

SVKM's Narsee Monjee Institute of Management Studies  
Mukesh Patel School of Technology Management & Engineering

<b>Program:</b> B. Tech. (I.T., Computer, EXTC, Mechanical, Civil, Mechatronics, Data Science)					<b>Semester:</b> II	
<b>Course/Module:</b> Mathematics-II					<b>Module Code:</b> BTIT02008, BTCO02008, BTET02008, BTME02008, BTCIO2008, BTMA02008, BTDS02008	
<b>Teaching Scheme</b>					<b>Evaluation Scheme</b>	
<b>Classroom Session</b>	<b>Lecture (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Practical/ Group work (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks - 100 in Question Paper)</b>
45	3	1	0	4	Marks Scaled to 50	Marks Scaled to 50
<b>Course Rationale:</b> This course is designed to develop the concepts and methods related to Multivariate Integration, Ordinary Differential Equations and Functions of Complex Variables. Double Integrals, Triple Integrals, Line and Surface Integrals are all powerful tools for real world applications. Mathematical models of real world problems often involve Differential Equations. Approach to the solution of such equations is discussed in the course. The course also explores Analytic and Harmonic Functions, Conformal Mappings, Contour Integration, Cauchy Integral Formula and evaluation of Definite and Improper Integrals.						
<b>Course Objectives:</b> 1. To familiarize prospective engineers with techniques in Multivariate Integration, Ordinary Differential Equations and Complex Variables. 2. To enable students to deal with advanced levels of Mathematics and applications that would be essential for their disciplines.						
<b>Course Outcomes:</b> After completion of the course, students would be able to : 1. Understand and apply appropriate mathematical techniques in evaluating Multiple Integrals, Differentiation and Integration of Functions of Complex Variables. 2. Use effective mathematical tools for the solutions of ordinary differential equations that model physical processes. 3. Apply various techniques of Multivariable Integration, Differential Equations and Complex Analysis in solving engineering problems.						
<b>Pedagogy:</b> Lectures, tutorials, presentations, application-based videos and use of mathematical software.						
<b>Textbooks:</b> TB1. <i>Advanced Engineering Mathematics</i> , 10 e, Erwin Kreyszig, Wiley India, 2017. TB2. <i>Engineering Mathematics – I</i> , 1 e, Veerarajan T, McGraw-Hill Education, 2017. TB3. <i>Higher Engineering Mathematics</i> , 44 e, B.S. Grewal, Khanna Publishers, 2017. TB4. <i>Engineering Mathematics – II</i> , 1 e, Veerarajan T, McGraw-Hill Education, 2017.						
<b>Reference Books:</b> RB1. <i>Calculus and Analytic geometry</i> , 9 e, G. B. Thomas and R. L. Finney, Pearson, 2006.						

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21/7/2020



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- RB2. *Elementary Differential Equations and Boundary Value Problems*, 9 e, W. E. Boyce and R. C. DiPrima, Wiley India, 2015.
- RB3. *Differential Equations*, 3 e, S.L. Ross, Wiley India, 2016.
- RB4. *Complex Variables and Applications*, 8 e, J.W. Brown and R.V. Churchill, Mc- Graw Hill Education, 2014.
- RB5. *A text book of Engineering Mathematics*, 9 e, N. P. Bali and Manish Goyal, Laxmi Publications (P) LTD., 2017.

**Links to websites:**

- <http://mathworld.wolfram.com>
- <http://www.math.com>
- <https://ocw.mit.edu/index.htm>

**Evaluation Scheme:**

• Tutorial Test/Presentation/viva/quiz	30%
• Mid Term	20%
• Term End Exam	50%
<b>Total</b>	<b>100%</b>

