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Mukesh Patel School of Technology Management & Engineering

Program:	B. Tech Integrated (EXTC & Computer)	Semester : III
Course :	Computer Programming–II	Code : BTICO3001

Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE) (Marks - 100 in Question Paper)
3	2	0	4	Marks Scaled to 50	Marks Scaled to 50

Pre-requisite: Knowledge of Basic Computer Systems, Computer Programming - I

Objectives:

1. To enable the students to understand the basic concepts of object oriented programming and help them build programming logic.
2. To help them build classes and understand the reusability of code.

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

1. Develop and execute C++ program using basic programming constructs, various data types and functions
2. Implement object oriented concepts using classes, objects, constructor, destructor, operator overloading, type conversion.
3. Implement object oriented concepts inheritance, virtual functions and polymorphism

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction :** Principles of Object Oriented Programming , Comparison of procedural programming and OOP, Advantages and Characteristics of OOP, Definitions, Class, objects, data hiding and encapsulation.	5
2.	**Elements of C++ Language and Functions**: Data types, Variables, Operators in C++, Control Statements, Manipulators, Main function Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Arguments, Recursion.	5
3.	**Classes and Objects:** Specifying a Class, Defining member functions, Making an outside function inline, Memory Allocation for Objects, Static Members, Arrays of Objects, friend functions.	7
4.	**Constructors & Destructors:** Constructors, Parameterized constructor, Multiple constructors in a class, Constructors with Default Arguments, Copy Constructor, Destructors	7
5.	**Operator Overloading & Type Conversions:** Overloading Unary Operators, Overloading Binary Operators,	7

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	Overloading Binary Operators Using Friends, Rules for Overloading Operators	
6.	**Inheritance:** Defining Derived Classes, Single Inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes	7
7.	**Virtual Functions and Polymorphism:** Need for Virtual Functions and , Pointer to Derived Class Object, Pure Virtual Functions	7
	Total	**45**

Text Book:
E. Balaguruswamy, "Programming in C++", Tata McGraw Hill Education, 5th Edition, 2011.

Reference Book:
Herbert Schildt, "The Complete Reference C++", Tata McGraw Hill Education, 4th Edition, 2003

Term Work:
Details of Internal Continuous Assessment (ICA)
Term Test Marks: 20
Term Work Marks: 30
Details of Term Work:

1. At least 10-Experiments covering the entire syllabus.
2. Minimum 3 class assignments.
3. Practical examination

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Programme: B. Tech Integrated (EXTC & Computer)				**Semester:** III	
Subject: Electronic Materials and Components				**Code:** BTICO03002	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorials Hours per week**	**Credit**	**Theory (3 Hrs,100 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norm (50 Marks)**
2	-	2	3	Marks Scaled to 50	Marks Scaled to 50

Prerequisite: Nil

Objectives

1. To understand the construction and working of electronics components.
2. To understand the operation and applications of electronics material & components.
3. To learn measurements of various electronic quantities.

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

1. Describe the configuration of electronics components and its characteristics.
2. Identify and apply electronics components for different circuits.
3. Measure and compare the performance of various components for various electrical parameters.
4. Describe the working of simple circuits using different electronics components.

Unit	**Description**	**Duration (Hrs)**
1	**Resistors**: Introduction to Active & Passive Components, Fixed Resistors: Colour Coding, Tolerance Wattage, Temperature Coefficient, Operating Temperature Range, Carbon Composition Resistor, Cracked Carbon Resistor, Metal Film Resistor & Wire Wound Resistor. Ceramic & Aluminum Heat Sink, Variable Resistor, Linear & Logarithmic Potentiometer, Pots & Rheostat, Trimmers - Rectilinear Votary (Carbon, Wire Wound & Cermets) Non-linear Resistors, Thermistor - Bead, Probe, Disc & Rod Type, NTC, PTC, Varistors, Light Dependent Resister,	6

2	**Capacitors** Fixed Capacitors, Principal of Capacitor, Capacitance Working Voltage, Insulation Resistance C/V Ratio, Power Factor, Capacitance Frequency Characteristics, Specifications & Applications of Glass, Impregnated Paper, Metallized Paper (With Self-Healing Effect), Ceramic Aluminum & Tantalum Capacitor, Variable Capacitor - Straight-line Inverse Square Law & Square Law of Variable Capacitor Plates, Air Dielectric Gang Condenser, PVC Dielectric Gang Condenser, Trimmer Capacitor, Air dielectric- Rotary, Differential Rotary & Concentric Cylinder Type, Ceramic Rotary, Mica Compression & Plastic Dielectric.	6
3	**Inductor and Transformers** Inductor, Concept, Operation at Low & High Frequency, Self & Mutual Inductance Quality Factor, Inductive Reactance, Leakage Inductance, Construction & Applications: Air Core, Iron core, Ferrite Core, AFC, RFC, Filter Chokes. Transformer, Types of Coils - Shell, Core Type Laminations (E, I, L, F & Pot Core), Types of Transformer: Power, Auto, Variable, Audio Frequency, RFT & IFT, Driver, Isolation, Pulse, Current, High voltage (EHT), Losses in Transformer, Shielding of Transformer.	6
4	**Relays and Display** Relays, Definitions of NO, NC Contents, Operate Time, Release Time & Bounce Time, Mechanical & Electrical Life. Constructions, Specifications & Applications: General-Purpose Electromagnetic Relay, Dry Reed Relay, Ferried Relay Solid-State Relays, Display Devices - LED , Nixie Tube, Dual Color LED 7-Segment Display, LCD - Types, Reflected Light, Twisted Pneumatic Drive, Switching & Two Phase Drive, Alphanumeric Display Like Dot Matrix.	6
5	**Microphones, Speakers & Batteries** Principle, Construction & Applications: Microphone - Carbon, Capacitor, Moving Coil, Crystal, Ribbon, Loud speakers - Cone Type, Horn Type Speakers Woofer, Tweeter & Speaker, Batteries, Cells & Battery Fundamentals, Charging & Discharging Process Difference Between Primary & Secondary Cell, Types of Batteries - Lead Acid Battery - Construction, Open Circuit Voltage Specific Gravity, Discharge, Ampere - Hour Rating, Ni-Cd battery	6

	Construction, Specifications, Charging Methods of Above Batteries, Maintenance Free Battery (Introduction).	
		30

Text Books:

1. Electronic Components and Materials by SM Dhir, Tata McGraw Hill, New Delhi, 4th edition, 2011.

Reference Books:

1. Text book of Applied Electronics by R.S. Sedha, S. Chand Publication, 5th edition, 2014.

Term Work:

1. Two term tests
2. Assignments based on the whole syllabus, duly recorded and graded.

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Program: B. Tech. Integrated (Computer)				Semester : III	
Course : Environmental Studies				Code : BTICO03003	
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)
2	0	0	2	0	Marks Scaled to 50

Pre-requisite: NIL

Objectives:

1. To provide knowledge/information on the emergence of Strategic options for environmental decision-making.
2. To provide the skills to prepare Corporate Environmental Reports-Sustainability Reports/ TBL reports.
3. To provide the foundations for corporate governance –non-financial implications and the significance of environmental governance and best practices.

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

1. Recognize Role of the industries in managing the industrial pollution.
2. Identify the foundations for corporate governance.
3. Assess Urban Environmental problems and use of practices to minimize them.

Detailed Syllabus:

Unit	Description	Duration Hr
1.	**Overview** of the nature and significance of emerging global environmental issues and trends. **Major** industrial and other environmental disasters like Bhopal Tragedy **International conventions** like Montreal Protocol, Basal Convention Climate Convention and similar other developments and their significance in policy formulation and policy enactment.	06
2.	**Industrial Pollution-** types of industrial pollution, - Hazardous Waste Management, Role of the industries in managing the industrial pollution. pollution prevention. ISO 14000 EMS certification	06
3.	**Triple Bottom Line (TBL), Sustainability Reporting Practices** – Strategic options for companies and competitive advantages for corporate reporting practices. Command and control strategies Vs market driven mechanisms. Carbon Credits/ carbon trading.	06

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	Role of the Government in managing the environmental activities in all sectors. Organisational set up at the Central and state level to manage the environment.	
4.	**Management Tools -** Regulatory and legal instruments available for Environmental Management. Environmental Statement and Environmental Impact assessment (EIA) in all sectors. Role of judiciary in managing the environment. Major Laws Air (P&C.P.) Act, Water (P & C.P) Act. Environment Protection Act EPA 1986. Wild life Protection Act etc., PIL	**06**
5.	Urban Environmental problems specific to cities, waste management issues (both domestic and industrial). Garbage disposal and management, solid waste management options for waste minimization. Role of Citizens, Role of NGOs/ Environmental Activists. Environmental footprints.	**06**
	Total	**30**

Text Books:

1. Dr.(Smt.).Bala Krishnamoorthy, Environment Management, Text and Cases, Prentice Hall of India, 2nd Edition, 2008.

Reference Books:

1. Agarwal S.K, Environmental Issues and Themes, A.P.H. Publishing Corporation, 1997 (Classic).
2. Dodds Felix, Earth summit 2002: A new deal by, Routledge, 2001.
3. Journal of Down to earth published by Centre for Science and Education CSE.

Term work consists of the following:

1. At least two assignments, covering the whole of syllabus, duly recorded and graded.
2. At least one case study with presentation.

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Program: B. Tech. Integrated (Computer)				Semester: III	
Course: Engineering Mathematics-I				Code: BTICO3004	
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 impart knowledge of complex numbers and its applications to solve Engineering problems.
- To provide an understanding of principles of vector algebra, single variable and multivariable calculus.

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

- Understand the concepts of complex numbers, hyperbolic functions, Mean value theorems and vector products to solve Engineering problems.
- Express functions in series using Taylor's and Maclaurin's expansions, and evaluate limits of indeterminate forms using L' Höspital's Rule.
- Find partial derivatives of functions and carry out the knowledge to error and approximations, maxima and minima.
- Apply the concepts such as gradient, directional derivative, curl and divergence to solve real life problems.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	**Complex Numbers:** Introduction to complex numbers, modulus and amplitude of a complex number, Argand's diagram, cartesian, polar and exponential forms of a complex number. **Algebra of complex numbers:** equality, addition, subtraction, multiplication and division. De-Moivre's theorem, Roots of complex numbers, Euler's form of circular functions, Hyperbolic functions, relation between circular and hyperbolic functions.	12
2.	**Mean value theorems, Series expansion and Indeterminate forms:** Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem. Taylor's formula, Maclaurin's series. **Indeterminate forms:** $\frac{0}{0}, \frac{\infty}{\infty}, 0\times\infty, \infty-\infty, 0^0, \infty^0, 1^\infty$ by L'Höspital's rule.	10
3.	**Partial Derivatives and its applications:**	13

	Partial Derivatives of two and three variable functions, Partial derivative of composite function, Homogeneous functions in two or three variables, Euler's theorem, error and approximations, Maxima and Minima in 2 variables by second derivative test.	
4.	**Vectors:** Scalar and vector triple products, Product of four vectors, curves in space, Differentiation of a vector function of a single scalar variable, Theorems on derivatives, concept of tangent vector, scalar and vector point functions, gradient, directional derivative, Curl and Divergence, Irrotational and Solenoidal Fields.	10
	Total	**45**

Text Book:

1. Erwin Kreyszig (2010), "Advanced Engineering Mathematics", *Wiley Eastern Ltd, 10th edition.*

Reference Books:

1. Andreescu Titu, Andrica Dorin (2014), Complex Numbers from A to ... Z, *Birkhäuser Basel Publishers, 2nd edition.*
2. Thomas, Calculus (2014), *Pearson Education, 7th edition.*
3. Howard Anton (2012), "Calculus", *Wiley, 10th edition.*
4. B. V. Ramana (2010), "Higher Engineering Mathematics", *Tata McGraw Hill, 1st edition.*
5. 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 (Mechanical, Civil, Computer & EXTC)				**Semester:** III	
Course/Module: Engineering Chemistry				**Module Code:** BTICO03005	
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Internal Continuous Assessment (ICA) (Marks - 50)**	**Term End Examinations (TEE) (Marks - 100 in Question Paper)**
2	2	0	3	Marks Scaled to 50	Marks Scaled to 50

Objectives

1. To introduce basic principles of chemistry such as functional group identification, properties of solutions, and reaction stoichiometry.
2. To familiarize the concepts and applications of fuels, polymers, and e-waste management.

Course Outcomes:

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

1. Identify different functional groups of compounds and various organic reactions associated with it.
2. Identify the importance of various classes of polymers and applications in daily life.
3. Classify different types of fuels and lubricants based on their properties and applications;
4. Recognize the importance of e-waste management with respect to environment and health hazards and solve numerical problems based on atom economy and distinguish the various formula applied to different types of solutions; interpret reaction stoichiometry and solve numerical problems.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	**Organic Reactions:** Reactions of functional groups: those containing oxygen (-COOH, -OH, -CHO, -C=O); Nucleophilic substitution reaction, Elimination reaction Organic Name Reactions E.g. Aldol & related reactions.	06
2.	**Solutions and Stoichiometry:** Types of solutions and its characteristics, properties of aqueous solutions, different units for expressing concentration of solutions (ppm, ppb, normality, molarity, molality, mole fraction of solute, mass fraction of solute and solvent), empirical and molecular formula from elemental composition, numerical based on empirical formula, normality, molarity, molality molarity.	06
3.	**Fuels & Combustion:** Definition, Classification, characteristics. Calorific Value-Theoretical & Experimental (Bomb calorimeter). **Solid Fuels**: Coal, proximate and ultimate analysis, Numerical based on analysis of coal. (Dulong formula) and bomb calorimetry.	06

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	Liquid fuels: Mining of Petroleum, Cracking, Reforming, Knocking in IC engines, anti-knocking agents (TEL and MTBE),	
4.	**Lubricants:** Definition, Mechanism of lubrication, Properties- viscosity, viscosity index, flash & fire, cloud & pour points, oiliness, saponification & acid value (numericals based on saponification and acid value)	04
5.	**Polymers:** Introduction and definition of important terms – monomer, polymer, polymerization, degree of polymerization, tacticity, and melting-glass transition temperature. Some commercially important polymers (PP, PVC). **Plastics**: Thermosetting & Thermoplastics, Compounding of plastics, Preparation, properties and applications of commercial plastics (Rubber, Phenol formaldehyde resin).	05
6.	**Environmental Aspects of Chemistry:** **i) Green Chemistry:** Principles of Green Chemistry with examples (Numerical Problems on Atom economy) **ii) E-waste management:** Definition, classification and management of e-waste.	03
	Total	**30**

Text Books:

1. Abhijit Mallick; Chemistry for Engineers, Viva books, 2nd Edition 2017.
2. Palanna.O.G., Engineering Chemistry, Tata McGraw Hill Education. Pvt. Ltd, 2nd Edition 2017.
3. Samir Sarkar; Fuels & Combustion, Orient Longman Pvt. Ltd 3rd Edition 2009.

Reference Books:

1. R.T. Morrison & R. N. Boyd, Organic Chemistry, Prentice Hall, 8th Edition 2016.
2. Johrie. R.; E-waste, TERI Press, 2009.
3. Paul C. Hiemenz & Timothy P. Lodge; Polymer Chemistry, CRC Press, 2nd Edition 2007.

Any other information:

Details of Internal Continuous Assessment (ICA)
Test Marks: 20
Term Work Marks: 30
Details of Term work:
1. Minimum Eight Lab experiments to be taken.
2. Unit wise assignments to be taken.
3. Presentation/Viva-voce/Quiz to be conducted.

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Program: B. Tech. Integrated (Computer)				Semester: III	
Course: Constitution of India				Code: BTICO03006	
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
2	0	0	0	Marks Scaled to 50	---

Objective:

- To understand the basic aspects of the constitution of India, the evolution, the directive principle & important provisions.
- To understand the implications of important constitutional provision on Business and Professionals.

Outcomes:

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

- Learn basic aspects of constitution of India.
- Apply Constitutional provision on Business and their Professionals.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	The Constitution, its evolution and Preamble to the Constitution.	04
2.	Fundamental rights and duties, exceptions with examples, individual responsibilities and duties, application to business.	10
3.	Directive principles of State Policy, its emphasis and its impact as related to business.	04
4.	Indian Judiciary and LokAdalats.	06
5.	Emergency Provisions under Article 352 – 360.	04
6.	Voting behaviour in India and present political scene. Responsibility of Business in relation to the Constitution.	02
	Total	**30**

Text Books:

1. Durga Das Basu (2009), "Indian Constitution", *20th Edition.*

Reference Books:

1. N. A. Palkhiwala (2009), "We the People".
2. Justice Hidayatullah (2009), "Indian Constitution".

Term work consists of the following:

1. Assignments / Case studies.
2. Two class tests.

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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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Mukesh Patel School of Technology Management & Engineering

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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Program: B. Tech. Integrated(Computer)				**Semester :** V	
Course : Discrete Structures				**Code :**BTICO05001	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: HSC level mathematics

Objectives:

1. To provide the knowledge of formal logic, sets, relations and functions.
2. To impart knowledge of algebraic structures and its use in coding theory.
3. To impart knowledge of different types of graphs, graph coloring etc

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

1. Apply rules and techniques for determining whether a given argument is valid using knowledge of logic.
2. Understand the concept of sets, subsets and their operations in different mathematical structures.
3. Develop the concept of binary relation, and its properties.
4. Draw several graphs and gain knowledge of graph coloring and isomorphism between graphs.
5. Apply ideas of mathematical structures in coding theory.
6. Learn different methods of generating function and recurrence relation for analyzing the computer programs.

Detailed Syllabus:

Unit	Description	Duration
1.	**Set Theory:** Sets, Venn diagrams, Operations on sets, Set membership of tables, Laws of set theory, Partitions of sets, Power set, The principle of Inclusion-Exclusion.	04

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2.	**Logic:** Propositions and logical operations, Truth tables, Equivalence, Implications, Laws of logic, Normal Forms, Predicates and Quantifiers, Mathematical Induction.	**04**
3.	**Relations, Posets and Lattice:** Relations, Representation of Relation, Operations on relation, Properties and types of binary relations, Paths in relation, closures of relation and Warshall's algorithm. Equivalence and Partial ordered relations, Posets and Hasse diagram, Extremal elements, Lattice.	**12**
4.	**Functions and Pigeon Hole Principle:** Definition and types of functions: injective, surjective and bijective, Composition, identity and inverse, Pigeon-hole principle and extended pigeon-hole principle.	**04**
5.	**Graphs:** Definition, Eulerian graph, Hamiltonian graph, Planar graphs, Graph Coloring, Isomorphism of graphs.	**04**
6.	**Groups:** Algebraic structures with one binary operation: Monoids, Semi groups, Groups; Product of algebraic structures, Isomorphism, Homomorphism, Automorphism of groups, Subgroup, Normal subgroup, Quotient group, Codes and group codes.	**09**
7.	**Rings and Fields:** Definition and examples of Rings, Sub-rings, ideal, integral domains and fields; Ring Homomorphism and Isomorphism.	**04**
8.	**Generating Functions and Recurrence Relations:** Series and Sequences, Generating functions, Recurrence relations, Solving Linear Homogeneous Recurrence Relations with constant coefficients.	**04**
	Total	**45**

Text Books:

1. Swapan Kumar Sarkar, "Discrete Mathematics", S. Chand, Fifth edition, 2008
2. Seymour Lipschutz and Marc Lars Lipson, "Discrete Mathematics", McGrawHill, 3rd Edition,2009

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Reference Books:

1. Kolman, Busby, Ross, "Discrete Mathematical Structures", PHI, 6th edition, 2009
2. Tremblay and Manohar, "Discrete Mathematical Structures with application to computer", McGraw Hill, 35th reprint 2008.

Term Work:

Two class tests
Minimum two assignments to be taken.

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Program: B. Tech. Integrated (Computer)				**Semester :** V	
Course : Database Management System				**Code :** BTICO05002	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Computer Programming (BTIAB02005) & Computer Programming-II (BTICO03001), Data Structures (BTICO04003)

Objectives: To provide the knowledge of relational database management systems, design their management and implementation.

