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

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	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

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	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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