**Session Plan:**

Session	Topics	Pedagogical Tool	Textbook Chapters & Readings
Unit 1	Multivariate Integration	--	--
1.	<b>Multiple Integration</b> <ul style="list-style-type: none"><li>• Double integrals (Cartesian)</li></ul>	<ul style="list-style-type: none"><li>• Lecture</li><li>• Problem Solving</li></ul>	<b>TB2:</b> Chapter 4: Multiple Integrals <b>TB3:</b> Chapter 7: Multiple Integrals and Beta and Gamma functions
2.	<b>Multiple Integration</b> <ul style="list-style-type: none"><li>• Change of order of integration in double integrals</li><li>• Change of variables (Cartesian to polar).</li></ul>		
3.	<b>Applications</b> <ul style="list-style-type: none"><li>• areas and volumes</li></ul>		
4.	<b>Applications</b> <ul style="list-style-type: none"><li>• Centre of mass and Gravity (constant and variable densities).</li></ul>		
5.	<b>Triple Integration</b> <ul style="list-style-type: none"><li>• Triple integrals (Cartesian), orthogonal curvilinear coordinates.</li></ul>	<ul style="list-style-type: none"><li>• Lecture</li><li>• Problem Solving</li><li>• Presentations involving videos</li></ul>	
6.	<b>Triple Integration</b> <ul style="list-style-type: none"><li>• (contd.)</li></ul> Triple integrals (Cartesian), orthogonal curvilinear coordinates.		
7.	<b>Applications</b> <ul style="list-style-type: none"><li>• Simple applications involving</li></ul>		

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	cubes, sphere and rectangular parallelopipeds.		
8.	<b>Applications</b> <ul style="list-style-type: none"> <li>(contd.) Simple applications involving cubes, sphere and rectangular parallelopipeds.</li> </ul>		
9.	<b>Scalar line integrals</b> <ul style="list-style-type: none"> <li>Definition and examples of scalar line integrals</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	<b>TB3:</b> Chapter 8: Vector Calculus and its Applications
10.	<b>Vector surface integrals</b> <ul style="list-style-type: none"> <li>Definition and examples of vector surface integrals</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	
11.	<b>Theorems on Integrals</b> <ul style="list-style-type: none"> <li>Theorems of Green, Gauss and Stokes.</li> </ul>	<ul style="list-style-type: none"> <li>Presentation s involving videos</li> </ul>	
<b>Unit 2</b>	<b>First order ordinary differential equations</b>	--	--
12.	<b>Exact and linear differential equations</b> <ul style="list-style-type: none"> <li>Solving Exact and linear differential equations.</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	<b>TB1:</b> Chapter 1: First order ODEs  <b>TB2:</b> Chapter 5: Differential Equations  <b>TB3:</b> Chapter 11: Differential Equations of first order
13.	<b>Euler's equations</b> <ul style="list-style-type: none"> <li>Solving Euler's equations.</li> </ul>		
14.	<b>Euler's equations</b> <ul style="list-style-type: none"> <li>Solving Euler's equations.</li> </ul>		
15.	<b>Equations not of first degree</b> <ul style="list-style-type: none"> <li>Equations solvable for p</li> </ul>		
16.	<b>Equations not of first degree</b> <ul style="list-style-type: none"> <li>Equations solvable for y, equations solvable for x and Clairaut's type.</li> </ul>		
17.	<b>Equations not of first degree</b> <ul style="list-style-type: none"> <li>(contd.) Equations solvable for y, equations solvable for x and Clairaut's type.</li> </ul>		
<b>Unit 3</b>	<b>Ordinary differential equations of Higher order</b>	--	--

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18.	<b>Second order linear differential equations</b> <ul style="list-style-type: none"> <li>Solving second order linear differential equations with variable coefficients.</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	<b>TB1:</b> Chapter 2: Second Order Linear ODEs Chapter 3: Higher Order Linear ODEs <b>TB2:</b> Chapter 5: Differential Equations <b>TB3:</b> Chapter 13: Linear Differential Equations
19.	<b>Second order linear differential equations</b> <ul style="list-style-type: none"> <li>(contd.)  Second order linear differential equations with variable coefficients.</li> </ul>		<b>TB1:</b> Chapter 2: Second Order Linear ODEs Chapter 3: Higher Order Linear ODEs <b>TB2:</b> Chapter 5: Differential Equations <b>TB3:</b> Chapter 13: Linear Differential Equations
20.	<b>Higher order linear differential equations</b> <ul style="list-style-type: none"> <li>Method of variation of parameters.</li> </ul>		<b>TB1:</b> Chapter 2: Second Order Linear ODEs Chapter 3: Higher Order Linear ODEs <b>TB3:</b> Chapter 13: Linear Differential Equations
21.	<b>Higher order linear differential equations</b> <ul style="list-style-type: none"> <li>Cauchy-Euler equation</li> </ul>		<b>TB1:</b> Chapter 2: Second Order Linear ODEs Chapter 3: Higher Order Linear ODEs <b>TB3:</b> Chapter 13: Linear Differential Equations
22.	<b>Higher order linear differential equations</b> <ul style="list-style-type: none"> <li>Power series solutions.</li> </ul>		<b>TB1:</b> Chapter 5: Series solution of ODEs and Special Functions <b>TB3:</b> Chapter 16: Series solutions of differential equations and special functions
23.	<b>Higher order linear differential equations</b> <ul style="list-style-type: none"> <li>Legendre polynomials.</li> </ul>		
24.	<b>Bessel functions</b> <ul style="list-style-type: none"> <li>Bessel functions of the first kind and their properties.</li> </ul>		
25.	<b>Bessel functions (contd.)</b> <ul style="list-style-type: none"> <li>Bessel functions of the first kind and their properties.</li> </ul>		