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

1. Describe the core concepts of database and model a database management system through ER modeling.
2. Apply knowledge of relational algebra and structural query language to retrieve and manage data in relational databases.
3. Apply integrity constraints and triggers in database.
4. Illustrate the concept of Normalization.
5. Discover the importance of indexing, transaction management, concurrency and recovery in database management system.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introductory Database concepts:** Introduction to Data Processing, Overview of Files Systems, Drawbacks of File Systems, Purpose of Database System, Concept of a Database, Database System Vs File Systems, View of Data, Data Models, Database Languages, Database Users and Administrator, Transaction Management, Database System Structures.	04
2.	**Entity Relationship Model:** Overview of the design process, The Entity-Relationship model, Constraints, Removing redundant	05

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	attributes in entity sets, ER diagrams, and reduction to relational schemas, Entity-Relationship design issues, Extended ER features.	
3.	**Relational Model:** Concept of relation, Notion of primary and secondary keys, foreign keys, Structure of relational databases, The relational algebra and extended relational algebra operations, Formation of queries, Modification of the databases, views.	05
4.	**Structured Query Language (SQL):** Background, Basic Structure, Set Operations, Aggregate Functions, Null Values, Nested Queries, Views, Complex Queries, Database Modification, DDL, Embedded SQL, Stored Procedures and Functions, Dynamic SQL Features.	07
5.	**Integrity and Security:** Domain Constrains, Referential Integrity, Assertions, Triggers, Triggers and Assertions in SQL, Security and Authorization in SQL.	03
6.	**Relational Database Design:** Features of good relational database design, Atomic domains and first normal form, Decomposition using functional dependencies, Functional dependency theory, Normalization, Decomposition, First Normal Form to Fifth Normal Form, BCNF, Pitfalls in Relational-Database Design.	06
7.	**Indexing and Hashing:** Basic concepts, Ordered Indices – dense, Sparse Index, Multilevel Indices, Static Hashing, Dynamic Hashing, Comparison of Indexing and Hashing, Indexing in SQL.	04
8.	**Transactions:** Basic Concept of Transaction, State of a Transaction, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Testing for Serializability, Recoverability, Implementation of Isolation, Transaction in SQL.	04
9.	**Concurrency Control and Recovery:** Lock based protocols, Timestamp based protocols, validation based protocols, Deadlock handling, Failure classification, Storage structure, Recovery and atomicity, Log based recovery and shadow paging.	06
10	**Case Study:** Conceptual and database design for library management system and banking system.	01
	Total	45
Text Books:		

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1. Hennery Korth and Abraham Silberschatz, "Database System Concepts", McGraw Hill, 6th edition, 2011.
2. Elmarsi and Navathe, "Fundamentals of Database Design", Addison Wesley, 5th edition, 2006
3. Coronel Morris Rob, "Database Principles Fundamentals of Design Implementation and Management", Cengage Learning, 9th edition, 2012.

Reference Books:

1. Bipin Desai, "An Introduction to Database System", Galgotia Publication Ltd, 1st edition, 2013.
2. C.J. Date, "An Introduction to Database System", Addison Wesley, 8th edition, 2003
3. Ivan Bayross, "Oracle Developer", BPB, 2000.
4.George Koch, "Oracle8i – The Complete Reference", Tata McGraw Hill, 2001
5. W. Kim, "Modern Database System", ACM Press, Addison Wesley, 1995.
6. R. Ramakrishnan, "Database Management Systems", McGraw Hill, 3rd edition, 2002.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)	**Semester :** V
Course: Digital Logic Design & Analysis	**Code :** BTICO05003

Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Electronics I & II

Objectives: To provide knowledge of logic circuits theory, elementary analysis and its implementation in practical cases.

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

1. Describe the fundamentals of number system, Boolean algebra and its importance in Digital logic design.
2. Analyse and design combinational logic useful in digital logic design.
3. Analyse and design sequential circuits using sequential logic.

Detailed Syllabus:

Unit	Description	Duration
1.	**Number System:** Decimal , Binary, Octal and Hexadecimal number system and conversion, Binary weighted codes, Signed number binary order, 1's and 2's complement codes, Binary arithmetic	06
2.	**Boolean Algebra:** Binary logic functions, Boolean Laws, Truth tables, Associative and distributive properties, DeMorgan's Theorems, Realization of switching functions using logic gates	05
3.	**Combinational Logic:** Switching equations, Canonical logic forms, Sum of product & Product of sums Karnaugh maps, Simplification of expressions , Quine McCluskey minimization techniques, Mixed logic combinational circuits, Multiple output functions	09

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4.	**Analysis and Design of Combinational Logic:** Introduction to combinational circuit, Code conversion , Decoder, Encoder, Priority encoder, Multiplexers as function generators, Binary address, Subtractor, BCD adder , Binary Comparator, Arithmetic and logic units	08
5.	**Sequential Logic:** Sequential circuits, Flip-Flops , Clocked and edge triggered flip-flops timing specifications counters asynchronous and synchronous, Counter design with state equations registors , Serial in serial out shift registers, Tristate register ,Register transfer timing considerations	09
6.	**Sequential Circuits:** State diagrams and tables, Transition table, Excitation table and equations. Examples using flip-flops. Simple synchronous and asynchronous sequential circuit analysis, Construction of state diagram and counter design.	08
	Total	45

Text Books:

1. M.Morris Mano," Digital Logic and Computer Design", PHI,10th Edition ,2008

Reference Books:

1. John P. Uyemura, Brookes,"Digital Systems Design",Cole publishing Co.2001
2. A.B. Marcontz, "Introduction to Logic Design",McGraw Hill,1994.
3. Dr. (Mrs.) Nandini Jog "Logic Circuits & Design ", Nandu Publication,2003

Term Work:

Minimum 10 experiments to be performed

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Program: B. Tech Integrated(Computer)				Semester :V	
Course : Design & Analysis of Algorithms				Code BTICO05004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite:
Computer Programming (BTIAB02005),
Computer Programming-II (BTICO03001),
Data Structures (BTICO04003) , Discrete Structures (BTICO05001)

Objectives:

1. Demonstrate a familiarity with major algorithm design paradigm
2. Analyse the asymptotic performance of algorithms.
3. Synthesize efficient algorithms in common engineering design situations

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

1. Determine and analyse the space-time complexity of an algorithm
2. Implement and analyse divide and conquer and greedy approaches
3. Implement and analyse dynamic programming and Backtracking approach.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction:** What is Algorithms, Characteristics of Algorithms Time and Space Complexity, Examples based on time and space complexity analysis, Time complexity analysis of insertion Sort Introduction to P, NP, NP Completeness and NP hard problems	06
2	**Analysing the Algorithms:** Asymptotic notations, Asymptotic order, Properties of big oh, big omega, and big theta, Classifying functions by their asymptotic growth rates, Best case , average Case and worst case analysis. Recursive algorithms: Master's Theorem and Substitution Method	06
3	**Divide and Conquer Approach:** The general method, control abstraction for divide and conquer, Finding the maximum and minimum: straightforward and recursive algorithm and analysis, Merge sort and analysis, Quick sort and analysis, Strassen's matrix multiplication and analysis	08
4	**Greedy Approach:** The general method, control abstraction, Optimal storage on tapes, Knapsack problem, Huffman codes, Minimum spanning trees: Prim's and Kruskal's algorithm, Single source shortest path Dijkstra's algorithm. Efficiency of greedy algorithms	08
5	**Dynamic Programming**	12

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	The general method, principle of optimality, Single source shortest path Bellman Ford algorithm, All pairs shortest paths: Floyd's Warshall Algorithm, 0/1-knapsack, The travelling salesperson problem, Longest Common Subsequence problem, Efficiency of dynamic programming approaches.	
6	**Backtracking:** The general method, The n-queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles Efficiency of backtracking algorithms	**05**
	Total	**45**

Text Books:

1. Ellis Horowitz, and Sartaj Sahani, "Fundamentals of Computer Algorithms", University Press, 2nd edition
2. Thomas H. Cormen, Charles E., Leiserson, Ronald L. Rivest,"Introduction to Algorithms", MIT Press, 3rd edition

Reference Books:

1. Aho, Hopcroft, Ullman, "Data Structures and Algorithms", Addison-Wesley

Term Work:

1. Minimum Ten Practical experiments covering all the topics.
2. Minimum two class tests
3. Minimum Two assignments.

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Program: B. Tech. Integrated(Computer)				Semester :V	
Course : Fundamentals of Web Technology				Code : BTICO05005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite:

Objectives:

1. To enable students for web site development with the understanding of fundamental principles of web technologies.

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

1. Outline the fundamental concepts of Web technologies.
2. Apply the concept of CSS for controlling the layout of Web pages.
3. Demonstrate client and server side scripting.
4. Outline role of Ecommerce and Distinguish security algorithms.

Detailed Syllabus:

Unit	Description	Duration
1.	**INTRODUCTION:** Introduction to Web technology, World Wide Web, TCP/IP, Protocols, Internet services, Web Server, Client-Server Model, Routing, Gateways.	03
2.	**OVERVIEW OF WEB TECHNOLOGIES:** Components of Web, Working of web server and web browser, Interaction between browser and server, HTTP, HTTP commands, HTTP interaction, Proxy server, Internal architecture of webBrowser, One, two and three tier architecture, Various technologies provided by Microsoft and Sun at different tiers, Types of web pages and technologies to create each (Static: HTML, Dynamic: DHTML, CGI, ASP, Servlet, JSP, ActiveX control and Java Beans)	06
3.	**HTML:** Introduction to HTML, Web page structure, Basic tags, Anchors, Fonts, Backgrounds, Images, Image maps, Hyper linking, Lists, Character Formatting, Color Control, Tables, Frames, Forms in HTML, Multimedia and HTML, Cascading style sheet.	07
4.	**CLENT SIDE PROGRAMMING:** Client side forms, JavaScript, Incorporating JavaScript in HTML, Control flow and functions, Strings, Arrays, JavaScript Objects: History, Location, Navigation, Date, Window, Document, Introduction to DHTML, Creating menus, Visual Toolbars, and Image Rollover in DHTML.	08

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5.	**SERVER SIDE PROGRAMMING:** CGI Scripting, Java Applets, Problems with CGI and FastCGI, ASP Object Model: Application, Request, Response, Server, Session, Forms, Query Strings, Cookies, Connectivity with databases, Advances data handling techniques in ASP, Life cycle of Servlet and JSP, Comparison between ASP, Servlet, JSP	**08**
6.	**E – COMMERCE:** Introduction to E-commerce, Business Strategy, Business to Business Electronics commerce (B2B), Transactions, EDI, Business to Consumers Electronics commerce (B2C), Elements of E-commerce, Establishing a secure business on the web, Online payment, Internet Banking	**04**
7.	**SECURITY:** E-commerce security issues, Cryptography, Digital Signature & Authentication protocol, Digital Certificates, Online security, Secure socket Layer (SSL), Secure Electronics Transaction (SET)	**04**
8.	Introduction to ASP .net, AJAX technology	**05**
	Total	**45**

Text Books:

1. Vivek Sharma, Rajiv Sharma, "Developing e-commerce site: An Integrated Approach", Addison Wesley.1st edition 2000
2. Steven Holzner, "HTML Black Book", Dreamtech Press., 2000

Reference Books:

1. Tom Negrino and Dori Smith, "JavaScript: Visual QuickStart Guide (8th Edition)", Peachpit Press; 8 edition (August 6, 2011)
2. Elijah Lovejoy, "Essential of ASP for Professionals", Prentice Hall PTR; 1st edition (December 15, 2000)
3. Kris Jamsa, Konrad King, Andy Anderson, "HTML & Web Design Tips & Techniques" McGraw Hill Professional, 2002
4. Achyut Godbole, "Web Technologies TCP/IP Architecture and Java Programming, McGraw-Hill Education (India); 2nd Edition edition (2009)

Term Work:

1. Design of a Website using HTML.
2. Introduce CSS in the Website designed in Experiment No 1.
3. Based on Experiment 1 perform Form validation using Javascript.
4. Introduce DHTML in the Website designed in Experiment No 1.
5. Database connectivity using ASP.
6. Database connectivity using Servlet.
7. Enhancement of the Website Using tools (Dreamweaver).

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Program: B. Tech. Integrated (All Branches)				Semester: V	
Course: Engineering Mathematics–III				Code: BTICO05006	
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, 70 Marks)
3	0	2	4	Scaled to 30 marks	Scaled to 70 marks

Objectives:

- To provide an understanding of matrices to solve Engineering problems.
- Impart knowledge of Laplace transforms and Fourier series.

Outcomes:

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

- Apply Matrices, Laplace transforms, Fourier series to Engineering problems.
- Use the concepts of Matrices, Laplace transforms and Fourier series for solving problems.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	**Matrices:** Characteristic equation, Eigen values and Eigen vectors of a square matrix, Cayley-Hamilton Theorem, Similar Matrices, Diagonalization, Functions of a Square Matrix, Quadratic Forms, Reduction of a quadratic form to canonical form using orthogonal transformation.	12
2.	**Laplace transform:** Definition, Laplace transform of $1, e^{at}, \sin at, \cos at, \sinh at, \cosh at, t^n$, Change of scale property, First shifting property, $L\{t^n f(t)\}, L\left\{\frac{f(t)}{t}\right\}, L\left\{\int_0^t f(u)du\right\}, L\{f^n(t)\}$, Inverse Laplace transform, Properties of Inverse Laplace transform, Inverse Laplace using partial fraction and Convolution Theorem. Laplace transforms of Periodic functions, Dirac delta functions, Unit step functions, Second shifting property. Application to solve initial and boundary value problems involving ordinary differential equations.	20
3.	**Fourier Series:** Orthogonality and orthonormality, Definition of Periodic function, Trigonometric Series, Dirichlet's conditions, Euler's formulae	13

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	(Derivation of Fourier coefficients a_0, a_n, b_n is not expected), Fourier series for the interval $[\alpha, \alpha+2\pi]$ and $[\alpha, \alpha+2c]$, Even and Odd functions, Half range sine and cosine expansions, Parseval's identities.	
	Total	**45**

Text Books:

1. Glyn James (2010), "Advance Modern Engineering Mathematics", *Pearson Education, 4th edition.*

Reference Books:

1. Erwin Kreyszig (2006), "Advanced Engineering Mathematics", *Wiley Eastern Ltd, 8th edition.*
2. Murray Spiegel (2005), "Schaum's Outline: Advanced Mathematics for Engineers and Scientists", *Tata McGraw Hill.*
3. B.V. Ramana (2010), "Higher Engineering Mathematics", *Tata McGraw Hill, 1st edition.*

Term Work:

As per institute norms.

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Program: B. Tech Integrated (Computer)				**Semester:** VI	
Subject: Microprocessor				**Code:**BTICO06001	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment(ICA) as per Institute norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Prerequisite: Digital Logic Design & Analysis (BTICO05004)

Objective:

1. To provide exposure of 8086 architecture, interface and programming.

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

1. Describe the architectural design of 8086 along with its features.
2. Implement assembly language programs for 8086.
3. Discuss the significance of interrupts in the operation of microprocessor
4. Design the interface with peripheral devices and coprocessor

Detailed Syllabus:

Unit	Description	Duration
1	**Intel 8086/8088 microprocessor family :-** Introduction Feature of 8086Architecture and programming model of 8086, Microprocessor family Latches 8282, clock generator 8284, Transceiver 8286. Min and Max Mode Timing diagram of 8086, 8288 bus controller.	10
2	**Programming of 8086:-**Introduction, Addressing Modes, Instruction sets of 8086, Assembly language programming, Assembler Directive, Passing parameter to Procedure and Macro.	12

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3	**8086 Interrupt Structure: -** Instruction, Hardware software and program generated interrupts in 8086. Response to interrupt, Interrupt vector Table, Interrupt acknowledge machine cycle, 8259 PCI, EOI, and interfacing with 8086.	08
4	**Programmable Interface and peripheral devices :-** Introduction , Programming and application 8455/8156 , Programmable input output port and timer , 8255A Programmable peripheral interface, 8253/8254 programmable interval timer, 8257 direct memory access controller,	10
5	**8087 Math Co-processor:** - Study of architecture of 8087, architecture of NIC architecture of 8087. Data type Supported by 8087.	05
	Total	45

Text Books:

1. Badri Ram, "Advanced Microprocessors and Interfacing", Tata McGraw Hill publication, 2011.

Reference Books:

1. Douglas Hall, "Microprocessors Interfacing and Programming", Tata McGraw Hill publication, 2006.

Term work consists of the following:

1. Minimum 10 experiments based on the above syllabus.
2. Two class tests.
3. Minimum 3 assignments.

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Program: B. Tech Integrated (Computer)				Semester : VI	
Course : System Programming				Code: BTICO06002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Data Structures (BTICO04003), C and C++ Programming

Objectives: To understand the fundamental concept about system software such as assembler, compiler, macro processor, loader and linker and structure of compiler.

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

1. Illustrate the fundamentals of System programming and system software.
2. Design Single pass and multi pass assemblers.
3. Design absolute loader and linker and differentiate between loader and linkers.
4. Design single pass and two pass macro processors.
5. Implement various parsing techniques, phases and aspects of compilation.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction:** Introduction to system programming, Types of s/w and application software, System programming and system programs, Need of system software, Language Processors: Fundamentals of language processing and language specification. Static and Dynamic Binding. Language processor development tools: Assemblers, Loaders, Compilers, Interpreters, Macros, Operating system and formula system, Translators and its types.	06
2	**Assemblers:** Basic assembler Functions, Assembler algorithms and data structures, Design of single pass assembler. Design of Multi-pass assemblers. Implementation examples: IBM single pass assembler, MASM assembler, SPARC Assembler.	08
3	**Loaders and Linkers**: Basic Loader Functions, Design of an absolute loader, Relocation and Linking Concepts Linkage Editors, Dynamic Linking. Bootstrap Loaders. Design of Linker. Implementation Examples: Linker in MS-DOS.	07
4	**Macros and Macro Processors:** Definition and function of Macro Processor, Features of macro facility, Macro expansion, Nested macros, Design of macro processor – single pass and two pass macro processor, Detailed design of two pass macro processor. Implementation Examples: MASM Macro Processor, ANSI C macro Language.	06

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5	**Scanning and parsing:** introduction to regular expressions and finite state automata. Optimization of DFA based pattern matchers. Top-down and Botom-up parsing techniques. Recursive descent parsing. LL parsing. LALR parsing and operator precedence parsing. LEX and YACC. Syntax directed translation.	09
6	**Compilers and Interpreters:** Aspects of compilation. Memory Allocation. Rum time storage organization. Static, dynamic heap storage and garbage collection. Phases of Compilation. Lexical analysis. Syntax analysis. Intermediate code generation. Machine independent and Machine dependent code optimization. Compilation of expressions and control structures. Interpreters. Java compiler and environment. YACC: Yet another compiler compiler.	09
	Total	45

Text Books:

1) Dhamdhere "System Programming & Operating System", TMH, 2nd Ed, 2009
2) Aho, Ulman, Sethi, "Compiler Construction" – Pearson LPE, 2009

Reference Books:

1) John J. Donovan "System Programming", TMH, 2009

Term Work:

1. Minimum 10 practical experiments covering all the topics.
2. Two class tests.
3. Minimum two Assignments

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Program: B. Tech. Integrated(Computer)				Semester : VI	
Course : Computer Organisation & Architecture				Code : BTICO06003	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite:

Objectives:

To provide knowledge of the basic principles of the organization, operation and performance of modern day computer systems and the underlying integrated circuit technology used to construct computer components to the use of parallel organization concepts in combining those components.

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

1. Compare and contrast computer architecture and computer organization.
2. Describe the operation of memory and system bus.
3. Describe various components of CPU and its functionalities.
4. Discuss various I/O operations and flynn's classification.

Detailed Syllabus:

Unit	Description	Duration
1.	**Overview:** General Organization and architecture, structural/functional view of a computer, Evolution/brief history of computer.	04
2.	**System Buses**: computer functions and flow control, interrupts and interconnection, bus design and timings, hierarchy and arbitration	05
3.	**Memory Organization**: Internal Memory – characteristics and hierarchy, semiconductor main memory: types of ram, chip logic, memory module organization. Cache memory: elements of cache design, address mapping and translation, Replacement algorithms, advanced DRAM organization, Performance characteristics of two level memory, External memory- Magnetic	12

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	disk, Tape, Raid, optical memory, High speed memories: associative memory, interleave memory.	
4.	**Data path Design**: fixed point arithmetic and floating point arithmetic, design of basic serial and parallel high speed adders, subtractors, multipliers, booth's algorithm, ALU: combinational and sequential ALU	06
5.	**Central Processing Unit**: Basic Instruction Cycle, Instruction set, formats and addressing, Processor Organization, Register Organization, Instruction Pipelining, Co-processors, Pipeline processors, RISC computers, RISC computers verses CISC computers.	06
6.	**Control Unit**: Micro Operations, Hardwired Implementations, Micro Programmed control, Micro instruction format, applications of microprogramming	05
7.	**Input and Output Unit**: External Devices, Keyboard, monitor, disk drive and device driver, I/O modules, Programmed I/O, Interrupt Driven I/O, DMA, I/O channels and I/O processors, Serial transmission and synchronization.	05
8.	**Multiprocessor Processor Organizations**: Flynn's classification of parallel processing Systems, Pipelining Concepts.	02
	Total	45

Text Books:

1. William Stallings, "Computer Organization and Architecture: Designing and Performance" Pentice Hall; Eight Edition, 2010.
2. John P. Hayes, "Computer Architecture and Organization", Mc-Graw Hill; second Edition, 2010.

