2. B. S. Grewal (2013), "Higher Engineering Mathematics", *Khanna Publishers.*

Reference Books:

1. Erwin Kreyszig (2010),"Advanced Engineering Mathematics", *Wiley Eastern Ltd, 10th edition.*
2. Howard Anton (2012), "Calculus", *Wiley, 10th edition.*
3. G. Birkhoff and G. C. Rota, Ordinary Differential Equations (2003), *4th Edition, Wiley Singapore Edition.*
4. Alan Jeffrey (2003), Handbook of Mathematical Formulas and Integrals, *Academic Press, 3rd edition.*

Term Work:

As per institute norms.

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Program: B. Tech. Integrated (Computer)				**Semester:** IV	
Course: Engineering Physics				**Code:** BTICO04005	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours Per week	**Practical Hours per week**	**Tutorials Hours per week**	**Credit**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)**	**Term End Examinations (TEE) Theory (3 Hrs, 70 Marks)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Objectives

- To enable the students understand the basic principles of physics, making them meet the needs of engineering and technology.

Outcomes: After completion of the course, students would be able to :

- Apply the concept of interference, diffraction in various engineering applications.
- Understand the quantization effect in reduced dimensional materials and their consequences.
- Implement the concepts of clean energy for power generation.
- Illustrate the usage of nanomaterial in various applications.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	**Optics:** Interference: Analytical treatment of interference. Interference in thin film in reflected system. Wedge shaped film. Newton's rings and applications. Diffraction: Fraunhoffer's diffraction at single slit, double slits, N Parallel slits (multiple slits). Diffraction grating, resolving power of grating, dispersive power of grating.	08
2.	**Quantum physics:** The origin of quantum theory, Blackbody radiation, Wein's law, Rayleigh- Jeans Law, Stefen's law, Plank's theory, dual nature of radiation. Wave nature of Matter: De Broglie's hypothesis, Davisson-Germer Experiment, the double slit experiment with particles, the need for a wave function, Born's interpretation of the wave function. Wave Packets and Uncertainty Principle: General statement of Heisenberg's Uncertainty Principle, Energy-Time and Position-momentum uncertainty relation and its applications	08
3.	**Energy technology :** Need for clean energy, different methods for obtaining clean energy viz. nuclear energy (including basics of nuclear physics like fission and fusion etc.) solar cells (including conventional and Nano	06

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	material based solar cells), hydrogen fuels and wind mills. Advantages and limitations of each method.	
4.	**Introduction to Nanotechnology:** Definition of nanotechnology, quantum confinement effect [how the material properties differ as the size is reduced: Coloumb Blockade, Surface plasmon resonance, some basic Nano materials like carbon nanotubes, graphene, quantum dots, applications of nanotechnology (scratch resistance coatings, clothing, antimicrobial applications, drug delivery, IC technology), Nano- toxicity (basic idea). Scanning and Transmission electron microscopes, Scanning Tunneling Microscope, Atomic Force Microscope.	08
	Total	**30**

Text Books:

1. Jenkins and White (2013), Optics, *MC Graw Hill.*
2. Arther Beiser (2009), Concept of Modern Physics, *Tata McGraw Hill, 6th edition.*

Reference Books:

1. Halliday and Resnick (2014), Fundamentals of Physics, *Wiley India, 10th edition.*
2. L. I. Schiff (1968), Quantum Physics, *McGraw Hills.*
3. V. V. N. Kishore (2009), Renewable Energy Engineering and Technology – A Knowledge Compendium, *TERI Press.*
4. Sulabha K. Kulkarni (2011), Nanotechnology: Principles and Practices, *Springer.*
5. Richard P. Feynman (2011), Feynman lectures on physics, *The New Millennium Edition.*
6. Dattu R Joshi (2010), Engineering Physics, *Tata McGraw Hill, 1st Edition.*

Term work:

As per Institute norms.

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Mukesh Patel School of Technology Management & Engineering

Program: B. Tech. Integrated (Computer)				Semester: IV	
Course: Numerical Techniques				Code: BTICO04006	
Teaching Scheme				Evaluation Scheme	
Lecture Hours Per week	Practical Hours Per week	Tutorial Hours Per week	Credit	Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)	Term End Examinations (TEE) Theory (3 Hrs, 100 Marks)
3	0	2	4	Marks Scaled to 50	Marks Scaled to 50

Objectives:

- To bring awareness of various numerical techniques to solve Engineering problems.

Outcomes:

After completion of the course, students would be able to :

- Analyse error in numerical data.
- Solve algebraic, transcendental and system of linear equations using different numerical techniques.
- Understand the concept of interpolation and regression.
- Apply the techniques learnt in numerical differentiation and integration to solve engineering problems.
- Evaluate ordinary differential equation numerically.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	**Introduction to Numerical Computing:** Introduction, Types of Errors: Absolute error, Relative error, Percentage error, Round-off error, Truncation error.	02
2.	**Roots of Equations:** Bisection Method, False Position Method, Newton-Raphson Method, Secant Method, Convergence of Numerical Methods.	10
3.	**Systems of Linear Algebraic Equations:** Gaussian Elimination Method, Gauss Jordan Method, Gauss Seidel Method, Jacobi Method.	06
4.	**Interpolation:** Finite Differences, Forward Differences, Backward Differences, Newton's Forward Interpolation, Newton's Backward Interpolation, Lagrange's Interpolation. Application of this technique to estimate data type such as income, distance, production etc.	07
5.	**Curve Fitting:** Method of Least Square to fit the straight line and the parabola.	03
6.	**Numerical differentiation & Integration:** Derivatives using Forward and Backward difference formula, Trapezoidal Rule for Numerical Integration, Simpson's 1/3 Rule,	09

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	Simpson's 3/8 Rule. Application to estimate the distance covered in given time and volume of a solid.	
7.	**Solution to Ordinary differential equations:** Picard's method, Taylor series method, Euler's method, Fourth-Order Runge-Kutta method.	08
	Total	**45**

Text Books:

1. E. Balagurusamy (2008), Numerical Methods, *Tata-Mc Graw Hill.*

Reference Books:

1. S. S. Sastry (2007), Introductory methods of Numerical Analysis, *PHI, 5th edition.*
2. B. S. Grewal (2010), Numerical Methods in Engineering & Science with Programs in C & C+ +, *Khanna Publishers.*
3. John Heinbockel (2004), Numerical Methods for Scientific Computing, *Trafford Publishing.*

Term Work:

As per institute norms.

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