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Unit 4	Complex Variables: Differentiation	--	--
26.	<b>Complex Differentiation</b> <ul style="list-style-type: none"> <li>Differentiation</li> <li>Cauchy-Riemann equati</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	<b>TB1:</b> Chapter 3: Complex Numbers and functions and Complex Differentiation  <b>TB3:</b> Chapter 20: Calculus of Complex functions  <b>TB4:</b> Chapter 3: Analytic Functions
27.	<b>Complex Differentiation</b> <ul style="list-style-type: none"> <li>analytic functions</li> </ul>		
28.	<b>Complex Differentiation</b> <ul style="list-style-type: none"> <li>Harmonic functions</li> <li>finding harmonic conjugate</li> </ul>		
29.	<b>Elementary analytic functions</b> <ul style="list-style-type: none"> <li>Elementary analytic functions (exponential, trigonometric, logarithm) and their properties</li> </ul>		
30.	<b>Elementary analytic functions</b> <ul style="list-style-type: none"> <li>(contd.) Elementary analytic functions (exponential, trigonometric, logarithm) and their properties</li> </ul>		
31.	<b>Conformal Mapping</b> <ul style="list-style-type: none"> <li>Conformal mappings: Definition and problems</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	<b>TB3:</b> Chapter 20: Calculus of Complex functions
32.	<b>Mobius transformation</b> <ul style="list-style-type: none"> <li>Mobius transformation and their properties.</li> </ul>		
33.	<b>Mobius transformation</b> <ul style="list-style-type: none"> <li>(contd.) Mobius transformations and their properties.</li> </ul>		
Unit 5	Complex Variables: Integration	--	--
34.	<b>Contour Integrals</b> <ul style="list-style-type: none"> <li>Definition and problems on Contour integrals</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	<b>TB1:</b> Chapter 14: Complex Integration  <b>TB3:</b> Chapter 20: Calculus of Complex functions  <b>TB4:</b> Chapter 4: Complex Integration
35.	<b>Contour Integrals</b> <ul style="list-style-type: none"> <li>Cauchy-Goursat theorem (without proof).</li> </ul>		
36.	<b>Contour Integrals</b> <ul style="list-style-type: none"> <li>Cauchy Integral formula (without proof)</li> </ul>		

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37.	<b>Contour Integrals</b> <ul style="list-style-type: none"> <li>Liouville's theorem and Maximum-Modulus theorem (without proof).</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	
38.	<b>Taylor's and Laurent's series</b> <ul style="list-style-type: none"> <li>Taylor's series, zeros of analytic functions</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	<b>TB1:</b> Chapter 15: Power Series, Taylor Series
39.	<b>Taylor's and Laurent's series</b> <ul style="list-style-type: none"> <li>singularities</li> <li>Laurent's series.</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	Chapter 16: Laurent Series, Residue Integration
40.	<b>Residues</b> <ul style="list-style-type: none"> <li>Residues</li> <li>Cauchy Residue theorem (without proof)</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	<b>TB1:</b> Chapter 16: Laurent Series, Residue Integration
41.	<b>Evaluation of definite integrals</b> <ul style="list-style-type: none"> <li>Evaluation of definite integral involving sine and cosine.</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	
42.	<b>Evaluation of improper integrals</b> <ul style="list-style-type: none"> <li>Evaluation of certain improper integrals using the Bromwich contour.</li> </ul>	<ul style="list-style-type: none"> <li>Lecture</li> <li>Problem Solving</li> </ul>	
43, 44, 45	Beyond classroom activities; including remedial lectures, guest lectures and other extension activities.		