Reference Books:

1. Tannenbaum, "Computer Organization", Third Edition; PHI,2010
2. V. Carl Hamacher and zaky , " Computer Organization", Mc-Hill, 2010
3. Thomas C. Bartee, "Computer Architecture and Logic Design", Tata Mc-Graw hill, 2010.
4. Moris Mano "Computer System Architecture", 3rd Edition, Pentice Hall of India, 2010.

Term Work: 1. Minimum three Assignments.
2. Two class tests.

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Program: B. Tech Integrated (Computer)				Semester : VI	
Course : Computer Networks				Code : BTICO06004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Data Structures(BTICO04003)

Objectives: This course provides the fundamental knowledge of computer networks through the understanding of ISO-OSI model.

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

1. Discuss the fundamentals of computer networks, its types, transmission modes and different reference models.
2. Implement error free transmission of data and analyse data collision with various protocols.
3. Implement various routing and congestion control algorithms over a network.
4. Identify Quality of service parameters and addressing techniques.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction:** Communicating in a network centric world, network as a platform, Architecture of the internet, Classification of Networks, Layered Models, Network Addressing, components of network, topology, and transmission mode, Internetworking devices	06
2	**The physical Layer:** Communication Signals, Purpose of the Physical Layer, Physical Layer Operation, Physical Layer Standards, Physical Layer Fundamental Principles, Physical Signaling and Encoding Physical Media: Types of Physical Media and Media Connectors, transmission impairment, Performance, Circuit and Packet Switching The public switched Telephone Network, Cable Television.	05
3	**The Data Link Layer:** Data link layer design issues, error detection and correction, elementary data link protocols, Sliding Window Protocols, Example of Data Link Protocol: HDLC.	06
4	**Medium Access Sub-layer:** The channel allocation problem, Multiple Access Protocols, Ethernet, Data link layer switching, Shortest Path Algorithm, MST. The LAN, WAN design issues.	06
5.	**The Network Layer:**	08

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	Network Layer Design issues, Routing Algorithms, Congestion Control Algorithms, and Quality of Service, X.25 and frame Relay architecture. IPv4, IPv4 Addressing.	
6	**The Transport Layer:** Introduction to TCP, The TCP Service, Elements of Transport Protocols, A simple Transport Protocol, The TCP Segment Header, Connection Establishment, connection release, Modeling TCP Management. The Transport: UDP, Performance Issues.	08
7	**The Application Layer:** DNS, E-Mail Services and SMTP/POP Protocols, File Transfer Protocol (FTP), WWW Service and HTTP, Multimedia, SNMP Protocol.	06
	Total	45

Text Books:

1. Andrew S. Tanenbaum,"Computer Networks", Pearson Education, Fourth Edition, 2009.
2. B.F. Forouzan, "Data Communications and Networking", TMH, second edition, 2008.

Reference Books:

1. Mark Dye et.al, "Network Fundamentals", CCNA Exploration Companion Guide, Cisco Press, 2011.
2. Kurose, Ross, "Computer Networking: *A Top-Down Approach ", 5th Edition,* 2009, Pearson Education.
3. D.E. Comer, "Computer Networks with Internet Applications", 5th edition, Prentice Hall, 2008.
4. B.F. Forouzan, "TCP/IP Protocol Suite", TMH, Fourth edition, 2010.

Term Work:

1. Minimum 10 practical experiments covering all the topics.
2. Two class test papers.
3. Minimum two assignments.

As per Internal Continuous Assessment (ICA) norms of the institute

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Program: B. Tech Integrated (Computer)				Semester : VI	
Course : Implementation of Technology				Code : BTICO06005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
0	2	0	1	-	Scaled to 50 marks

Pre-requisite: Computer Programming -I(BTIAB002005) & Computer Programming-II (BTICO03001)

Objectives:
This course prepares students to develop self learning attitude practical knowledge of programming language/ modern technology and documentation skill through report preparation.

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

1. Develop self learning attitude
2. Gain hands-on/practical knowledge of programming language/ modern technology in depth through project.
3. Develop the professional documents based on the project carried out.
4. Communicate the developed project effectively.

Detailed Syllabus:

A group of 3-4 students selects the problem definition for the project work discussed and finalized with the help of faculty mentor. They are required to use modern technology decided by the department in the said project.

Evaluation:

Each group is expected to maintain the log book. The log book needs to be evaluated by the mentor every week as the part of continuous evaluation. Each group must demonstrate the working project, submit the report and do the ppt presentation as the part of evaluation. The exam can be taken by two examiners: one internal and one external examiner.

Project Report must contain:

1. Problem Definition
2. Originality of the work/Plagiarism declaration
3. Project description
4. Details of development – Methods / Techniques / Data / Charts / Diagrams
5. Applications – Advantages and Limitations.
6. Project Code & Snapshots/Output
7. References

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Program: B. Tech. Integrated (All Branches)				Semester: VI	
Course: Engineering Mathematics – IV				Code: BTICO06006	
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, 70 Marks)
3	0	2	4	Scaled to 30 marks	Scaled to 70 marks

Objectives:

- To provide the understanding and use of Complex variables.
- Acquire knowledge of statistical methods and linear programming problems.

Outcomes:

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

- Solve problems involving functions of complex variables, random variables, probability distribution, Testing of Hypothesis and operations research.
- Identify the suitable methods of complex variables, random variables, probability distribution, Testing of Hypothesis and operations research to solve real life problems.
- Apply knowledge of complex variables, random variables, probability distribution, Testing of Hypothesis and operations research to Engineering problems.

Detailed Syllabus: (per session plan)

Unit	Description	Duration
1.	**Complex Variables :** Functions of Complex Variables Analytic Function, Cauchy-Riemann Conditions for Analytic Functions, Harmonic Functions, Milne-Thompson method to determine analytic function when it's real or imaginary or its combination is given. Conformal transformation: Standard transformations such as translation, rotation and magnification, inversion and reflection. Bilinear transformation, cross ratio, fixed points.	12
2.	**Random Variables:** Discrete and continuous random variables, probability density function, cumulative distribution function, mean, variance,	08

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	moments and moment generating functions. Relation between raw moments and central moments.	
3.	**Probability Distribution:** Discrete Probability Distribution: Binomial Distribution, Poisson Distribution, Continuous Probability Distribution: Normal Distribution, Mean and Variance of the above distributions.	08
4.	**Testing of Hypothesis:** Large Sample Tests: tests for mean. Small sample tests: Student's t-test, F- test.	08
5.	**Introduction to Operations Research:** Linear Programming Problems: Problem Formulation, Graphical method, Simplex method, Big-M method.	09
	Total	**45**

Text Books:

1. H. K. Dass (2008) "Advanced Engineering Mathematics", *S. Chand & Co., 18th edition.*
2. J. K. Sharma (2010), "Operations Research Theory and Applications", *Macmillan, 4th Edition.*

Reference Books:

1. Glyn James (2010), "Advance Modern Engineering Mathematics", *Pearson Education, 4th edition.*
2. S. P. Gupta (2007), "Statistical Methods", *Sultan Chand & Sons, 35th Edition.*
3. Erwin Kreyszig (2010), "Advanced Engineering Mathematics", *Wiley Eastern Ltd, 10th Edition.*
4. T. Veerarajan (2008), "Probability, Statistics and Random Processes", *Tata McGraw Hill, 2nd Edition.*
5. V. K. Kapoor (2007), "Operations Research", *Sultan Chand & Sons, 4th Edition.*

Term Work:
As per institute norms.

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Program: B. Tech. Integrated (Computer)				Semester :VII	
Course : Theoretical Computer Science				Code : BTICO07001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	0	2	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite:
Data Structures & Numerical Techniques, Discrete Structures (BTICO05002)

Objectives:
1. To introduce fundamental principle of grammars, automata theory and Turing Machine to students to understand the design of a programming language.
2. The syllabus focuses on the theoretical concepts of different constituents of a programming language.

Course Outcomes: After successful completion of this course, students will be able to
1. Describe the fundamentals of Automata theory and Regular sets.
2. Design regular language, language modeling, Finite Automata, & Non deterministic Finite Automata.
3. Apply different types of grammars and generate parse trees from context free grammar.
4. Analyse and compare Moore & Mealy, Turing and PDA machine.
5. Describe undecidability & Halting Problem.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Automata theory:** Basic concepts of sets Graph, Tree string Language Application of the subject in complier construction	02
2	**Regular sets and automate theory:** Regular Expressions, Regular sets, Converting given English statement in regular expression, Expressing R. E. to plain English statement, & Problem on it, Closure properties & Pumping Lemma for regular sets.	04
3	**Finite State Machine:** examples of FSM, NFA & DFA Problems Thomson's rules, Converting R. E. to NFA with e-moves, Converting NFA to DFA, DFA Minimization, examples of expressing given DFA to R. E.	04
4	**Moore and Mealy machine:** examples of Moore & Mealy machines, converting Moore machines to Mealy machines, converting Mealy machines to Moore machines, Decision problems, Myhill-Nerode Theorem, Kleen's Theorem Disadvantages of FSMs Properties & Limitations.	05
5	**Grammar:** Type 0, 1, 2, 3 Grammar, Context Free Grammar, Formalization of Grammar Notations, Derivatives, Tree, Context	07

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	Free Language Ambiguous CFG & its Removal Simplification of CFG, Normal Forms: Chomsky's, GNF	
6	**Turing Machine:** Turing Machine Definition & Examples, Types of TM, TM as acceptors & Generators, variations & Equivalence of TM, TM Languages, Universal TM, Multitask TM, The Halting Problem, Church's Turing Hypothesis, Undecidability & Post's Correspondence Problems (PCP)	07
7	**PushDown Stack-memory Machine (PDM):** Elements in PDM, PDA, Pictorial Representation of PDA, FA & PDA, Power of PDA over FSM, CFG & PDA, Closure Properties & Pumping Lemma for CFLs	06
8	**Post Machine:** Elements of PM, Comparison between PDM & PM Pictorial representation for PM, PM & FA, PM examples, PM accepting Non-CFL	05
9	**Undecidability & Halting Problem:** Rice's Theorem Post Correspondence Problem, Unsolvable problems using TM & CFG, Griebach Theorem, enumerable & Recursively enumerable Languages	05
	Total	**45**

Text Books:

1. Peter Linz, "Introduction to Formal Languages and Automata", Narosa, 4th Edition,2012
2. J.E. Hopcroft, J.D. Ullman, Motwani, "Introduction to Automata Theory, Languages and Computation", Pearson Edu., 3rd Edition, 2008

Reference Books:

1.J.C. Martin, "Introduction to Languages and the Theory of Computation", TMH, SIE,2007

2. Michael Sipser, "Introduction to Theory of Computation", Course Technology, 3rd Edition, 2012.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				Semester : VII	
Course : Software Engineering				Code :BTICO07002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: --

Objectives:

1. To impart knowledge of Software Engineering Principles and Methodologies
2. To impart knowledge of Software Building Techniques
3. To make students aware of analysis and design of Software Applications
4. To make students aware of various testing strategies

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

1. Explain the importance of software engineering concepts in building the quality software
2. Understand and Analyse Prescriptive and agile process models
3. Discuss requirement analysis, architecture and User Interface design
4. Analyse Testing, quality metrics and software project management

Detailed Syllabus:

Unit	Description	Duration
1.	Importance of Software Engineering: Role of Software, Categories of Software, Legacy Software, Software Myths	03
2.	Prescriptive Process Models: Process Framework, Capability Maturity Model Integration Waterfall Model, Incremental & RAD Models, Prototyping, Spiral Model, Concurrent Development Model	04
3.	Agile Process Models: Agility, Agile Process, Extreme Programming, Adaptive Software Development, Dynamic Software Development, SCRUM, Crystal	05
4.	Requirement Analysis & Design: Requirement Engineering tasks, Elements of Analysis Model, Data Modeling Concepts, Data Flow Model, Control Flow Model, Control Specification, Process Specification Design Process & Design Quality, Design Concepts.	06
5.	Architectural Design: Software Architecture, Data Design, Architectural Styles, Representing System in Context, Refining Architecture into Components, Mapping Data Flow into a Software Architecture	06
6.	User Interface Design:	03

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	Golden Rules for User Interface Design, Interface Analysis & Design, Interface Design Steps	
7.	Testing Strategies & Tactics: Test Strategies for Conventional Software, Validation Testing, System Testing, Black-Box & White-Box Testing, Basis Path Testing, Control Structure Testing. Testing Tool.	06
8.	Software Quality & Metrics: McCall's Software Quality Factors, ISO 9126 Quality Factors, Framework for Product Metrics, Function-based Matrices, Architectural Design Metrics, Process & Project Metrics, Size oriented & Function Oriented Metrics, Metrics for Software Quality, SQA Activities	06
9.	Software Project Management: W5HH Principles, Software Project Estimation, Software Sizing, LOC-Based Estimation, FP-Based Estimation, COCOMO-II Estimation Model, Software Configuration Management: Baseline, Software Configuration Items, SCM Repository, SCM Process Reengineering & Reverse Engineering Concepts	06
	Total	45

Text Books:

1. R. Pressman, "Software Engineering: A Practitioner's Approach", McGraw Hill, 7th Edn, 2010

Reference Books:

1. Ian Somerville, "Software Engineering", Pearson Education, 9th Edn, 2011
2. References online: NPTL and Local Guru Lectures Series

Term Work:

1. Minimum Twelve practical experiments covering all the topics and out of which three experiments on specific Rational suite or equivalent SE/OOSE Tools
2. Two Term Test Papers
3. Minimum Six Assignments.

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Program: B. Tech. Integrated(Computer)				**Semester :** VII	
Course : Operating System				**Code :** BTICO07003	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Data Structures (BTICO04007), Computer Organization and Architecture (BTICO06004) and Computer Programming –I and II.

Course Objectives: To impart the fundamental knowledge of operating system.

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

1. Describe the fundamental concepts of operating system.
2. Discuss and implement process management strategies.
3. Discuss and implement memory, I/O and file management strategies.
4. Differentiate among various operating systems with respect to operating systems functionalities.

Detailed Syllabus:

Unit	Description	Duration
1.	**Operating System Overview:** Operating system objectives and functions, evolution of operating system, characteristics of modern operating system, basic concepts: Processes, Files, System calls, Shell, Layered structure v/s Monolithic structure of OS, Introduction to distributed OS, RTOS, Mobile OS.	04
2.	**Process and Process Scheduling:** Process description, Process control block, threads, thread management, comparison between Processes and threads, process	08

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	scheduling: Types, study and comparison of various scheduling algorithms.	
3.	**Process concurrency:** Principles of concurrency: mutual exclusion- hardware approaches, mutual exclusion – software approaches, semaphores, monitors, message passing, reader /writer problem.	08
4.	**Deadlock:** Principles of deadlock, Deadlock prevention, Deadlock avoidance: Ostrich algorithm, Banker's algorithm, Deadlock detection, Dining Philosopher problem	05
5.	**Memory Management:** Memory management requirements, memory partitioning, virtual memory management, paging, segmentation, segmented paging, design and implementation issues in paging and segmentation, page replacement algorithms	06
6.	**I/O Management and Disc Scheduling:** I/O devices, organization of the I/O function, operating system design issues, I/O buffering, disk scheduling and disc scheduling algorithms, RAID, Disk cache.	04
7.	**File Management:** Overview, File organization, File directories, File sharing, Record blocking, Secondary storage management, UNIX file system.	04
8.	**Case Study:** Mobile Operating System: Introduction, Process & thread management, memory management, File system and I/O management, Comparison with Windows and Linux operating system functions	06
	Total	45

Text Books:

1. William Stallings, " Operating Systems: Internals and Design Principles", 7th edition, Pearson education, 2011
2. Silberschatz A. Galvin P., "Operating Systems Principles", 7th edition, Wiley Publications, 2003

3. Flynn Ida M, Mchoes A.M.,"Understanding Operating systems" 6th edition, 2010.

Reference Books:

1. Tannenbaum, "Modern Operating System," third edition, PHI, 2007.
2. Milan Milenkovic, "Operating system", TMH, 1992.
3. Michael J. Jipping, "Smart Phone Operating System Concepts with Symbian Operating System: A Tutorial Guide"Wiley Publication.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				Semester : VII	
Course : Image Processing				Code: BTICO07004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Computer Programming – I (BTIAB02005)

Objectives:

1. To provide the fundamental knowledge of Image processing and related algorithms involved in it.

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

1. Outline the fundamentals of image processing.
1. Compute and analyse effects of various image transformation techniques in spatial and frequency domains
2. Analyse images using image segmentation and morphological operations.
3. Demonstrate and compare basic transforms, wavelets and multiresolution techniques
4. Compress the digital images using various techniques.

Detailed Syllabus:

Unit	Description	Duration
1.	**Digital Image Processing Systems**: Introduction, structure of human eye, image formation in the human eye, Brightness adaptation and discrimination, Image sensing and acquisition, storage, Processing, Communication, Display Image Sampling and quantization, Basic relationships between pixels.	04
2.	**Image Enhancement in the Spatial Domain:** Gray level transformations, Histogram processing, Arithmetic and logic operations, Spatial filtering: Introduction, Smoothing and sharpening filters.	07
3.	**Image Segmentation, Representation and Description:** Detection of discontinuities, Edge linking and Boundary detection, Thresholding, Region based segmentation, Representation – Chain Codes, polynomial approximations, Signatures, Boundary Descriptors, Regional Descriptors	08
4.	**Morphological Image Processing:** Introduction, Dilation, Erosion, Opening, closing, Hit –or-Miss transformation, Morphological algorithm operations on binary images, Morphological algorithm operations on gray-scale images.	06

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5.	**Image Transforms:** Introduction to Fourier transform, Walsh transform, Hadamard transform, Discrete cosine transform, Slant transform, Optimum transform: Karhunen – Loeve (Hotelling) transform. Frequency domain filters: Smoothing and Sharpening filters, Homomorphic filtering.	07
6.	**Wavelets and Multiresolution Processing:** Image pyramids, Subband coding, Haar transform, Series expansion, Scaling functions, Wavelet functions, Discrete wavelet transforms in one dimension, Fast wavelet transform	07
7.	**Image Data Compression:** Fundamentals, Redundancies: Coding, Interpixel, Pysycho-visual, fidelity criteria, Image compression models, Error free compression, Lossy compression, Image compression standards: Binary image and Continuous tone still image compression standards.	06
	Total	45

Text Books:

1. R.C Gonzalez and Richard Woods, "Digital Image Processing", 7th Indian reprint, Pearson publication, 2012.
2. Anil K. Jain, "Fundamental of Digital Image processing", PHI, 2015.

Reference Books:

1. B. Chanda & D. Dutta Majumder, "Digital Image Processing and Analysis", PHI, 2009

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				**Semester :** VII	
Course : Research Methodology				**Code :**BTICO07005	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
2	2	0	3	-	Scaled to 50 marks

Pre-requisite: Environmental Studies (BTICO03006), Professional Ethics (BTCO04009)

Objective: this course prepares students to gain and develop the insight of research paper writing skills, understanding the technical research papers & Professional software such as LATEX.

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

1. Develop Research paper writing skills using Professional software such as LATEX.
2. Review and analyze technical papers.
3. Perform literature survey and develop research ability.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** What is Research? Why Research required? Benefits of research? Basics of Research methodology. Steps of Research methodology. Possible mistakes in Research. History of Indian Research. Case studies of various Researchers focusing on the research attitude one needs to build up.	06
2.	**An overview of performance evaluation, measurement techniques and tools,** types of workloads, the art of workload selection, workload characterization & techniques monitors: program-execution monitors and accounting logs, capacity planning and benchmarking, The art of data presentation, ratio games.	06

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3.	**System analysis and comparison:** summarizing measured data, comparing systems using sample data, simple linear regression models.	06
4.	**Effective technical writing and presentation skills**: overview, Examples of excellent technical writing, Common components of technical writing , Defining the purpose and scope, Organizing data : Determining content, building an outline, creating sections, subsections, building the table of content, index, and glossary, Common documentation errors and how to avoid them, Enhanced understanding with examples, illustrations, charts, and graphics. Proof-reading, Plagarism, Effective presentation skills.	06
5.	**Technical Writing cases:** Technical reports, Project proposals, Instructions, Specifications, User and other types of technical manuals, Overview of Paper writing formats with case study of the different formats (IEEE/ACM/Elsevier), Introduction to Professional software such as LATEX	06
	Total	30

Text Books:

1. C.R.Kothari, "Research methodology-methods & Techniques", New age International Publisher, 2nd Edition, 2009.
2. The MLA Handbook for Writers of Research Papers, by Modern Language Association of America (MLA), 2009.
3. Raj jain," the art of computer systems performance analysis-Techniques for experimental Design, Measurement, simulation and Modeling", Wiley India Edition, 2009 reprint.
4. Probability and Statistics, second edition, TMH, 2008.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated(Computer)				Semester : VII	
Course : Professional Ethics				Code : BTICO07006	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
2	0	0	2	-	Scaled to 50 marks

Pre-requisite: Constitution of India (BTAB02007)

Objectives:
To create an awareness of ethical values in Engineering profession.

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

1. Describe various approaches to ethical decision making
2. Manage ethical issues that arise at workplace.
3. Understand various cybercrimes
4. Understand copyrights, patents and laws needed in IT organizations
5. Understand the concepts of online social networking, its applications and effective usage

Detailed Syllabus:

Unit	Description	Duration (Hours)
1	An Overview of Ethics: Definition of ethics, the importance of integrity, the difference between morals, ethics and laws, ethics in the business world: forecasting business ethics, improving corporate ethics, creating an ethical work environment, decision making, ethics in Information technology	06
2	Ethics for IT workers and IT users: IT professionals: professional business industry, managing professional relationships, professional code of ethics, professional organizations, certification, government licensing, IT professionals malpractice. IT users: common ethical issues, ethical practice of IT users.	06
3	Computer and Internet Crime: IT security incidents: types of exploits, types of perpetrators, laws for prosecuting computer attacks, implementing trustworthy computing: risk assessment, security policy, education, prevention, detection, and response.	06
4	Intellectual Property: Intellectual property, copyrights, patents, trade secrets and its laws, employees and trade secret, key intellectual property issues, plagiarism, reverse engineering, open	06

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	source code, competitive intelligence, trademark infringement, cyber squatting	
5	Social Networking: Social Networking website, business application of online social networking, social networking ethical issues: cyberbullying, cyber stalking, sexual predators, uploading inappropriate material. Online virtual world: crime in virtual world, educational and business uses	06
	Total	**30**

Text Books:

"Ethics in Information Technology", 4th Edition, George Reynolds Strayer University, 2012.

Reference Books:

1. "Ethics and Technology: Controversies, Questions and Strategies for Ethical Computing", 3rd edition, Herman T. Tavani, John Wiley & Sons, 2011.
2. "Contemporary Issues in Ethics and Information Technology", Robert A. Schultz, Idea Group Inc (IGI), 2006.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum two case study based group discussion in the class.
2. Two class tests.

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Program: B. Tech. Integrated(Computer)				Semester :VII	
Course : Advanced Computer Networks (Elective-I-a)				Code :BTICO07007	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Computer Networks(BTICO06005), basic probability theory, programming (BBE1106)

Objective: To provide knowledge of Internet principles and advanced protocols of TCP/IP suite.

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

1. Describe TCP/IP protocol suite for internetworking with different IP versions.
2. Implement process to process communication using TCP, UDP and ARP.
3. Simulate various routing protocols and algorithms over a network in different address environment.
4. Identify methods to analyze packet queues & delays in a computer network.
5. Describe multimedia networking protocols and networks like VPN, MPLS and overlay networks.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction and Overview:** The motivation For Internetworking, OSI model, The TCP/IP protocol suite, IP addressing (Classful and Classless), subnetting in Classful and Classless IP addresses.	04
2	**Internet Protocol:** Virtual Circuit and Datagram networks, IPv4 header format, fragmentation, checksum and options, IPv6, IPv6 addresses, special addresses, header format, extension headers, IPv6 transition.	04
3	**UDP and TCP:** Process to Process communication, UDP header format and operation, TCP services and operations, flow control, silly window syndrome, error control, TCP timers, congestion control, segment, options, checksum, state transition diagram.	05
4	**ARP, RARP and DHCP:** ARP and RARP packet format, encapsulation and operation, proxy ARP, DHCP packet format, DHCP messages and state transition diagram.	02

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5	**Delivery and routing of IP packets:** Direct and indirect delivery, routing methods (next hop routing, network specific routing, host specific routing, default routing) static routing and dynamic routing, routing table, routing in classful and classless address environment.	05
6	**Unicast Routing Protocols:** RIPv1 and v2 message format, timers, problems in RIP and remedies, OSPF basic concept, OSPF operation, OSPF packets and packet formats, path vector routing, BGP packets and packet formats.	06
7	**IP over ATM:** ATM WANS, Carrying a datagram in cells, routing the cells, ATMARP packet format, ATMARP operations, logical IP subnet.	05
8	**Packet queues and delay Analysis:** little's theorem, birth and death process, queueing disciplines, Markovian FIFO queueing system (M/M/1 only)	04
9	**Multimedia Networking:** introduction, RTP, RTCP, SIP, H.323, scheduling (description of FIFO, Priority Queuing, Round Robin and Weighted fair Queuing. Mathematical modeling not expected.) and policing mechanism (leaky bucket), integrated services and differentiated services.	06
10	**VPN, MPLS and overlay networks:** VPN technology, NAT address translation, translation table, NAT and ISP, MPLS operation, routing in MPLS domains, introduction to overlay networks, peer to peer connection.	04
	Total	45

Text Books:

1. Forouzan B., TCP/IP Protocol Suite, 4/e, Mc Graw Hill, 2010
2. Mir F. Nader, Computer and Communication Networks, Pearson Education,2007

Reference Books:

1. Comer D., Internetworking with TCP/IP Volume – I, 5/e, PHI, 2005.
2. Feit S., TCP/IP including IPv6,2/e, TMH,2008
3. Tanenbaum A., Computer Networks,4/e, Prentice Hall,2003
4. Elahi Mehran, Elahi Ata, Data, Network and Internet Communication Technology, 1/e, Cengage learning, 2006.

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5. Kurose, Ross, Computer Networking A top down approach featuring the Internet, 3/e, Pearson Education, 2005
6. TCP/IP Illustrated Volume-I: The Protocols, by W. Richard Stevens and Kevin R. Fall, 2nd edition Pearson Education, 2014.
7. Keshav, S., An Engineering Approach to Computer Networking: ATM Networks, the Internet, and the Telephone Network, 1/e, Pearson Education, 2002.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				Semester : VII	
Course : Advanced Database Management System (Elective-I-b)				Code : BTICO07008	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Database Management System(BTICO05003)

Objectives: Expand the knowledge gained in Database Management Systems in several directions like Non-Relational data models, deductive (Intelligent) database systems, Distributed systems, web based systems and object oriented systems etc.

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

1. Design database using concept of extended entity relationship model.
2. Implement functions and procedures using concepts of PL/SQL
3. Implement object oriented concepts in database.
4. Compare and contrast different types of advance database management systems.
5. Describe database Administration and its management.

Detailed Syllabus:

Unit	Description	Duration
1	**The Extended Entity Relationship Model and Object Model:** The ER model revisited, Motivation for complex data types, User defined abstract data types and structured types, subclasses, super classes, Inheritance, Specialization and Generalization, Constraints and characterisitics of specialization and generalization, relationship types of degree higher than two.	05
2	**Procedural Language/Structured Query language (PL/SQL):** Introduction to PL/SQL, Disadvantages of SQL and advantages of PL/SQL, PL/SQL block structure, block data types, block variable declaration, exception handling, Cursors, types of cursors, functions, procedures, triggers.	07
3	**Object Oriented Databases:** Overview of object oriented concepts, object identity, object structure and type constructions, Encapsulation of operations, Method and persistence, Type hierarchies and Inheritance, Type extents and queries, Complex objects; Database schema design for OODBMS; OQL, Persistent programming language; OODBMS architecture and storage issues; Transaction and Concurrency control, example of ODBMS.	05
4	**Object Relational and Extended Relational Databases:** Database design for an ORDBMS, Nested relations and collections, storage and access methods, Query processing and optimization, An overview of SQL3, Implementation issues of extended type; System comparison of RDBMS, OODBMS, and ORDBMS.	04

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5	**Parallel and Distributed Databases and Client-Server Architecture:** Architectures for parallel database, Parallel query evaluation, Parallelizing individual operations, Sorting, Joins, Distributed Database Concepts, Data Fragmentation, Replication, and allocation techniques for distributed database design; Query processing in distributed databases; Concurrency control and Recovery in distributed databases. An overview of Client-Server architecture.	05
6	**Databases on the web and Semi-Structured Data:** Web interfaces of the web. Overview of XML; data XML applications; The semi structured data model, Implementation issues, Indexes for data.	05
7	**Enhanced data models for Advanced applications:** Active database concepts, Temporal database concepts, Spatial database concepts and architecture, Deductive databases and Query processing, Mobile databases, Geographic information systems.	07
8	**Database Administration:** Managing a database instance, Maintaining an Online Redo Log files, Managing table spaces and data files, Managing undo data, Managing users and privileges, Managing roles and auditing.	07
	Total	45

Text Books:

Elmarsi, Navathe, Fundamentals of Database Systems, 5th edition, Addison Wesley, 2006

Reference Books:

1. Stefano Ceri and Giuseppe Pelagatti, Distributed Databases Principles and Systems, McGraw Hill, 2008.
2. R.Ramakrishnan, Database Management Systems, 3rd edition, McGraw Hill, 2002
3.Hennery Korth, Abraham Silberschatz, S Sudarshan, Database System Concepts, 5th edition, McGraw Hill, 2005.
4. C.J. Date, An Introduction to Database System, 8th edition, Addison Wesley, 2006.
5. W. Kim, Modern Database System, ACM Press, Addison Wesley, 1995.
6.George Koch, Oracle 8i – The complete Reference, Tata McGraw Hill, 2001
7. Ivan Bayross, Oracle Developer 2000, BPB.
8. M. Tamer Ozsu, Patrick Valduriez, Principles of Distributed Database Systems, Pearson Education, 2nd edition, 2005.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech Integrated(Computer)				**Semester :** VII	
Course : Unix Programming (Elective I-c)				**Code :** BTICO07009	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Operating system (BTICO07003)

Objective: To get familiarized with the kernel level programming in UNIX.

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

1. Describe UNIX architecture, basic commands and its file system.
2. Implement basic kernel programs for Process, threads and IPC.
3. Implement basic kernel programs for terminal IO
4. Implement programs using shell script.

Detailed Syllabus:

Unit	Description	Duration
1.	**Unix System Overview**: Introducing Unix Architecture: Traditional and Modern, Features of Unix, Becoming Familiar With Unix Commands, General Purpose Utilities, System Calls, Standardization, File I/O, Unix OS v/s Windows OS and Various versions of Unix, Introduction to Shell scripting.	6
2	**File Handling in Unix:** The File System, Handling Files & Directories, Users and Groups; Security Levels; File Attributes: Ownership, Permission, Inodes, Links, file & directory related commands; I/O Redirection; Wildcards; Quotes. File System Calls, Standard I/O Library, System data files and Information, Concatenating Files; Displaying start & end of files; cut and paste; sorting; count & comparing files; regular expressions, related shell scripting for file handling.	9

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3	**Processes in Unix**: The process environment, Process control, Process Relationships, The Process: Creation of process, running the process and killing the process, Daemon Processes, related shell scripting for processes.	7
4	**Signals and Threads**: Introduction, Signal Concepts, Unreliable signals, Reentrant Functions, Reliable signal terminology and semantics, Signal sets, Threads: Creation, termination, synchronization, Thread Control, related shell scripting for signals and threads.	7
5	**Inter-process Communication** :Introduction, Pipes, Co-processes, XSI IPC, Network IPC: Sockets, Advanced IPC : STREAMS Based Pipes, Unix Domain Sockets, Passing File descriptors, related shell scripting for IPC.	6
6	Terminal I/O: Introduction, Terminal Option Flags, Baud rate functions, Line control functions, Terminal Identification : Canonical mode, non canonical mode, related shell scripting for terminal I/O.	6
7	**Shell Programming (Bourne Shell):** Variables; Arithmetic operators, hierarchy of Logical operators; Decisions: if, case, file tests, string tests, Numerical tests; Loops: for, until, while, break, continue; nested loops; shell metacharacters; system variables; functions; command line arguments, positional parameters; read, echo, eval, expr.	4
	Total	**45**

Text Books:

1. Behrouz A. Forouzan, Richard F. Gilberg, "Unix and Shell Programming", Cengage Learning, 2011.
2. W. Richard Stevens, Stephen A. Rago, "Advanced Programming in the Unix Environment", Pearson Education, 2009.

Reference Books:

1. Sumitabha Das, "Unix and Shell Programming", Tata Mc Graw Hill, 2008
2. Sumitabha Das, "Unix concepts and Applications",4th Edition Tata Mc Graw, 2006
3. William Stallings, "Operating Systems: Internals and Design Principles", PHI Publication Fifth Edition. 2006
3. Yashwant Kanetkar, "Unix Shell Programming", BPB Publications, 2003.

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Term Work:

1. At Least two assignment/Quiz etc.
2. At least 10 experiments based on the syllabus.
3. Two class tests

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Program:	B. Tech. Integrated(Computer)			Semester : VII	
Course :	Information Storage and Management (Elective-I-d)			Code:BTICO07010	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Operating System (BTICO07003), Computer Networks (BTICO06005)

Objectives:
The course provides detailed knowledge, practical training, and insight into the implementation and management of various storage technologies with a focus towards applying these technologies in an information lifecycle paradigm.

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

1. Describe fundamentals of data centre environment.
2. Compare and analyse various Storage networks.
3. Discuss data backup, replication and cloud technologies.
4. Analyse monitoring, management and security issues of Storage networks.
5. Appear internationally accepted certification examination.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Information Storage:** Information Storage, Evolution of Storage Architecture, Data Center Infrastructure, Virtualization and Cloud Computing Summary. **Data Center Environment:** Application, Database Management System(DBMS), Host (Compute), Connectivity, Storage, Disk Drive Components, Disk Drive Performance, Host Access to Data, Direct-Attached Storage, Storage Design based on Application Requirements and Disk Performance, Disk Native Command Queuing, Introduction to Flash Drive, Concept in Practice: VMware ESXi Summary. **RAID:** RAID Implementation Methods, RAID Array Components, RAID Techniques, RAID levels, RAID impact on Disk performance, RAID comparison, Hot Spares Summary	05
2	**Intelligent Storage Systems:** Components of an Intelligent Storage System, Storage Provisioning, Types of Intelligent Storage Systems, Concepts in Practice: EMC Symmetrix and VNX	02
3	**Storage Networking Technologies:**	07

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	Fibre Channel Storage Area Networks: Fibre Channel: Overview, The SAN and its evolution, Components of FC SAN, FC Connectivity, Switched Fabric Ports, Fibre Channel Architecture, Fabric Services, Switched Fabric Login types, Zoning, FC SAN topologies, Virtualization in SAN, Concepts in Practice: EMC Connectrix and EMC VPLEX. **IP SAN and FCoE**: iSCSI, FCIP, FCoE,	
4	**Network attached Storage**: General- Purpose Servers versus NAS Devices, Benefits of NAS, File Systems and Network File Sharing, Components of NAS, NAS I/O Operation, NAS Implementations, NAS File –Sharing Protocols, Factors Affecting NAS Performance, File- Level Virtualization, Concepts in Practice: EMC Isilon and EMC VNX Gateway, Summary **Object- Based and Unified Storage:** Object- Based Storage Devices, Content-Addressed Storage, CAS Use cases, Unified Storage, Concepts in Practice: EMC Atmos, EMC VNX and EMC Centera, Summary	07
5	**Business Continuity & Backup, Archive and Replication** : **Introduction to Business Continuity**: Information Availability, BC Terminology, BC Planning Life Cycle, Failure Analysis, Business Impact Analysis, BC Technology Solutions, Concept in Practice: EMC PowerPath, Summary. **Backup and Archive**: Backup Purpose, Backup Considerations, Backup Granularity, Recovery Considerations, Backup Methods, Backup Architecture, Backup and Restore Operations, Backup Topologies, Backup in NAS Environments, Backup Targets, Data Deduplication for Backup, Backup in Virtualized Environments, Data Archive, Archiving Solution Architecture, Concepts in Practice: EMC Networker, EMC Avamar, and EMC Data Domain, Summary.	07
6	**Local Replication**: Replication Terminology, Uses of Local Replicas, Replica Consistency, Local Replication Technologies, Tracking Changes to Source and Replica, Restore and Restart Considerations, Creating Multiple Replicas, Local Replication in a Virtualized Environment, Concepts in practice: EMC TimeFinder, EMC SnapView, and EMC Recoverpoint, Summary **Remote Replication**: Modes of Remote Replication, Remote Replication Technologies, Three-Site Replication, Data Migration Solutions, Remote replication and migration in a Virtualized Environment, Concepts of Practice: EMC SRDF, EMC MirrorView, and EMC Recoverpoint, Summary.	05

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7	**Cloud Computing:** Cloud enabling technologies, characteristics of cloud computing, Benefits of cloud computing, Cloud service models, Cloud deployment models, Cloud computing infrastructure, Cloud challenges, Cloud adaptation considerations, Concepts in Practice: Vblock, Summary	05
8	**Securing the Storage Infrastructure:** Information Security Framework, Risk Triad, Storage Security Domains, Security Implementations in Storage Networking, Securing Storage Infrastructure in Virtualized and Cloud Environments, Concepts in Practice: RSA and VMware Security products, Summary **Managing the Storage Infrastructure**: Monitoring the Storage Infrastructure, Storage Infrastructure Management Activities, Storage Infrastructure Management Challenges, Developing an ideal solution, Information Lifecycle Management, Storage Tiering, Concepts in Practice: EMC Infrastructure management tools, Summary	07
	Total	45

Text Books:

1. Somasundaram Gana sundaram, Alok Shrivastava, "Information Storage and Management", EMC Education services, Wiley India Publisher, second Edition, 2012.

Reference Books:

1. Somasundaram Gana sundaram, Alok Shrivastava, "Information Storage and Management", EMC Education Services, Wiley India Publisher, First Edition, 2009.
2. Marc Farley Osborne, "Building Storage Networks", 2nd edition, Tata McGraw Hill, 2001.
3. Robert Spalding, "Storage Networks: The Complete Reference ", Tata McGraw Hill, 2003.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				**Semester :**VII	
Course : Operation Research (Elective-I-f)				**Code :**BTICO07011	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Engineering Mathematics - IV (BTICO04001)

Objectives:

1. To provide a set of tools and methods that are helpful in effective decision-making.
2. To provide the knowledge of the topics involved in Operations Research.
3. To recognize, classify and use various models in solving real life problems under consideration

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

1. Explain fundamental concepts and mathematical structures of Linear Programming models.
2. Design model for Transportation and Assignment problems to find Optimal Solution.
3. Perform Project scheduling using PERT and CPM techniques with uncertain activity times.
4. Analyse situations that generate queuing problems.
5. Discuss characteristics and necessity of Operations Research (OR) in industry.

Detailed Syllabus:

Unit	Description	Duration
1.	**Basics of OR** Characteristics of OR, Necessity of OR in industry, OR and decision making, Role of computers in OR.	02
2.	**Linear Programming Problems:** Introduction, Formulating linear programming models, Graphical Method, Simplex Method, Big-M Method, Two Phase method, Duality in Linear Programming, Dual Simplex Method, Revised Simplex Method, Integer Linear Programming: Gomory's Cutting Plane Method, Branch and Bound Method.	18
3.	**Transportation problems:** Mathematical model of Transportation problem, Method for finding Initial Solution (North West Corner method, Least cost method, Vogel's Approximation method), Optimal Solution (Modi Method), Variations in Transportation problem (Maximization case, Unbalanced, degeneracy, alternative, prohibited routes).	06

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4.	**Assignment Problem:** Mathematical model of Assignment Problem, Hungarian method, Variations in Assignment Problem (Maximization case, Multiple/ Alternative Optimum Solutions, Unbalanced, Restricted), Travelling Salesman Problem.	06
5.	**Network Analysis:** Introduction, Critical Path Analysis (CPM), Project Scheduling with uncertain activity times (PERT).	05
6.	**Queuing Theory:** Introduction, Features of queuing system, queuing models- Single server Models (no derivation only examples).	04
7.	**Job Sequencing:** Introduction, Processing n jobs through two Machines, Processing n jobs through 3 machines, Processing n jobs through m machines.	04
	Total	45

Text Books:

1. J.K. Sharma, "Operations Research Theory and Applications", Macmillan, 4th Edition, 2010.

Reference Books:

1. Frederick S. Hillier and Gerald J. Lieberman, "Introduction to Operations Research: concepts and cases", Tata Mc-Graw Hill, 2006.
2. N. D. Vohra, "Quantitative Techniques in Management", Tata McGraw-hill, 3rd edition, 2009.
3. V. K. Kapoor, "Operations Research Problem and Solutions", Sultan Chand & Sons, 5th edition, 2010.
4. Hamdy A. Taha, "Operations Research an Introduction", PHI, 8th edition, 2010.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				Semester : VIII	
Course : Object Oriented Software Engineering				Code : :BTICO08001	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Programming Skills-C++, Java.