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<b>Program:</b> B. Tech. (I.T., Computer, EXTC, Mechanical, Civil, Mechatronics, Data Science)					<b>Semester:</b> II	
<b>Course/Module:</b> Programming for Problem Solving					<b>Module Code:</b> BTIT02009, BTCO02009, BTET02009, BTME02009, BTCIO2009, BTMA02009, BTDS02009	
<b>Teaching Scheme</b>					<b>Evaluation Scheme</b>	
<b>Classroom Session</b>	<b>Lecture (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Practical/ Group work (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks - 100 in Question Paper)</b>
45	3	0	4	5	Marks Scaled to 50	Marks Scaled to 50
<b>Course Rationale:</b> This course aims to teach the fundamental concepts of Procedural Programming. Students will develop skills related to problem solving by writing computer programs. This course does not require any prior programming experience.						
<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1. Enable students understand the basic concepts of Programming and help them build Programming Logic.</li> <li>2. Develop problem solving skills using basic Programming constructs, Decision Making and Looping.</li> <li>3. Enable students solve complex problems using the knowledge of Arrays, Functions, Structures and Pointers.</li> </ol>						
<b>Course Outcomes:</b> After completion of the course, students would be able to: <ol style="list-style-type: none"> <li>1. To formulate algorithms and draw flowcharts for arithmetic and logical problems.</li> <li>2. To implement Decision Making, Nested Control Structures and Iterations.</li> <li>3. To implement programs using Functions and concept of Recursion.</li> <li>4. To implement programs using arrays, strings, structure, pointers, searching and sorting algorithms.</li> </ol>						
<b>Pedagogy:</b> Peer learning, Group exercises, quizzes, presentations and lecture method						
<b>Textbooks:</b> TB1. <i>Schaum's Outline Programming with C</i> , 3 e, Byron Gottfried, McGraw-Hill, 2017. TB2. <i>Programming in ANSI C</i> , 7 e, E. Balaguruswamy, Tata McGraw Hill Education, 2017.						
<b>Reference Books:</b> RB1. <i>The C Programming Language</i> , 2 e, Brian W. Kernighan and Dennis M. Ritchie, Prentice Hall of India, 1988. RB2. <i>Schaum's Outlines Data Structures</i> , Revised 1 e, Seymour Lipschutz, Tata McGraw Hill, 2014.						

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<b>Links to websites:</b>			
<ul style="list-style-type: none"> <li><a href="https://cprogrammingcodes.blogspot.in/2011/09/algorithms-and-flowchart.html">https://cprogrammingcodes.blogspot.in/2011/09/algorithms-and-flowchart.html</a></li> </ul>			
<b>Evaluation Scheme:</b>			
• Tutorial Test/Presentation/viva/quiz		30%	
• Mid Term		20%	
• Term End Exam		50%	
<b>Total</b>		<b>100%</b>	
<b>Session Plan:</b>			
Session	Topics	Pedagogical Tool	Textbook Chapters & Readings
<b>Unit 1</b>	<b>Introduction to Programming</b>	--	--
1.	Introduction to components of a computer system (disks, memory, processor, where a program is stored and executed, operating system, compilers etc.)	Lectures	<b>TB1:</b> Chapter 1: Introductory Concepts
2.	<b>Idea of Algorithm:</b> <ul style="list-style-type: none"> <li>Steps to solve logical and numerical problems.</li> </ul> <b>Representation of Algorithm:</b> <ul style="list-style-type: none"> <li>Flowchart/Pseudo code with examples</li> </ul>		<b>TB1:</b> Chapter 1: Introductory Concepts
3.	<b>From algorithms to programs:</b> <ul style="list-style-type: none"> <li>Source code, variables (with data types) variables and memory locations, Syntax and Logical Errors in compilation, object and executable code</li> </ul>		<b>TB1:</b> Chapter 2: Introduction to C programming <b>TB2:</b> Chapter 1: Overview of C Chapter 2: Constants variables and data types
<b>Unit 2</b>	<b>Basic Programming Constructs</b>	--	--
4.	<b>Operators</b>	<ul style="list-style-type: none"> <li>Lectures</li> <li>Presentations</li> <li>Quizzes</li> </ul>	<b>TB1,TB2:</b> Chapter 3: Operators and expressions <b>TB1:</b> Chapter 5: Control Statements <b>TB2:</b> Chapter 5: Decision making and branching
5.	<b>Expressions</b>		
6.	<b>Decision making and Branching:</b> <ul style="list-style-type: none"> <li>If statements and if else statement</li> </ul>		
7.	<b>Nesting of if else statements and Else if ladder</b>		<b>TB1:</b> Chapter 6: Control Statements <b>TB2:</b>
8.	<b>Switch statements</b>		
9.	<b>Continue statement Break statement</b>		
10.	<b>Looping – while</b>		
11.	<b>do-while</b>		
12.	<b>For loops</b>		