Objectives: To prepare students to apply Object Oriented Analysis and design Models in their Projects. The students are exposed to Coding, team work, Project Management. To prepare students to excel in working and designing their project, Succeed in industry. The Star UML tool is used to excel in the design of the project.

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

1. Define and explain unified process
2. Analyze and Design real world problem using object oriented concepts
3. Explain and Test various testing methodologies
4. Estimate and Manage software projects

Detailed Syllabus:

Unit	Description	Duration
1.	Unified Process Phases of the Unified Process, Mapping of Phases & Generic Process Frame Work, Unified Process Work Products.	03
2.	Introduction to Unified Modelling Language Things, Relationships, Common Mechanisms in UML, Basic Object Modelling, Views & Models with UML, Introduction to StarUML, Use Case Diagram, Problem Analysis, Using & Recording Use Case Analysis, Modelling Scenarios.	09
3.	UML Diagrams Views in UML, Activity Diagram, Class Diagrams, Object Diagram, Sequence Diagram, Collaboration Diagram, Component Diagram, State Diagram, Deployment Diagram, Extension in UML 2.0	09
4.	Object Oriented Analysis & Design with UML Identifying Classes & Objects of Real world problems, Defining Attributes & Methods, Mapping Events to Objects, , Simple Collaboration Modeling, Modeling Workflow	06
5.	Modeling Component Level Design Designing Class-based Components, Component Level Design Guidelines, Cohesion & Coupling.	03
6.	Testing	

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	Object Oriented Testing: Test Case Design Implication of O O Concepts, Fault-based Testing, Test Cases & Class Hierarchy, Random Testing for O O Classes, Partition Testing at Class Level, Multiple Class Testing, Test Derived from Behavioral Models.	06
7.	Object Oriented Software Project Management Object Oriented Metrics, Estimation for Object Oriented Projects, Object Oriented Software Project Management Issues. Use case points & Class points	06
8.	Case Study – Study of all 8 diagrams with a case study.	03
	Total	45

Text Books:

1. Booch, Rumbaugh & Jacobson: The Unified Modelling Language User Guide", Pearson 2010.
2. Roger Pressman, "Software Engineering Practictioner's Approach", 6th Edn 2005.

Reference Books:

1 Michael R Blaha, James R Rumbaugh : "Object –Oriented Modeling and design with UML", Pearson, 2005

2 Hans- Erik Eriksson, Maqnus Penker, Brian Lyons, David Fado, "UML2 Toolkit", OMG Press, 2003

E reference : Software Engineering : Sakshat Virtual Lab "http://iitkgp.vlab.co.in/?sub=38&brch=204"

Term Work:

1. Minimum 7 practical experiments covering all the topics
2. Two term test papers
3. Minimum two assignments.

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Program: B. Tech Integrated (Computer)				Semester : VIII	
Course : Biometrics				Code : BTICO08002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Image Processing (BTICO07004), Computer Vision

Objectives:

This course is designed to cover Biometric Identification Science and Technology.

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

1. Explain knowledge of biometric based systems and its importance.
2. Use the knowledge of Image processing and design the Biometrics solution.
3. Develop various biometric recognition system.
4. Design and implement traits of biometric system considering their ethical responsibilities.
5. Explore the multimodal Biometric based recognition system

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Biometric Identification:** Operation of a biometric system, Verification versus identification, Performance of a biometric system, Applications of biometrics, Biometric characteristics, Limitations of biometric systems, Introduction to Biometrics and its various techniques. Euclidian and non Euclidian Matching, Definition of FAR, GAR and FRR.	08
2	**Common Biometric Identification Methods:** Principle Component Analysis (PCA), Image Transforms, Image Transform Wavelets, Transform Texture Patterns, Sectorization in Transform Domain, Vector Quantization Codebooks alias LBG, KFCG	08
3	**Face Recognition:** Introduction, History, Characteristics of Face Features, Image processing algorithms for identification (PCA, ISA), Standard Test beds	06
4	**Iris Recognition:** Preface, Current State of Art, Iris Feature Types, Image processing and verification, Standard Test beds	06
5	**Signature verification:** Introduction, History, Signature characteristics, Verification and Identification, Signature feature extraction, Image processing methods for identification.	06
6	**Fingerprint and Palm print Identification:** Prologue, History, Fingerprint Features, Limitations of Minutiae based Identification, Novel Image processing based verification methods, Standard Test beds.	06

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7	**Multi-modal Biometrics:** Basics, Limitations, Advantages **Scope and Limitations of Biometric Identification**: The legal, social and ethical concerns of applying these technologies	05
	Total	**45**

Text Books:

1. Handbook of Biometrics, Anil K. Jain, Patrick Flynn, Arun A. Ross, Springer Science + Business Media, LLC. 2008. (ISBN: 13:978-0-387-71040-2)
2. BIOMETRICS Personal Identification in Networked Society, edited by Anil K. Jain and Ruud Bolle and Sharath Pankanti, Kluwer Academic publisher. January 15, 1999 | ISBN-10: 0792383451 | Edition: **1st**

Reference Books:

1. Handbook of Multibiometrics by Arun A, Ross and Karthik Nandakumar and Anil K. Jain Springer-Verlag New York Inc, Oct 19, 2007, (ISBN: 9780387710402)
2. Biometric Systems: Technology, Design and Performance Evaluation,(Hardcover) James Wayman, Anil Jain, Davide Maltoni, Dario Maio
3. Biometrics for Network Security, by Paul Reid, Pearson Education Inc.,2011

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				Semester :VIII	
Course : Industrial Economics & Management				Code :BTICO08003	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	0	0	3	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Basic knowledge of Mathematics Economics and Government policies.

Objectives:

1. To develop basic understanding about microeconomic and macro-economic concepts.
2. To expose students to basics of general management and functional management.

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

1. Explain basic concepts of economics and its essential components.
2. Recognize macro-economic indicators and new economic policies
3. Describe basic concepts of various branches of management, organizational and functional structure.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** Concept of Economics, Industrial Economics, Microeconomics and Macroeconomics. Problem of scarcity of resources, Basic model of an economy and types of economic systems.	03
2.	**Demand & Supply Analysis-** Concept of demand and supply, determinants of demand and supply, law of demand & supply, exceptions to law of demand and supply, elasticity of demand and supply and their types & equilibrium price. **Consumer Behavior** – Concept of utility, Law of diminishing marginal utility, Concept of consumer surplus, Indifference curve, Budget line & Consumer equilibrium	05
3.	**Production and Cost concepts**: Production function Returns to scale, Scale economies. Cost function, cost concepts, Short run and Long run costs. **Market Structure/Industry Analysis-** Types of market structure- Perfect & Imperfect markets. Types of competition and their characteristics- Monopoly, Oligopoly, Monopolistic competition. Concept of Monopsony and Oligopsony.	05
4.	**Macro Economic Indicators-** GDP, Business/Economic cycles, Inflation- Concept, Types, Causes, Impact & Solution, Exchange rate and it's determinants, Full employment & Unemployment.	03

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5.	**Macro Economic Concepts & Policies-** Functions of Central Bank, Monetary Policy-Types, Objectives and it's tools, Fiscal Policy & it's types, Taxation- Cannons, Types of taxes, Balance of Payment- Balance of trade, Current Account & Capital account, Concept of Fiscal & Budget Deficit.	05
6.	**New Economic Policy-** Liberalization, Privatization & Globalization. Functions of IMF, WTO & World Bank.	03
7.	**Introduction to Management:** Development of Management thought, Contribution of F.W.Taylor, Henri Fayol, Elton Mayo. Functions of Management, Planning- Nature, Features, Importance, Process & Types, Decision Making Process, Management by Objectives (MBO)- Features, Process , Advantages and Limitations.	05
8.	**Motivation & Control -** Concept, Features and Importance. Motivation theories- Maslow's & Alderfer's hierarchy of needs, McGregor's theory X & Y, Herzberg's two factor theory & McClelland's theory of needs. Control- Types & Process.	03
9.	**Organizational structure-** Line and Staff structure and relationships, Centralization & Decentralization, Delegation of Authority.	03
10.	**Introduction to Production and Marketing Management-** Production, Planning & Control, Inventory management & Quality control. Concept of Marketing, Difference between marketing and selling, 4 P's of marketing, Market research.	05
11.	**Introduction to Financial and Human resource management-** Importance, Breakeven analysis, Concept of Time value of money, concept and techniques of Depreciation, Techniques of Capital Budgeting. Manpower Planning, Staffing and Training.	05
	Total	45

Text Books:

1. Yogesh Maheshwari, Managerial Economics. PHILPL, 2011.
2. L. M. Prasad, Principles and Practice of Management, Sultan Chand and Sons, 2009

Reference Books:

1. D. N. Dwivedi, Principles of Economics, VPHPL, 2009.
2. V. S. Ramaswamy, Marketing Management, Macmillan Publishers India Ltd., 2009
3. Khan & Jain, Financial Management, McGraw Hill, 2007.
4. Dr. B.S. Goel, Production Operations Management, Pragati Prakashan, 2010.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech Integrated (Computer)				**Semester :** VIII	
Course : Project Management				**Code :** BTICO08004	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Software Engineering (BTICO07002), Object Oriented Software Engineering (BTICO08001)

Objectives:

1. The objective of this course is to provide an understanding of the management issues and processes during the software development project. It provides a holistic view of the different aspects of the development process. Students will become conversant with various tools & techniques used in project management in modern industrial environment.

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

1. Explain basic concepts of project planning, management and evaluation.
2. Demonstrate the use of software effort estimation and activity plan in a given project.
3. Discuss resource allocation and risk management in software projects.
4. Describe project tracking, project management and software quality processes.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction:** Software development as a project, Stakeholders in software project, process, resources, quality and cost. Objective issues and problems relating to software projects.	5

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2	**Project Planning and Project Evaluation:** Steps in project planning, Defining scope and objective, work breakdown structure, Execute plans. Evaluation: Strategic assessment, Technical assessment, Cost-benefit analysis, Cash flow forecasting, Breakeven analysis, Risk Evaluation.	6
3	**Selection of Appropriate Project Approach:** Choosing development technology and methodology, Various Process models.	4
4	**Software Effort Estimation:** Problems in software estimation, effort estimation techniques, expert judgment, Estimation by analogy, top-down and bottom-up estimation, function point analysis, object points, COCOMO model.	5
5	**Activity planning :** Network planning model, Activity-on-arrow network, precedence network, forward pass and backward pass, critical path, slack and float, Product Data Management (PDM)	5
6	**Risk Management and Resource Allocation:** The nature of risk, Types of risk, Managing risk, Hazard identification, Hazard analysis, Risk planning and control, Evaluating risks to the schedule. The nature of resources, Identifying resource requirements, Scheduling resources, Creating critical paths, Counting the cost, Being specific, publishing the resource, Cost schedules, The scheduling sequence.	7
7	**Project Tracking and Control:** Measurement of physical and financial progress, earned value analysis, Status reports, Milestone reports and change control.	4
8	**Managing contracts ,Managing people and organizing teams:** Types of contract, Stages in contract placement, Typical terms of a contract, Contract management, Acceptance. Organizational behavior, Recruitment and placement, motivation. Group behavior, individual and group decision making, leadership and forms of organizational structures.	5
9	**Software quality :** Planning for quality, product verses process quality management, procedural and quantitative approaches, defect analysis and prevention, quality standards: ISO 9000, Capability Maturity model, quality audit.	4
	Total	45

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Text Books:

1. Bob Hughes and Mike Cotterell, "Software Project Management", McGraw-Hall, 3rd edition, 2002(5th Edition is latest).
2. Milton D. Rosenau, Jr. & Gregory D. Githers, "Successful Project Management", Wiley India Edition, 2006

Reference Books:

1. Pankaj Jalote, "Software Project Management in Practice", Pearson Education, 2005.
2. Robert K. Wysocki, "Effective Software Project Management", Frommer's, 2010.
3. Walker Royce, "Software Project Management- A Unified, Framework", Addison-Wesley, 1998.
4. Kathy Schwalbe, "Project Management in IT", Cengage Learning, 6th Edition, 2011
5. Clements, Gido, "Effective Project Management", Cengage Learning, 2011
6. Jack R. Meredith, Samuel J Mantel Jr., "Project Management", Wiley, 5th Edition, 2006

Term Work: As per internal Continuous Assessment(ICA) norms of the institute:

1. At least 10 experiments based on the syllabus.
2. Two class tests
3. At Least two assignment/case study/quiz etc.

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Program: B. Tech. Integrated (Computer)				Semester : VIII	
Course : Computer Graphics				Code : BTICO08005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite:
Computer Programming - I (BTIAB01006), Computer Programming-II (BTIAB02006)

Objectives:
1. To introduce the basic 2-D and 3-D graphics primitives to the students.
2. The syllabus focuses on practical use of a programming language to implement different graphical algorithms which will enable students to go for higher trimester subjects like image processing.

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

1. Explain different computer graphics hardware and its functionality.
2. Implement Basic Raster graphics algorithm for drawing 2-D primitives.
3. Demonstrate different 2-D and 3-D geometric transformations, viewing and clipping techniques
4. Explain hidden surface elimination, curve and light shading techniques.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction**: Application areas, Input & Output Devices, Video Display Devices, Refresh CRT, Raster scan display, Colour CRT Monitor, Flat panel display, Co-ordinate Representation	04
2	**Basic Raster Graphics Algorithm for drawing 2-D Primitives:** Output characteristics, Aspect ratio, Aliasing and anti-aliasing, Line Drawing Algorithm, DDA Algorithm, Bresnham Algorithm, Circle Generation Algorithm, Midpoint Circle Algorithm, Ellipse Generation Algorithm, Midpoint Ellipse Algorithm, Aria Filling Scan Line Polygon filling, Inside – outside Test, Boundary fill algorithm, Flood-fill Algorithm.	09
3	**2-D Geometric Transformation:** Window & View Port, their relationship, World Co-ordinates, Normalized device co-ordinates Basic Transformations: Translation, Rotation & Scaling, Other Transformations, Reflection & Shear, Composite Transformation	06
4	**2-D Viewing and Clipping:** Window to View port Co-ordinate Transformation, Liang-Barksy Clipping, Midpoint Subdivision, Polygon, Sutherland-Hodgman Algorithm	06
5	**3-D Concepts:** 3-D Display Methods, Parallel & Perspective Projections, Depth Cueing, 3-D Transformation, Basic	07

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	transformation: Translation, Rotation & Scaling, Other Transformation: Reflection, & Shear, Composite Transformation , 3-D viewing & Clipping	
6	**Hidden Surface Elimination Method:** Backface detection, Depth or Z-Buffer Method, Scan Line Method, Area Subdivision Method	06
7	**Curves & Light Shading:** Spline representation, Bezier Curves, B-Pline, Illumination Method, Shading Constant Intensity Shading, Gouraud Shading, Phong Shading, Halftoning, Ray Tracing	07
	Total	45

Text Books:

1. Donald Hearn & M. Pauline Baker, "Computer Graphics with C Version", Pearson Education, Second Edition, 2008.
2. Steven Harington, "Computer Graphics A Programming Approach", MGH, 7th Edition, 1987.

Reference Books:

1. Rogers and Adams,"Mathematical Elements for Compute Graphics", TMH 2nd Edition, 2002.
2. Xiang and Plastok, "Schaum's Outlines for Computer Graphics", TMH, Second Edition, 2000.
3. Newman and Sproul, "Principles of Interactive Computer Graphics", McGraw Hill, Second Edition, 2001.
4. Rogers, "Procedural Elements in Computer Graphics", TMH, 2nd Edition, 2001.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				Semester : VIII	
Course : Programming Laboratory -I				Code : BTICO08007	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
0	2	0	1	-	Scaled to 50 marks

Pre-requisite:
Computer Programming - I (BTAB01006), Computer Programming-II (BTAB02006), Database Management System (BTCO05003), Implementation of Technology (BTCO06006), Software Engineering (BTCO07002),Design & Analysis of Algorithms (BTCO05005), Research Methodology (BTCO07005)

Objectives:

1. To motivate the students to work in group as a team.
2. To inspire the student to select a recent topic for implementation.
3. To encourage the students to implement the previously studied concepts in the practical implementation of the module with effective documentation and communication.

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

1. Analyse and design solution for a computer engineering problem.
2. Develop management skills and ability to work in team.
3. Document and Communicate the project work effectively.
4. **Develop** independent and lifelong learning.

Detailed Syllabus:
Students are divided into different groups. Each group will consists of strictly 2 or 3 students only (No single student and no group will have more than 3 students).

Each group needs to identify an application to be developed in consultation with the concerned faculty. The group will develop the working model for the selected topic by applying previously studied knowledge in consultation with the concerned faculty.

Each group will prepare a report containing the details of the application including design and screen shots. The coding will not be the part of report in any case.

Evaluation will be based on the continuous assessment by faculty mentor, report and demonstration of working model developed.

Generally the report will contain the followings:

1. Introduction
2. Application Description

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3. System Requirement
4. Database Architecture
5. Database Design
6. Use case models
7. Screen Shots
8. Conclusion & Future Scope
9. References
10. Appendix (If any)

*External Practical exam will be conducted

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Program: B. Tech. Integrated (Computer)				**Semester :** VIII	
Course : Introduction to Cloud Computing (Elective – II-a)				**Code :**BTICO08008	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Information Storage & Management(BTICO07010), Computer Networks(BTICO06005)

Objectives:

1. The course educates students on building cloud infrastructure based on a cloud computing reference model.
2. The course also covers technologies, components, processes, and mechanisms of cloud infrastructure
3. This course prepares students to take the EMC Cloud Infrastructure and Services Associate Certification (EMCCIS).

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

1. Outline the fundamental concepts of cloud computing
2. Describe the phases of transition from classical data centre to the cloud environment.
3. Compare amongst the virtualization technologies at various layers of IT infrastructure.
4. Analyse various cloud security concerns before migrating to cloud.
5. Complete Internationally recognized Professional certification exam successfully

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction:** Essential characteristics of cloud computing, Cloud service models and cloud service brokerage, Cloud deployment models	04
2	**Building the Cloud Infrastructure:** Cloud computing reference model, Deployment options and solutions for building cloud infrastructure, Considerations for building cloud infrastructure	04
3	**Cloud Infrastructure Components: Physical Layer:** Compute	15

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	system, Storage system architectures, Network connectivity **Virtual Layer:** Virtual layer functions, Virtualization software, Resource pool and virtual resources **Control Layer :** Control layer functions, Control software, Software defined approach for managing IT infrastructure, Resource optimization techniques	
4	**Service and Orchestration Layers:** Service layer functions, Cloud portal, Cloud interface standards, Protocols for accessing cloud services - Service orchestration, Cloud service lifecycle	08
5	**Business Continuity:** Business continuity and service availability, Fault tolerance mechanisms, Backup and replication, Cloud application resiliency	06
6	**Cloud Security and Service Management:** Cloud security threats - Cloud security mechanisms - Governance, risk, and compliance, Service portfolio management processes - Service operation management processes	08
	Total	45

Text Books:

1. Dr. Kumar Saurabh, "Cloud Computing: Insights into New-Era Infrastructure", Wiley India, First Edition, **2011** ISBN: 978-81-265-2833-7.

Reference Books:

1. Anthony T.Velte, "Cloud Computing: A Pratical", Tata Mcgraw Hill Education Private Limited (2009) ISBN: 0070683514
2. Halper Fern, Kaufman Marcia, Bloor Robin, Hurwit Judith, "Cloud Computing For Dummies", Wiley India Pvt. Ltd. (2009) ISBN: 8126524871
3. Michael Miller, "Cloud Computing Web- based applications that change the way you work and collaborate online", Pearson, 2013 ISBN:978-81-317-2533-7

Term Work:

1. Minimum 10 practical experiments covering all the topics.
2. Two class tests.
3. Minimum two assignments.

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Program: B. Tech. Integrated (Computer)				**Semester:** VIII	
Course: Embedded System (Elective –II-b)				**Code:** BTICO08009	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Prerequisite: Operating System (BTICO07003), Computer Networks (BTICO06005).

Objective:

1. This course gives basic knowledge of Design and development of embedded system.
2. This would be helpful in understanding the programming with microcontroller.

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

1. Explain the basic concepts embedded systems.
2. Understand architecture of embedded system.
3. Describe the process of embedded system development and software architecture.
4. Explore real time operating system for embedded software.
5. Perform embedded system programming

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Embedded System** :Embedded system ,Categories, Specialties, Application areas, Recent Trends	04
2	**Architecture of Embedded System:** Hardware Architecture, Software Architecture, Application Software, Process of Generating Executable Image, Development / Testing Tools.	06
3	**Processes:** Threads , Virtualization , Client, Servers, Code Migration	05
4	**Process of Embedded System Development:** The Development process, Design, Implementation, Integration and Testing.	04
5	**Survey of Software Architectures:** Round –robin, round	04

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	robin with interrupts, function queue scheduling architecture, real-time operating system architecture, selecting architecture.	
6	**Introduction to Real-Time Operating System Concept:** Tasks and task states, semaphores, Mutex, Mailboxes, Message Queues, Pipes, Signals, Timers, Memory Management, Priority Inversion Problem.	05
7	**Basic Design Using a Real-Time Operating System:** Overview, Principles, An Example, Encapsulating Semaphores and Queues, Hard Real-Time Scheduling Considerations, Saving Memory Space, Saving Power.	05
8	**Embedded System Programming–I:** Embedded C Programming, Operations On Bits, Introduction to Embedded Systems, Embedded System Boards, First Embedded System Program, Blinking LEDs.	06
9.	**Embedded System Programming–II:** EEPROM Programming, Flash Programming, Programming With Sensors, Interrupts &Timers, Serial Communication, Serial Communication Using Interrupts, Building Interactive Embedded Systems, Working With RTC	06
	Total	45

Text Books:

1. Dr. K.V.K.K. Prasad, "Embedded / Real-Time Systems: Concepts, Design and Programming (Black Book)" DreamTech Press, 2005
2. George Couloris, "Distributed System: Concept and Design", Pearson Education, 2008
3. Raj Kamal, "Embedded Systems Architecture, Programming & Design"TMH, 2009

Reference Books:

1. David E.Simon, "An Embedded Software Primer" Pearson Education, 2008
2. Yashwant Kanetkar, "Go Embedded", BPB, 2009.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Two class tests.
3. Minimum two Assignments

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Program: B. Tech. Integrated (Computer)				Semester : VIII	
Course : Advanced Image Processing (Elective-II-c)				Code :BTICO08010	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Image Processing (BTICO07004)

Objectives:

Provide comprehensive coverage of image processing tools and techniques, enable the students to use these techniques for advance real life applications such as biometrics for security and identification, satellite imaging for earth resources and medical diagnosis.

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

1. Implement various transformation functions
2. Analyse Digital images with respect to colour spaces and morphological and segmentation techniques
3. Discuss and Appreciate various Image Compression Techniques
4. Appraise knowledge of advanced techniques of image processing.

Detailed Syllabus:

Unit	Description	Duration
1.	**Basics of Image Processing** Acquisition-sampling and quantization, Image representation, storage-gray and color images, image pre-processing, point processing techniques, low-pass and high pass, mask processing techniques, Image histogram.	04
2.	**Image Perception** Light, Luminance, Brightness and contrast color images, Additive and Subtractive color models. RGB color scheme, CMYK, YCbCr, LUV, HSI and other Color spaces and their relationship to RGB. Colorization of grayscale images using exhaustive and Kekre's fast search algorithms.	06
3.	**Image Analysis** Spatial feature extraction, Edge detection, Boundary Representation, moment representation, Morphological operations: Dilation, Erosion, Opening and closing. Morphological operations on Binary and grayscale images. Image Segmentaton.	06
4.	**Image Compression**	06

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	Redundancy in images, Inter-pixel redundancy, coding redundancy, and psycho-visual redundancy. Various Lossy and lossless techniques to minimize these redundancies.	
5.	**Image Transforms** Kronecker product of matrices and development of Fast Algorithm. Application of Kronecker product algorithm to Hadamard, Walsh, and Haar Transforms. Similar Fast Algorithms for DFT, DCT, DST, Slant and Kekre Transform. Wavelets.	**08**
6.	**Image as Random Variable** Modeling of Image as Random Variable, Mean Variance, Co-Variance matrix and its properties, Eigen vector, K-L Hotelling Transform, Auto-Correlation, Power Density Spectrum.	**05**
7.	**Advanced Topics** Image Restoration, Vector Quantization (LBG), Image Mosaicing, Image Fusion, Digital Watermarking, Steganography and Information Hiding, Principle Component Analysis and its Applications to Finger Print and Face Recognition, Image Databases-CBIR.	**10**
	Total	**45**

Text Books:

1. R.C. Gonsalez, R.E. Woods "Digital Image Processing : JNTU", Pearson India,2012

Reference Books:

1. R.C. Gonsalez, R.E. Woods, Steven Eddins "Digital Image Processing using Matlab", TMH, 2010
2. Anil K. Jain "Fundamentals of Image Processing", PHI, 2011
3. William Pratt, "Digital Image Processing", John Willey, 2011
4. M. A. Joshi, "Digital Image Processing: An Algorithmic Approach", PHI, 2011

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated (Computer)				Semester : VIII	
Course : Software Architecture(Elective II-d)				Code : BTICO08011	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Software Engineering (BTICO07002)

Objectives:

1. To provide the students with technical exposure to the Basic concepts, principles, methods in software architecture.
2. This enables students to learn different architectural styles, patterns and presenting the description of the same using some Architectural description language (ADL).
3. This course also helps them to think about large and complex systems in software and system architectural terms

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

1. Explain the basic concepts of Software Architecture
2. Design, Analyze and implement framework
3. Distinguish Existing Frameworks, deployment of Software Architecture and NFPs for an application.
4. Distinguish Applied and Conventional Architectural styles.

Detailed Syllabus:

Unit	Description	Duration
1.	**Basic Concepts** 1.1 Concepts of Software Architecture 1.2 Models. 1.3 Processes. 1.4 Stakeholders.	03
2.	**Designing Architectures** 2.1 The Design Process. 2.2 Architectural Conception. 2.3 Refined Experience in Action: Styles and Architectural Patterns. 2.4 Architectural Conception in Absence of Experience.	02

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3.	**Connectors** 3.1 Connectors in Action: A Motivating Example. 3.2 Connector Foundations. 3.3 Connector Roles. 3.4 Connector Types and Their Variation Dimensions. 3.5 Example Connectors.	04
4.	**Modeling** 4.1 Modeling Concepts. 4.2 Ambiguity, Accuracy, and Precision. 4.3 Complex Modeling: Mixed Content and Multiple Views. 4.4 Evaluating Modeling Techniques. 4.5 Specific Modeling Techniques.	04
5.	**Analysis** 5.1 Analysis Goals. 5.2 Scope of Analysis. 5.3 Architectural Concern being Analyzed. 5.4 Level of Formality of Architectural Models. 5.5 Type of Analysis. 5.6 Analysis Techniques.	05
6.	**Implementation and Deployment** 6.1 Concepts. 6.2 Existing Frameworks. 6.3 Software Architecture and Deployment. 6.4 Software Architecture and Mobility.	04
7.	**Conventional Architectural styles** 7.1 Pipes and Filters 7.2 Event- based, Implicit Invocation 7.3 Layered systems 7.4 Repositories 7.5 Interpreters 7.6 Process control	05
8.	**Case Studies on Architectural Styles** 8.1 Key word in context 8.2 Instrumentation Software 8.3 Mobile Robotics 8.4 Cruise Control 8.5 A layered Design with Different styles 8.6 Interpreter using different Idioms for components 8.7 A blackboard globally recast as an interpreter	04
9.	**Applied Architectures and Styles** 8.1 Distributed and Networked Architectures. 8.2 Architectures for Network-Based Applications.	05

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	8.3 Decentralized Architectures. 8.4 Service-Oriented Architectures and Web Services.	
10.	**Designing for Non-Functional Properties** 9.1 Efficiency. 9.2 Complexity. 9.3 Scalability and Heterogeneity. 9.4 Adaptability. 9.5 Dependability.	05
11.	**Domain-Specific Software Engineering** 10.1 Domain-Specific Software Engineering in a Nutshell. 10.2 Domain-Specific Software Architecture. 10.3 DSSAs, Product Lines, and Architectural Styles.	04
	Total	45

Text Books:

1. Richard N. Taylor, Nenad Medvidovic, Eric Dashofy , "Software Architecture: Foundations, Theory, and Practice" Wiley, Edition 1, January 2009.
2. Mary Shaw, David Garlan "Software Architecture Perspectives on an Emerging Discipline", Prentice Hall April 12, 1996.
3. Len Bass, Paul Clements, Rick Kazman "Software Architecture in Practice, Second edition", Addison –Wesley Professional; 2nd edition, April 19, 2003.

Reference Books:

1. Frank Buschmann, Regine Meunier , Hans Rohnert , Peter Sommerlad, Michael Stal, "Pattern Oriented Software Architecture" Wiley; Volume 1 edition, August 8, 1996.
2. Stephen T. Albin "The Art of Software Architecture: Design Methods and Techniques" Wiley; 1st edition, March 28, 2003.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech. Integrated(Computer)				Semester :VIII	
Course : Advanced Computer Architecture (Elective II-e)				Code :BTICO08012	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Operating System(BTICO07003), Computer Networks(BTICO06005), Digital Communication(BTCO04006)

Objectives:

1. The objective of this course is to learn the fundamental aspects of computer architecture design and analysis.
2. The course focuses on processor design, pipelining, superscalar, out-of-order execution, caches (memory hierarchies), virtual memory, storage systems, and simulation techniques

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

1. Explain the fundamental concepts of advanced computer architectures.
2. Differentiate between CISC and RISC architectures
3. Recognize the various designs of modern computer architectures, parallel programming models.
4. Describe memory and cache coherence problem and resolve cache coherence problem

Detailed Syllabus:

Unit	Description	Duration
1	Introduction: Flynn's Classification, System Attributes to Performance, Parallel computer models - Multiprocessors and Multicomputers, Multivector and SIMD Computers. Static interconnection networks, Dynamic interconnection Networks: Bus Systems, Crossbar Switch, Multiport Memory, Multistage and Combining Networks.	04
2	Data and resource dependences, data hazards, Hardware and software parallelism, Program partitioning and scheduling, Grain size and latency, Control flow, data flow and Demand driven mechanisms, Instruction Level parallelism: basic compilers exposing ILP.	04

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3	Instruction set architecture, CISC Scalar Processors, RISC Scalar Processors, Memory Hierarchy, Inclusion, Coherence and Locality, Memory capacity planning. Interleaved memory organization- memory interleaving, pipelined memory access, Bandwidth and Fault Tolerance. Backplane Bus System:Backplane bus specification, Addressing and timing protocols, Arbitration transaction and interrupt.	06
4	Linear pipeline processor, Nonlinear pipeline processor, Instruction pipeline design, Mechanisms for instruction pipelining, pipeline hazards, Dynamic instruction scheduling - score boarding and Tomosulo's algorithm, Branch handling techniques, Arithmetic Pipeline Design, Static arithmetic pipeline, Multifunctional arithmetic pipelines. Superscaler pipeline design, Super pipeline processor design.	08
5	Cache coherence, Snoopy protocols, Directory based protocols. Message routing schemes in multicomputer network, deadlock and virtual channel. Vector Processing Principles, Vector instruction types, Vector-access memory schemes. Vector supercomputer architecture,	08
6	SIMD organization: distributed memory model and shared memory model. Performance of symmetric shared memory multiprocessor, Principles of Multithreading: Multithreading Issues and Solutions, Multiple-Context Processors	06
7	Parallel Programming Models, Shared-Variable Model, Message-Passing Model, Data-Parallel Model, Object-Oriented Model	04
8	MULTI-CORE ARCHITECTURES Software and hardware multithreading – SMT and CMP architectures – Design issues –Case studies – Intel Multi-core architecture – SUN CMP architecture – heterogenousmulti-core processors – case study: IBM Cell Processor.	05
	Total	**45**

Text Books:

1. Kai Hwang, "Advanced computer architecture", TMH, 2001.
2. J.P.Hayes, "computer Architecture and organization"; MGH, 1998.

Reference Books:

1. V.Rajaranam & C.S.R.Murthy, "Parallel computer"; PHI Learning, 2004.
2. Kain," Advance Computer Architecture: - A System Design Approach", PHI Learning, 1996.
3. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing. 1998,

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4. Hwang and Briggs, "Computer Architecture and Parallel Processing"; MGH, 2000.
5. David E. Callav & Jaswinder Pal Singh Marge Kaufmann"Advance Computer Architecture
6. John L Hennessey and David, "Computer Architecture, A Quantitative Approach" 4th edition, Elsevier, 2007.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech Intg. (Computer Engineering)					**Semester:** IX
Course : System Security					**Code :** BTICO09001
Teaching Scheme				**Evaluation Scheme**	
Lecture (Hours per week)	**Practical (Hours per week)**	**Tutorial (Hours per week)**	**Credit**	**Theory (3 Hrs., 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Operating System, Database Management System, Computer Networks

Objectives: To provide fundamental knowledge on various aspects of System Security.

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

1. Understand the basic components, design principles and policies of system security.
2. Apply various concepts related to program, OS, database and network security.
3. Analyze various system security controls and authentication methods.
4. Describe risk management, legal and ethical issues related to computer security.
5. Implement various cryptographic algorithms

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** Basic Components of Computer security(CIA), vulnerabilities, threats , Attacks and controls ,goals of security, Computer criminals, Internet Standards and RFC.	03
2.	**Design Principles:** Various Security attacks, method of defense, Design Principles, Security policies, types of security policies	04
3.	**Cryptography:** Cryptography basics, transposition ciphers, substitution ciphers, DES, Public key cryptography, streams and block ciphers, Key Management, Digital Signature.	08

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4.	**Program Security:** Secure programs, Non malicious Program Errors, Viruses and other malicious code, types of viruses, attack mechanism of viruses, Targeted Malicious Code, Controls Against Program Threats.	**04**
5.	**Operating System Security:** Protected objects and methods of protection, Memory address protection, Control of access to general objects, File protection mechanism	**04**
6.	**Database Security:** Security requirements, Reliability and integrity, Sensitive data, Inference, Multilevel database, Proposals for multilevel security	**03**
7.	**Network Security:** Threats: eavesdropping, spoofing, denial of service attacks, Security controls: encryption, virtual private networks, SSL, IPSEC, Firewall: Kinds of Firewalls, Filtering Services, DMZ, Implementing policies (Default allow, Default Deny) on proxy, IDS, types of IDS.	**08**
8.	**Authentication:** Authentication basics, Password, Challenge response, SSO, Biometrics	**02**
9.	**Access Control:** Access control principles, ACL, DAC, MAC, and Role based Access Control, Access control models, Kerberos	**03**
10	**Risk Management and Business Continuity planning:** Risk assessment techniques, managing risk, steps for risk management, Business impact analysis, various terminologies associated with BIA, Different types of continuity planning, testing and revising the plan	**04**
11	**Legal, Professional and Ethical issues in Computer Security:** Protecting Programs and Data, Information and the Law, Computer Crime, Ethical Issues in Computer Security, Case Studies of Ethics, Computer Ethic codes,	**02**
	Total	**45**

Text Books:

1. M. Bishop, S.S. Venkatramanayya, "Introduction to Computer Security", Pearson Education,2009

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2. M. Whitman, H. Mattford, "Principles of Information Security", Cengage Learning, 2nd edition, 2009.
C. Pfleeger, S. Pfleeger, "Security in Computing", Pearson Education, 4th edition, 2008.

Reference Books:

1. B. Schneier," Applied Cryptography: Protocols, Algorithms and Source code in C", 2nd Ed., Wiley ,2004
2. A. Kahate, "Cryptography & Network Security", TMH, 2nd edition, 2009.
3. Dr. Sean Smith," The Craft of System Security", 1/e, Pearson Education, 2008.
4. M. Merkow, J. Breithaupt," Information Security Principles and Practices", Pearson Education, 2007.
5. Alfred Basta, Wolf Halton, "Computer Security Concepts, Issues and Implementation", Cengage Learning, 1st Edition,Course Technology/cengage Learning (2009)

Term Work:

1. Minimum 10 experiments based on syllabus.
2. Minimum 2 class tests.
3. Minimum Two Assignments.

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Program: B. Tech Intg. (Computer Engineering)				**Semester :** IX	
Course : Artificial Intelligence				**Code :** BTICO09002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 Marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite : Computer Programming - I, Computer Programming - II, Data Structures

Objective:

1. To impart knowledge of the current theories, methods and techniques in the field of Artificial Intelligence.
2. To create ability to analyse, design and develop AI-systems.

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

1. Identify Artificial Intelligent Problems and formulate them as problem space
2. Apply various searching strategies to solve intelligent agent based problems.
3. Describe and implement different knowledge representation schemes.
4. Implement Game playing strategies and expert systems
5. Describe Natural Language Processing fundamentals.

Detailed Syllabus:

Unit	Description	Duration
1	Introduction to Artificial Intelligence: Definition, the AI problems, Physical symbol system, Physical symbol system hypothesis, Intelligent agents: agents and environment, agent types, desirable properties of knowledge, AI techniques, different AI techniques.	4
2	Problems, problem spaces and search: Need of a system to solve a problem, problem as a state space search, requirement of a formal description of a problem, production system, control strategy & its requirement, Breadth first search & Depth first search,	4
3	Heuristic search technique: Heuristic technique, Problems of heuristic technique with real world, different weak methods such as Generate and Test, Hill climbing, simple hill climbing and steepest ascent hill climbing,	8

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	problem with hill climbing such as Local Maxima, Plateau, Ridge, Simulated Annealing, Best first search, OR graphs, A* algorithm, agenda driven search, AND-OR Graphs, AO* algorithm.	
4	Knowledge Representation: Prepositional Logic: Syntax, Semantics Knowledge base and inference. Predicate logic: Facts, Representation of fact, mapping between facts and representation, properties and issues of knowledge representation system, Instance relationship, Isa, gt & It predicate. Unification algorithm, resolution in predicate and prepositional logic. Rules: Procedural versus Declarative knowledge, forward versus backward reasoning, forward & backward chaining rule system. Weak & Strong Slot & filler structure: Usefulness of slot & filler structure, Semantic net, Intersection search, representing non binary predicates by semantic net, partitioned semantic net, Frames. Conceptual Dependency, Script, Ontology.	12
5	Game playing: Domain of a game, different ways to improve search strategies, plausible move generate, Static evaluation function, different static evaluation functions, Minimax search procedure, adding Alpha-Beta cutoff, search efficiency of alpha-beta procedure, futility cutoff, additional refinements such as waiting for quiescence, secondary search, using book move, Iterative Deepening, advantage of depth first iterative deepening	4
6	Learning: General concept about learning, Super-vised, Unsupervised, Rote and Reinforced learning, learning by taking advice, learning in the problems solving, learning by chunking, utilities problem, learning from examples, explanation based learning, decision tree.	5
7	Expert system: Expert system: Definition, model, characteristic, architecture, development process, limitations, knowledge representation schemes, Blackboard Learning Model, Examples of Expert systems.	4
8	Natural Language Processing: Natural Language Processing: Introduction, Syntactic Processing, Semantic analysis and Representation Structure, Discourse and Pragmatic processing, Statistical Natural Language processing, Spell checking, Application of Natural Language Processing.	4
	Total	**45**
Text Books:		

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1. Stuart Russel and Peter Norvig, "Artificial Intelligence: A Modern Approach", Pearson Education, 2010.
2. Elaine Rich, Kevin Knight, "Artificial Intelligence", 3rd Edition, Tata Mc-Graw Hill, 2013.

Reference Books:

1. Patrick H. Winston, "Artificial Intelligence", 3rd Edition, Addison Wesley, 1990.
2. Nils J. Nilson, "Principles of Artificial Intelligence", Narosa Publication,1997.
3. Robert J. Schalkolf, "Artificial Inteilligence: An Engineering Approach", Mc-Graw Hill, 1990.
4. David W. Rolston, "Principles of Artificial Intelligence and Expert System Development", Mc-Graw Hill,1988.
5. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert System", PHI, 2001.
6. Giarratano and Riley, "Expert System Principles and Programming", 3rd Edition, PWS publishing company, 1998.

Term work:

1. At least 10 Experiments based on the Syllabus
2. Two class Tests
3. Minimum 2 Assignments.

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Program: B. Tech Intg. (Computer Engineering)				Semester : IX	
Course : Data Warehousing and Mining				Code :BTICO09003	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Database Management System

Objectives:
The objective of the course is to provide the fundamentals and concepts of data warehouse and mining.

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

1. Recognize the need for data warehousing & study the architecture of data warehouse.
2. Modelling multidimensional data & understand the ETL process
3. Learn the basic concepts of data mining and implement various algorithms for Association Rule mining.
4. Analyze, Implement & compare different approaches in classification and clustering of data
5. Understand data exploration and pre-processing

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Data Warehousing** The Need for Data Warehousing; Increasing Demand for Strategic Information; Inability of Past Decision Support System; Operational V/s Decisional Support System; Data Warehouse Defined; Benefits of Data Warehousing; Features of a Data Warehouse; Role of Metadata; Classification of Metadata; Data Warehouse Architecture; Different Types of Architecture; Data Warehouse and Data Marts;	05
2.	**Dimensional Modeling** Data Warehouse Modeling Vs Operational Database Modeling; Dimensional Model Vs ER Model; Features of a Good Dimensional Model; The Star Schema; How Does a Query Execute? The Snowflake	05

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	Schema; Fact Tables and Dimension Tables; The Factless Fact Table; Updates To Dimension Tables: Slowly Changing Dimensions, Type 1 Changes, Type 2 Changes, Type 3 Changes, Keys in the Data Warehouse Schema, Primary Keys, Surrogate Keys & Foreign Keys; Aggregate Tables; Fact Constellation Schema or Families of Star.	
3.	**ETL Process** Challenges in ETL Functions; Data Extraction; Identification of Data Sources; Extracting Data: Immediate Data Extraction, Deferred Data Extraction; Data Transformation: Tasks Involved in Data Transformation, Data Loading: Techniques of Data Loading, Loading the Fact Tables and Dimension Tables Data Quality; Issues in Data Cleansing.	**04**
4.	**Online Analytical Processing (OLAP)** Need for Online Analytical Processing; OLTP V/s OLAP; OLAP and Multidimensional Analysis; OLAP Operations in Multidimensional Data Model; OLAP Models: MOLAP, ROLAP, HOLAP,DOLAP;	**05**
5.	**Introduction to Data Mining:** Why data mining, what is data mining, what kinds of data can be mined, kinds of patterns can be mined, technologies to be used, applications targeted, major issues in data mining	**03**
6.	**Data Exploration and Preprocessing** Data objects and Types of Attributes; Statistical Description of Data; Data Visualization; Measuring similarity and dissimilarity. Why Preprocessing? Data Cleaning; Data Integration; Data Reduction: Attribute subset selection, Histograms, Clustering and Sampling; Data Transformation & Data Discretization: Normalization, Binning, Histogram Analysis and Concept hierarchy generation.	**05**
7.	**Classification** Basic Concepts; Classification methods: K-Nearest Neighbour, Decision Tree Induction: Attribute Selection Measures, Tree pruning. Bayesian Classification: Naïve Bayes' Classifier.	**06**

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	Prediction: Structure of regression models; Simple linear regression, Multiple linear regressions.	
8.	**Clustering** What is clustering? Partitioning Methods (K-Means, KMedoids) Hierarchical Methods(Agglomerative , Divisive, BIRCH), Density-Based Methods (DBSCAN, OPTICS)	08
9.	**Mining Frequent Pattern and Association Rule** Market Basket Analysis, Frequent Itemsets, Closed Itemsets, and Association Rules; Frequent Pattern Mining, Efficient and Scalable Frequent Itemset Mining Methods, The Apriori Algorithm, Generating Association Rules from Frequent Itemsets, Improving the Efficiency of Apriori, FP Growth; Mining Frequent itemsets using vertical data formats; Mining closed and maximal patterns;	07
	Total	**45**

Text Books:

1) Paulraj Ponniah, " Data Warehousing Fundamentals for IT Professionals", Wiley; 2 edition, May 24, 2010
2) Jiawei Han, Micheline Kamber, "Data Mining Concepts and Techniques", Morgan Kaufmann; 3 edition, 2014.

Reference Books:

1) Alex Berson, S. J. Smith, "Data Warehousing, Data Mining & OLAP", McGraw Hill, 2008.
2) Daniel T. Larose, Chantal D. Larose, "Data Mining and Predictive Analytics", 2nd edition Wiley India.Wiley; 2 edition, May 24, 2010

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech Intg. (Computer Engineering)				**Semester :** IX	
Course : Project-I				**Code :**BTICO09004	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Presentation, Demonstration and Viva (60 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (100 marks)**
0	8	0	4	-	Scaled to 100 marks

Pre-requisite: Software Engineering, DBMS, Project Laboratory

Objectives: This course prepares students to develop self learning attitude and working skills through software project development.
Development of the document preparation skills using standard practices

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

1. Define the problem statement in the chosen domain.
2. Paraphrase the literature review and analyse problem in hand.
3. Design and deduce possible solution for problem.
4. Develop model for the solution of problem and generate relevant documentation.
5. Demonstrate the Planned Team Work as per schedule.

Detailed Syllabus:

A group of 3-4 students selects the problem definition for the project work discussed and finalized with the help of faculty mentor. They are required to develop a project based on three- tier (Front end, logic development, Database) architecture.

Evaluation:
Each group is expected to maintain the log book. The log book needs to be evaluated by the mentor every week as the part of continuous evaluation. Each group must demonstrate the working project, submit the report and do the ppt presentation at the end of the semester as the part of semester end exam. The exam can be taken by two examiners: one internal and one external examiner.
Project Report must contain:

1. Problem Definition
2. Originality of the work/Plagiarism declaration

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3.	Project description
4.	Details of development – Methods / Techniques / Data / Charts / Diagrams
5.	Database design
6.	Applications – Advantages and Limitations.
7.	Project Code & Snapshots/Output
8.	Future scope
9.	References.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

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Program: B. Tech Intg. (Computer Engineering)				Semester : IX	
Course : Robotics (Elective- III-a)				Code :BTICO09005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Matrix Algebra, Fundamentals of Image Processing, Fundamentals of Controllers.

Objectives:
This course provides the basic knowledge of robotics by means of kinematics, trajectory planning, robot vision and Programmable logic circuits.

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

1. Explain automation and Classification of Robots.
2. Analyze the workspace using direct and inverse kinematics.
3. Demonstrate trajectory and task planning.
4. Apply image processing techniques on robot vision.
5. Design programmable logic controllers

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Robotics** Automation and Robots, Classification, Application, Specification, Notations.	05
2.	**Direct Kinematics** Dot and cross products, Co-ordinate frames, Rotations, Homogeneous Coordinates, Link co-ordinates, Arm equation ((Three axis, Four axis, and Five axis robots).	12
3.	**Inverse Kinematics & Workspace Analysis** General properties of solutions, Tool configuration, Inverse Kinematics of Three axis, Four axis and Five axis robots Workspace analysis of Four axis and Five axis robots, Work envelope, Workspace fixtures.	09
4.	**Trajectory Planning and Task Planning** Trajectory planning, Pick and place operations, Continuous path motion, Interpolated motion, Straight-line motion. Task level programming, Uncertainty, Configuration space, Gross motion planning, Grasp planning, Fine-motion Planning, Simulation of Planar motion, Source and goal scenes, Task planner simulation.	06

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5.	**Robot Vision** Image representation, Template matching, Polyhedral objects, Shape analysis, Segmentation, Iterative processing, Perspective transformation, Structured Illumination.	06
6.	**Programmable Logic Controller** Discrete-State Process Control, Relay Controllers background, hardwired control system definition, Ladder Diagram Elements and examples, Relay Sequencers, advantages of Programmable Logic Controller (PLC), Evolutions of PLCs, Block diagram of PLC system, symbols used relays and PLC Software Functions, logic functions. OR, AND, Comparator, Counters review, PLC Design, PLC Operation, Programming of PLCs. different methods. ladder STL and CSF, ladder programming of simple system like traffic light controller, conveyers, list of various PLCs available.	07
	Total	**45**

Text Books:

1. Robert Shilling, "Fundamentals of Robotics-Analysis and control", Prentice Hall of India,4/e, 2011
2. Mikkel P. Groover, Mitchell Weiss, Roger N. Nagel, Nicholas G. Odrey, "Industrial Robotics- Technology, Programming & Applications", TMH, 2008.
3. King Sun Fu, Rafael C. Gonzalez, C. S. George Lee, "Robotics: Control, Sensing, Vision & Intelligence", McGraw Hill, 3/e, 2008
4. Curtis D. Johnson, Process Control Instrumentation Technology, PHI Publication, 8/e, 2007

Reference Books:

1. Mittal R K & Nagrath I J, "Robotics and Control", TMH, 2007.
2. John J Craig, "Introduction to Robotics: Mechanics & Control, Pearson Education India, 3/e, 2008.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech Intg. (Computer Engineering)				Semester : IX	
Course : Parallel Computing(Elective –III-b)				Code :BTICO09006	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: C Programming, Data Structures and Algorithms, Distributed Systems.

Objectives: The course aims at giving a practical introduction to parallel programming in C using MPI. It gives a high-level overview of parallel architectures. The course presents parallel algorithm design and explains how to apply the design methodology to develop parallel programs with MPI.

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

1. Discuss Parallel architectures and parallel algorithm design
2. Describe and experiment message passing programming techniques
3. Evaluate and distinguish between sequential and parallel programming algorithms.
4. Analyze performance of parallel computing model.
5. Optimize sequential searching & sorting algorithms for parallel computing environment.
6. Explore different parallel programming tools.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction** Evolution of Supercomputing, Modern Parallel Computers, Seeking concurrency, Data Clustering, Programming Parallel Computers	04
2.	**Parallel Architectures** Introduction, Interconnection Networks, Processor Arrays, Multiprocessors, Multicomputers, Flynn's Taxanomy	04
3.	**Parallel Algorithm Design** The Task/Channel Model, Foster's Design Methodology, Examples of Parallel Algorithm Design	04
4.	**Message Passing Programming** The Message Passing Model, Interface, Initialization functions, Collective Communication, Benchmarking Parallel Performance	04
5.	**Sieve of Eratosthenes** Introduction, Sequential Algorithm, Sources of Parallelism, Data	04

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	Decomposition Options, Developing Parallel Algorithm, Analysis and Documentation, Improvements	
6.	**Floyd's Algorithm** The All-Pairs Shortest Path Problem, Creating Arrays at Run-Time, Designing Parallel Algorithm, Point-to-Point Communication, Documenting the Parallel Program, Analysis and Benchmarking	**04**
7.	**Performance Analysis** Speedup and Efficiency, Amdahl's Law, Gustafson-Barsis Law, The Karp-Flatt Metric, The Isoefficiency Matrix	**04**
8.	**Matrix-Vector Multiplication** Sequential Algorithm, Data Decomposition Options, Row-wise Blocked Striped Decomposition, Column-wise Block Striped Decomposition, Checkerboard, Block Decomposition	**04**
9.	**Document Classification** Parallel Algorithm Design, Non-blocking communication	**04**
10.	**Sorting Algorithms** General, compare and exchange sorting algorithms, sorting on specific network, other sorting algorithms.	**04**
11.	**Searching and optimization** Applications and techniques, branch and bound search, genetic algorithms, successive refinement, hill climbing.	**03**
12.	**Case study** OpenMP, Combining MPI and OpenMP, Basic PThread routines.	**02**
	Total	**45**

Text Books:

1. Micheal J. Quinn, "Parallel Programming in C with MPI and OpenMP", Tata McGraw-Hill, 2004.
2. Barry Wilkinson, Micheal Allen, "Parallel Programming", Pearson Education, 2nd Edition, 2009

Reference Books: Micheal J. Quinn, "Parallel Computing – Theory and Practice", Tata McGraw-Hill, 2006

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech Intg. (Computer Engineering)				**Semester :** IX	
Course : Soft Computing				**Code :**BTICO09007	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Advanced Programming Concepts, Data Structures and Artificial Intelligence

Objectives: The aim of the course is to impart knowledge of the current theories, introducing the concept of neural network, fuzzy theory, Genetic programming. This subject also make student capable to apply acquired knowledge to analyse, design and develop AI-systems. They can formulate scientific questions and is able to solve problems with the aid of abstraction and modelling.

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

1. Explain different models of neural network
2. Design and implement classifier in single and multi-layer neural network
3. Implement Associative Memory Network and Clustering
4. Design and implement application using fuzzy logic and genetic algorithm
5. Design hybrid system using soft computing techniques

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Neural Network –** Biological neurons, McCulloch and Pitts models of neuron, Models of ANN, Neural processing, Neural network learning rules	08
2.	**Single Layer Perceptron Classifier:** Training and classification using the discrete perceptron, Single layer continuous perceptron network for linearly separable classification, multi- category single layer perceptron network.	04
3.	**Multilayer Feedforward Network:** Linearly nonseparable pattern classification, Delta learning rule for multiperceptron layer, generalized delta learning rule, Feedforward recall and error backpropogation training, Learning factors.	06
4.	**Associative Memory Networks** – Training Algorithms for Association, Auto and Hetro – Associative Networks, Bidirectional Associative Memory, Hopfield Networks.	07
5.	**Matching and Self-Organizing Networks** – Hamming Net and	06

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	MAXNET, Unsupervised Learning of Clusters, Counter-propagation Network, Feature Mapping, Self-Organizing Feature Maps. Cluster Discovery Network.	
6.	**Fuzzy Logic and fuzzy systems :** Fuzzy set theory, crisp sets, fuzzy sets, crisp relations, fuzzy relations, Fuzzy systems : crisp logic, predicate logic, fuzzy logic, fuzzy rule based system, Defuzzification methods, Applications.	**06**
7.	**Genetic Algorithms Fundamentals of GA:** Basic concepts, creations of Offsprings, working principle, encoding, fitness function, reproduction	**04**
8.	**Hybrid Systems:** Neural Fuzzy, Fuzzy Genetic, Genetic algorithm based backpropagation networks.	**04**
	Total	**45**

Text Books:

1.Jack M. Zurada, "Introduction to Artificial Neural Network Systems", Jaico Publishing House, 2006
2. Timothy J. Ross, "Fuzzy Logic with Engineering Application", Wiley, 2004.
1. S. Rajasekaran, G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithms Synthesis and Applications", PHI 2003.

Reference Books:

1. Simon Haykin, "Neural Networks", PHI, 2002
2. Samir Roy, Udit Chakraborty, "Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms", Pearson 2013
3. S. Rajasekaran, G. A. Vijaylakshmi Pai, "Neural Network, Fuzzy Logic & Genetic Algorithms Synthesis & Application", PHI, 2005
4.S. N. Shivanandan, S. Sumathi & S. N. Deepa, "Introduction to Neural Networks using matlab 6.0", McGraw Hill Education, 2006

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. At least 10 experiments based on the various methods in the syllabus
2. Two class tests.
3. At least three assignments

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Program: B. Tech Intg. (Computer Engineering)					Semester : IX
Course : Software Quality Assurance & Testing (Elective-III-d)					Code: BTICO09008
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Programming Laboratory, Software Engineering

Objectives:
The students are exposed to design quality software, Management of Configuration and Testing

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

1. Define the underlying concepts of Software Quality and Testing.
2. Describe the processes of management of quality, configuration, testing handling risks and defects.
3. Evaluate verification, validation and testing techniques, their coverage and select appropriate tests for a project
4. Generate test plans, test cases and test reports for a project

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Software Quality:** Definition of Quality, Core Components of Quality, Quality View, Quality Principles of 'TQM', Benchmarking and Metrics	03
2	**Software Quality Management:** Problematic areas of software development life cycle, Software quality management, Process related to software quality, Quality management system structure, Quality management principles	

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		03
3	**Fundamentals Software Testing:** Definition of testing, Essentials of software testing, Workbench, Important features of testing process, Misconceptions about testing, Testing during Software Development Life Cycle, People challenges in software testing, Skills required by tester	06
4	**Software Configuration Management:** Introduction, **Baselining**, Configurable items, Configuration Management **process**, Configuration library, Auditing Configuration library	06
5	**Software Implementation Risk:** Introduction, Risk—, Project Risks, Software Implementation Risks, Identification of risks, risk control management, Testing as a risk reduction program, Risks of Testing	06
6	**Verification and Validation Methods**: Introduction, Verification, Methods of Verification, Types of review on the basis of phase, Examples of entities involved in verification, Review in testing life cycle, Validation, Levels of validation, Coverage in verification & Validation.	06
7	**Defect Management:** Introduction , Defect Classification, Defect Management process, Defect Life Cycle, Defect Template, Defect Management process, Why Defect management needs risk Discussion?, Techniques for finding Defects, Reporting a Defect	06
8	**Levels of Testing:** Introduction, Proposal Testing, Requirement Testing, Design Testing, Code Review, Unit Testing, Module Testing, Integration Testing, Big Bang Testing, Sandwich Testing, Critical Path Testing, Subsystem Testing, System Testing, Testing Stages, **Overview of tools used for testing**	03
9	**Acceptance Testing:** Introduction, Acceptance Testing Criteria, Importance of Acceptance criteria, Some famous Acceptance criteria, Alpha Testing, Beta Testing, Gamma Testing, Acceptance Testing at each phase during SDLC, Consideration of alpha and beta acceptance testing process, what does software acceptance enable, customers responsibilities in acceptance testing,	06

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	Developing acceptance test plan, software acceptance plan, user responsibilities in Acceptance test plan, Executing Acceptance plan	
	Total	**45**

Text Books:

M.G.Limaye, "Software Testing principles Techniques and tools", Tata McGraw Hill, 2009.

Reference Books:

1. Yogesh Singh, "Software Testing", Cambridge university press, 2011
2. Aditya P.Mathur, "Foundations of software testing", Pearson Education, 2008.
3. Bob Hughes & Mike Cottereil, "Software Project Management", Tata McGraw Hill, 4th Edition, 2008.
4. Prashant Sinalkar, "Software Testing and Quality Assurance", Vision Publication, 3rd Edition, 2010

Term Work:

1. Minimum 10 practical experiments covering all the topics
2. Two term test papers
3. Minimum two assignments.

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Program: B. Tech Intg. (Computer Engineering)				Semester :X	
Course : Distributed Computing				Code : BTICO10001	
Teaching Scheme				Evaluation Scheme	
Lecture	Practical	Tutorial	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Operating System, Computer Networks

Objectives: To present the principles underlying the functioning of distributed systems, technical challenges in its design, implementation, modern and classic technology advancements and associated software.

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

1. Explain the basic concepts of distributed computing.
2. Describe various mechanisms for communication, synchronization, naming and fault tolerance.
2. Analyze approaches for DSM, Distributed system Management and DFS.
3. Discuss real world distributed environments and real time DOS.

Detailed Syllabus:

Unit	Description	Duration
1	**Introduction to Distributed System** Definition, Goals, Examples of Distributed system: Internet, System architectures: centralized architecture, decentralized architecture, hybrid architecture, Client- Server Model, Servers: general design issues, server clusters, managing server clusters	05
2	**Communication** RPC: basic RPC operation, RPC implementation, RPC semantics in presence of failures RMI: Basics, Implementation, Case study: Java RMI Message oriented communication: transient and persistent communication Stream oriented communication: support for continuous media, streams and QoS, stream synchronization	07
3	**Synchronization** Introduction, Physical Clock synchronization algorithms; Logical clocks: event ordering, implementation of Logical clocks, Lamport's logical clock algorithm, Vector clocks; Mutual exclusion: Centralized, distributed and token ring mutual exclusion algorithms, comparison of these algorithms	07

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	Traditional election algorithm: Bully and Ring election algorithm Deadlocks: handling deadlocks in distributed systems, deadlock prevention in distributed systems	
4	**Consistency & Replication:** Introduction, basic concepts, general issues in DSM design Consistency: Data centric consistency models, Client centric consistency models Replication: need for replication, replica server placement, content replication and placement, Consistency protocols: primary based protocol Fault tolerance services.	08
5	**Distributed System Management** Task management approach, load balancing approach, load sharing approach, process management in distributed environment, process migration	05
6	**Naming** Names, identifiers, and addresses, Flat naming, Structured naming: name spaces and resolution, implementation of name space, Case study: DNS Attributed-based naming: Directory services	05
7	**Fault Tolerance** Introduction; Process resilience; Reliable group communication	03
8	**Distributed file system** Introduction to DFS, File models, Distributed file system design, Semantics of file sharing, DFS implementation, File caching in DFS, Replication in DFS, Case studies: Google File System (GFS)	05
	Total	45

Text Books:

1. Sunita Mahajan, Seema shah, "Distributed Computing", Oxford University Press, 2011.
2. Andrew S. Tanenbaum, "Distributed System: Principles and Paradigms", second edition, Pearson Prentice Hall, 2007.

Reference Books:

1. George Couloris, "Distributed System: Concept and Design", Pearson Education, 2009.
2. Pradeep K. Sinha, "Distributed Operating System", IEEE Press, Prentice Hall of India Ltd, 1998.
3. Mei-Ling L. Liu, "Distributed Computing: Principles and Applications", Addison – Wesley, 2004.

Term Work:

1. Minimum 10 practical experiments including case studies covering all the topics.
2. Two class test papers.
3. Minimum two assignments.

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Program: B. Tech Intg. (Computer Engineering)				**Semester** :X	
Course : Mobile Computing				**Code** :BTICO10002	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Computer Networks

Objectives:

1. To educate students with wide knowledge base in Mobile Computing.

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

1. Describe the mobile computing architecture and its applications.
2. Implement medium access control protocols.
3. Apply the concepts of Physical and logical Mobility for Mobile Computing.
4. Analyze issues related to mobile databases and Implement concepts of WAP.
5. Analyze heterogeneous networks and mobile operating systems.

Detailed Syllabus:

Unit	Description	Duration
1.	Introduction: Introduction to mobile computing, application examples, mobile computing architecture, mobile devices.	04
2.	Medium Access Control: Motivation for special MAC: Hidden & Exposed Terminal, Near & Far Terminal. SDMA, FDMA, TDMA, CDMA, Aloha, Reservation Schemes, Collision avoidance, MACA, Polling, multiplexing schemes comparison	06
3.	Logical Mobility: Process migration, steps in process migration, advantages and application of process migration, alternatives to process migration, mobile agents, characteristics of mobile agents, requirements for mobile agent systems, Mobile agent Platform (Aglets object and event model, aglet communication)	06
4.	Physical Mobility: Mobile IP, goals assumption and requirement, Entities and terminology , IP packet delivery, agent advertisement and discovery, Registration, tunneling and encapsulation , Optimizations, Reverse tunneling, IPv6; Dynamic host configuration protocol, Traditional TCP: Congestion control, slow start, fast Retransmit/ fast recovery, implications on mobility; indirect TCP, snooping TCP, Mobile TCP, fast retransmit/ fast recover, Transmission/ time-out freezing, selective Retransmission, Transaction oriented TCP,TCP over 2.5/3G wireless networks, Performance enhancing proxies	08
5.	Mobile databases: Design Issues, Problems in mobile databases,	02

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	CODA file system – case study	
6.	Wireless Communication: Components of Wireless Communication Systems, Bluetooth: Application, Protocol Stack, Services, Frame Structure, Architecture of Mobile Communication Systems, Wireless Networking Standards, WLAN.	04
7.	Mobile Internet and Wireless web: WAP programming model, WAP protocol stack, WAP 2.0, XHTML- MP	04
8.	Mobile Ad-hoc Networks: MANET characteristics, classification of MANETs, Routing in MANETs, DSDV, DSR, AODV, Zone routing protocol, hierarchical State routing protocol, power aware routing metrics	08
9.	Mobile OS: Case study of Android OS and Symbian OS	03
	Total	45

Text Books:

1. Kum Kum Garg," Mobile Computing Theory and Practice", Pearson Education, 2010
2. Jochen Schiller, "Mobile Communications", 2nd Edition, Pearson Education, 2008.

Reference Books:

1. P. Ncopolitidis, M S Obaidat, et. al "Wireless Networks", Wiley India, 2009
2. C.Siva ram Murthy and B.S.Manoj, "Adhoc Wireless Networks Architectures and Protocols", Pearson Education, 2004.
3. Raj Kamal," Mobile Computing", Oxford University Press, 2007
4. Asoke K Talukder and Roopa R Yavagal, "Mobile Computing Technology, Application and Service Creation", 2nd Ed., TMH.

Term Work:

1. At least 10 experiments based on the various methods in the syllabus.
2.Two class tests
3. At least two assignments.

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Program: B. Tech. Intg. (Computer Engineering)	Semester : X
Course : Data Science and Big Data Analytics	Code : BTICO10003

Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Statistical methods- Engineering Mathematics – IV, SQL- DBMS, Matlab Tools

Objectives:
1. Provide practical foundation level training that enables immediate and effective participation in big data and other analytics projects.
2. Provide grounding in basic and advanced analytic methods and an introduction to big data analytics technology and tools, including MapReduce and Hadoop.

Course Outcomes: After successful completion of this course, students will be able to
1 Explain the basic concepts of Big Data Analytics
2 Apply R to carry out initial analysis of data
3 Implement advanced analytics and statistical modeling techniques for big data
4 Demonstrate operation of analytics lifecycle lab and analytics project

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to Big Data Analytics:** Big Data Overview , State of the Practice of Analytics, The Data Scientist Role , Big Data Analytics in Industry Verticals	05
2.	**Overview of Data Analytics Lifecycle:** Discovery, Data, reparation, Model Planning, Model Building, Communicating Results and Findings, Operationalizing	07

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3.	**Using R for Initial Analysis of the Data:** Introduction to Using R, Initial Exploration and Analysis of the Data Using R, Basic Data Visualization Using R.	07
4.	**Advanced Analytics and Statistical Modeling for Big Data – Theory and Methods:** Candidate Selection Using Naïve Bayesian Classifier, Categorization Using K Means Clustering and Association Rules, Predictive Modeling Hadoop Using Decision Trees, Linear and Logistic Regression, and Time Series Analysis, Text Analytics.	08
5.	**Advanced Analytics and Statistical Modeling for Big Data – Technology & Tools:** Survey of Tools for Analytics, Analytics for Unstructured Data (MapReduce/ Hadoop, The Hadoop Eco-system , In-Database Analytics with SQL Extensions and Other Advanced SQL Techniques, MADlib Functions for In-Database Analytics	10
6.	**Operationalizing an Analytics Project:** Core Deliverables for Key Stakeholders and Others, Creating the Final Deliverables, Emphasizing Key Points Using Visualization Methods, Application of Analytics lifecycle to a Big Data Analytics challenge.	06
7.	**Big Data Analytics Lifecycle Lab**: Application of Analytics lifecycle to a Big Data Analytics challenge.	02
	Total	45

Text Books: "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", EMC Education services, Wiley India Publisher, second Edition, 2015.

Reference Books:

1. Prasad R. N., Acharya Seema, "Fundamentals of Business Analytics", Wiley India Pvt. Ltd., 2012
2. Adler Joseph, "R in Nutshell" Second Edition, O'Reilly, 2012
3. Milton Michael, "Head First Data Analysis", O'Reilly, First Edition, 2009

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech Intg.(Computer Engineering)				Semester : X	
Course : Project – II				Code :BTICO10004	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (100 marks)
0	8	0	4	-	Scaled to 100 marks

Pre-requisite:
Knowledge of any programming language, Software Engineering, DBMS,UML Diagrams, Software requirements document

Objectives:
This course prepares students to develop self-learning attitude and working skills through software project development.
Development of the document preparation skills using standard practices

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

1. Implement the Working model derived from Phase I (Semester VII)
2. Create a Log for Evaluation.
3. Document the project work as per the standard guidelines.
4. Demonstrate the software product Or Publish a research paper based on the work

Detailed Syllabus:

The selected problem definition for the project in the previous semester needs to be now converted to a working model using the appropriate programming language based on the application

Evaluation:
Each group is expected to maintain the log book. The log book needs to be evaluated by the mentor every week as the part of continuous evaluation. Each group must demonstrate the working project, submit the report and do the ppt presentation at the end of the semester as the part of semester end exam. The exam can be taken by two examiners: one internal and one external examiner.

Project Report must contain:
The sequence in which the project report material should be arranged and bound is as follows:
1. Cover Page & Title page
2. Certificate by the Guide
3. Declaration by the Student
4. Acknowledgment

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5. Abstract (1-2 pages long) 6. Organization of report 7. Table of Contents 8. List of figures 9. List of tables 10. abbreviations 11. Chapters 12. References 13. Appendices
Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

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Signature
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Program: B. Tech Intg. (Computer Engineering)				Semester :X	
Course : E-Commerce (Elective –IV-a)				Code :BTICO10005	
Teaching Scheme				Evaluation Scheme	
Lecture Hours per week	Practical Hours per week	Tutorial Hours per week	Credit	Theory (3 Hrs, 70 Marks)	Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Computer Networks, Security, Fundamentals of Web Technology

Objectives: To understand the fundamental concepts of E-commerce

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

1. Identify the need of E-Commerce and related technologies to solve business problems.
2. Use core concepts of E-business and its strategies.
3. Describe internet payment system and advance technologies of E-commerce.
4. Use Service oriented architecture integration of application.
5. Design and implement E- Commerce website.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction:** Electronic commerce and Physical Commerce, different type of ecommerce, some e-commerce scenario, Advantages of e-commerce	05
2.	**Basic technologies of Ecommerce:** Client side Programming, Server Side Programming, Database connectivity, session tracking techniques	05
3.	**Advance technologies of E-commerce**: Mobile Agent, WAP, XML, Data Mining, Rich Internet Application, Web 2.0, REST Web Services, Web Mashup, Working of Search Engines, Internet Security	05
4.	**Internet Payment System:** Characteristics of payment system, SET Protocol for credit card payment, E-cash, E-check, Micropayment system	05
5.	**E-commerce strategies:** Strategies for marketing, Sales and Promotions, Strategies for Purchasing and support activities, Strategies for Web Auctions, Virtual Communities, and web portals	05
6.	**E-Business -Introduction:** E-Business vs E-commerce,	05

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	Characteristics of e-Business, e-Business role and their challenges, e-business Requirements, impacts of e-business	
7.	**E-business strategies:** Strategic positioning, Levels of e-business strategies, Strategic planning process, Strategic alignment, the consequences of e-Business, Success factors for implementation of e-business strategies. Business models, Business process and collaborations	05
8.	**Integration of Application:** Approaches to Middleware, RPC and RMI, Enterprise Application Integration, e-business Integration, loosely Coupled e-Business solutions for integration, Service Oriented Architecture, EAI and web Services,WS-security	05
9.	**E-commerce Infrastructure** Cluster of Servers, Virtualization Techniques, Cloud computing, Server consolidation using cloud, Introduction to Hadoop, HDFS, Google Apps engine	05
	Total	45

Text Books:

1. "E-Commerce Fundamentals and application", Elizabeth Chang, Henry Chan, Raymond Lee, Tharam Dillon, Wiley publication, 1/e, 2007
2. "E-Commerce: Strategy, Technology and Implementation", Schneider, Cengage Learning, 9/e, 2012.
3. "E-Business Organizational and technical foundation", Michael P, Wiley Publication,1/e, 2006

Reference Books:

1. "E-Commerce Strategy: Technologies and Applications", David Whiteley, Tata McGraw Hill, 2/e, 2008.
2. "E-Commerce, A Managerial Perspective", E.Turban, David King, Jae Lee, Dennis Viehland, Pearson Education, 4/e, 2010

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program: B. Tech Intg. (Computer Engineering)				**Semester :** X	
Course : Principles of Compiler Design (Elective -IV-b)				**Code :**BTICO10006	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Theoretical Computer Science, Data Structures, C and C++ Programming

Objectives:

1. To provide knowledge of various phases of Compiler construction, significant theoretical developments and relevant tools.

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

1. Describe the fundamental concepts of Compiler Design
2. Design and develop lexical and syntax analyzer.
3. Design and Implement code generation phases.

Detailed Syllabus:

Unit	Description	Duration
1	**INTRODUCTION**: Introduction to Compilers and Translators, Phases of compiler, Regular expressions, Finite State Machines, compiler construction tools	04
2	**LEXICAL ANALYZER:** Tokens, Lexical analysis, Symbol Tables Organization, Role of Lexical Analyzer, Input Buffering, Specification of Tokens.	05
3	**SYNTAX ANALYSIS** : Role of the parser, Writing Grammars, Context-Free Grammars, Top Down parsing, Recursive Descent Parsing, Predictive Parsing, Bottom-up parsing, Shift Reduce Parsing, Operator Precedent Parsing, LR Parsers, SLR Parser, Canonical LR Parser, LALR Parser.	12
4	**INTERMEDIATE CODE GENERATION:** Syntax directed translatior, Three address code, Types and Declaration, Translation of Expressions, Type Checking, Control Flow, Backpatching, Switch Statements, Intermediate code for Procedures.	10

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5	**CODE GENERATION:** Issues in the design of code generator, The target machine, Runtime Storage management, Basic Blocks and Flow Graphs, Next-use Information, A simple Code generator, DAG representation of Basic Blocks, Peephole Optimization.	08
6	**CODE OPTIMIZATION AND RUN TIME ENVIRONMENTS:** Introduction, Principal Sources of Optimization, Optimization of basic Blocks, Introduction to Global Data Flow Analysis, Runtime Environments, Source Language Issues, Storage Organization, Storage Allocation strategies, Access to non-local names, Parameter Passing.	06
	Total	45

Text Books:

1.Compilers- Principles, Techniques and Tools" , Alfred Aho, Ravi Sethi, Jeffrey D. Ullman, Pearson Education, 2004

Reference Books:

1. "Compiler Design in C" A. Holub, PHI, 2004
2. "Modern Compiler Implementation in C" Andrew L. Appel, Foundation Books, Delhi, 2000.
3. Allen I. Holub "Compiler Design in C", Prentice Hall of India, 2003.

Term Work: As per Internal Continuous Assessment (ICA) norms of the institute

1. Minimum 10 practical experiments covering all the topics.
2. Minimum two Assignments.
3. Two class tests.

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Program:	B. Tech Intg. (Computer Engineering)			**Semester :** X	
Course :	Human Computer Interface (HCI) (Elective-IV-c)			**Code :**BTICO10007	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 70 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms (50 marks)**
3	2	0	4	Scaled to 70 marks	Scaled to 30 marks

Pre-requisite: Software Engineering

Objectives:

Basic objectives of the course is to understand:

1. User interface design and development.
2. Phenomena and theories of HCI.
3. Human aspects of HCI design.
4. Application domain of HCI.

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

1. Discuss the importance of good interface design for human computer interaction.
2. Apply design principles, models and evaluation techniques to user interface design.
3. Identify different user interface software, tools and issues related to stakeholder's requirements to model user interfaces.
4. Distinguish various features of groupware and different computing environments.
5. Develop a real application to demonstrate the knowledge of design, research and development issues related to HCI.

Detailed Syllabus:

Unit	Description	Duration
1.	**Introduction to HCI:** Introduction: Importance of user Interface – definition, importance of good design. Characterization, Notion - Human, Computer & Interaction.	04
2.	**User Interface Software and tools:** Software tools – Specification methods, interface – Building Tools. Interaction Devices – Keyboard and function keys – pointing devices, image and video displays – drivers.	08
3.	**Design Process:**	09

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	Interaction design basics, HCI in the software process, design rules Implementation support, Evaluation techniques in design process. User interface design : Models, Principles and Practices	
4.	**Cognitive Framework of HCI**: Hierarchical models, Linguistic models, Physical and device models, Cognitive architectures.	08
5.	**Models and Theories** : Socio-organizational issues and stakeholder requirements, Communication and collaboration models, Task analysis, Dialogue notations and design, Models of the system, Modeling rich interaction	08
6.	**Groupware And Cooperative Activity** Groupware ,Ubiquitous computing, virtual and augmented realities, Hypertext, multimedia, and the world wide web	08
	Total	45

Text Books:

1. Alan Dix, Janet Finlay, Gregory Abowd, Russel Beale, "Human–Computer Interaction", 3rd Edition, Pearson Education (2009).
2. John M Carroll, "Human Computer Interaction in the New Millennium", Pearson Education (2008).

Reference Books:

1. Ben Shneiderman, "Designing the User Interface: Strategies for Effective Human-Computer Interaction", 3rd Edition, Pearson Education.
2. Jenny Preece, Yvaonne Rogers, Helen Sharp, David Benyan, Simon Holand, Tom Carey, "Human Computer Interaction", Addison Wesley publishing Co.
3. Wilbert O Galitz, "The essential guide to user interface design", 3rd Edition, Wiley.

Term Work:

1. 10 Lab practicals, which should include development of a small interactive application.
2. Two term tests.
3. Minimum 2 Assignments covering all the topics

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Program: B.Tech. Integrated (Computer Engineering)				**Semester :** XI	
Course : In-plant Training Phase I				**Code :** BTICO11001	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 60 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms**
0	40	0	15	-	Scaled to 300 marks

Pre-requisite: Domain Knowledge of relevant stream

Objectives:

1. To make the student conversant with industrial activities, organizational behavior and ethics.
2. To understand various industrial aspects viz. manufacturing processes, industrial design, productivity improvement, value engineering, quality control.
3. To identify, analyze and solve engineering problems from relevant industry.

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

1. Understand industrial practices and work culture to integrate theory with practice with the help of industrial practitioner.
2. Enhance communication skills and maintain discipline, safety norms and environmental awareness.
3. Interpret and solve routine technical problems through the application of engineering principles.
4. Understand leadership and managerial skills.

Guidelines:

In plant Training, Trainee's Code of Conduct:

Trainee is required to:

- Join on the stated date and complete the training as specified by the Industry
- Fill the Joining Report, get it endorsed by the concerned Industry Official and email the scanned copy within One week of joining to the Placement Department and Faculty Mentor.
- Adhere to all the rules and regulations, safety norms of the Industry and thereby ensure professional conduct
- Take instructions from the Industry Mentor on a daily basis and complete the same with due diligence and quality

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- Fill the Weekly log book, get it endorsed by the concerned Industry Official and then email the scanned copy within a week to the Faculty Mentor

Mentoring process:

- Every In plant trainee shall be allocated two Mentors: an Industry Mentor and a Faculty from the Department (appointed by Head of the Department).
- Faculty Mentor shall connect with the Industry Mentor and the Trainee on a periodic basis.

Training Report:

- Students should take guidance from faculty and industry mentor and prepare a report on their work done in In plant training and one copy should be submitted to the Institute.
- The report should be prepared in a format prescribed by the University.

Interim Presentation
It should give overview about the training to be done.

Report: Interim Report (IR)
(One copy to be submitted each to Internal mentor & Company Mentor)
This report must cover the following aspects:

a. *Synopsis*: A statement of about 100-words describing what the training is about.
b. *Goals*: Stating what the training will accomplish
c. Schedule: A time frame indicating steps that will be required and the expected date when they will be completed.
d. *Reference*: Bibliography and internet materials referred.

Final Presentation
The Final Presentation will evaluate the students in terms of the following

a. Knowledge of basic concepts
b. Ability to identify and analyze the problem
c. Ability to apply the knowledge to solve the problem
d. Logical development of the subject
e. Effective oral communication

Training Report
(One copy to be submitted each to Institute & Company Mentor)
The Report (Interim Report and Final Report), which is the written component of evaluation, is judged for the following points.

1. Comprehensive study of the problem & objective
2. Methodology and implementation
3. Ability to analyze the problem
4. Logical sequencing, organizing and data handling

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5. Findings, observations, concluding remarks in terms of the objectives set earlier and the future scope of the problem.

The Training Report is to be prepared based on the guidelines given by Institute.

In plant Training Evaluation Scheme

Evaluation Phases	Evaluation	Marks	Duration	Remarks
Weekly Log book	Weekly progress report	100	15 Weeks	Evaluated by Industry Mentor
Interim	Weekly log book (30 Marks Internal Mentor), Interim Presentation and Report (70 Marks)	100	Between 8th to 10th week	Panel of at least two faculty mentors
Final	Final Presentation and Report	100	End of the term	Panel: Industry and Internal
Total Marks		300		

Details of Internal Continuous Assessment (ICA)
Test marks: NA
Term Work Marks: 300

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Program: B.Tech. Integrated (Computer Engineering)				**Semester :** XII	
Course : In-plant Training Phase II				**Code :** BTICO12001	
Teaching Scheme				**Evaluation Scheme**	
Lecture Hours per week	**Practical Hours per week**	**Tutorial Hours per week**	**Credit**	**Theory (3 Hrs, 60 Marks)**	**Internal Continuous Assessment (ICA) As per Institute Norms**
0	40	0	15	-	Scaled to 300 marks

Pre-requisite: Domain Knowledge of relevant stream

Objectives:

1. To make the student conversant with industrial activities, organizational behavior and ethics.
2. To understand various industrial aspects viz. manufacturing processes, industrial design, productivity improvement, value engineering, quality control.
3. To identify, analyze and solve engineering problems from relevant industry.

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

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Details of Internal Continuous Assessment (ICA)
Test marks: NA
Term Work Marks: 300

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