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13.	<b>For loops and Finding roots of equations</b>		Chapter 6: Decision making and looping
14.	<b>Nested loops</b>		
<b>Unit 3</b>	<b>Arrays and Strings</b>	--	--
15.	<ul style="list-style-type: none"> <li>Concept, declaration, initialization</li> <li>Accessing array elements of one-dimensional array</li> </ul>	<ul style="list-style-type: none"> <li>Lectures</li> <li>Problem Solving</li> <li>Quizzes</li> </ul>	<b>TB1:</b> Chapter 9: Arrays <b>TB2:</b> Chapter 7: Arrays
16.	<b>One-dimensional array</b>		
17.	<ul style="list-style-type: none"> <li>Concept, declaration, initialization</li> <li>Accessing array elements of two-dimensional array</li> </ul>		
18.	<b>Two - dimensional array</b>		
19.	<b>Introduction to strings</b>		
<b>Unit 4</b>	<b>Functions</b>	--	--
20.	<b>Function</b> <ul style="list-style-type: none"> <li>Introduction and need of user defined functions</li> </ul>	<ul style="list-style-type: none"> <li>Lectures</li> <li>Problem Solving</li> <li>Quizzes</li> </ul>	<b>TB1:</b> Chapter 7: Functions <b>TB2:</b> Chapter 9: User defined functions
21.	<ul style="list-style-type: none"> <li>Defining a Function</li> <li>Function calls and declaration</li> </ul>		
22.	<b>Category of functions:</b> <ul style="list-style-type: none"> <li>No argument and no return value</li> <li>Argument but no return value</li> </ul>		
23.	<b>Category of functions:</b> <ul style="list-style-type: none"> <li>Argument with return value</li> <li>No argument but return value</li> </ul>		
24.	<b>Passing arrays to functions</b>		<b>TB1:</b> Chapter 9: Arrays <b>TB2:</b> Chapter 9: User defined functions, Character arrays and strings
25.	Declaring & initialising string variable, Reading & writing strings		
26.	String handling functions		
27.	Passing strings to functions		
<b>Unit 5</b>	<b>Recursion</b>	--	--
28.	<b>Introduction to Recursion</b> <ul style="list-style-type: none"> <li>Recursion as a different way of solving problems adjoint method</li> </ul>	<ul style="list-style-type: none"> <li>Lectures</li> <li>Problem Solving</li> <li>Presentation</li> </ul>	<b>TB1:</b> Chapter 7: Functions <b>TB2:</b> Chapter 9: User defined functions
29.	<b>Recursion programs:</b> <ul style="list-style-type: none"> <li>Examples - Finding Factorial, Fibonacci series</li> </ul>		
30.	<b>Recursion programs:</b> <ul style="list-style-type: none"> <li>Examples GCD, Merge sort.</li> </ul>		

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Unit 6	Structures	--	--
31.	<ul style="list-style-type: none"><li>Defining a Structure Declaring structure variables</li><li>Accessing structure members</li><li>Structure Initialization</li></ul>	<ul style="list-style-type: none"><li>Lectures</li><li>Problem Solving</li><li>Quizzes</li><li>Presentation</li></ul>	<b>TB1:</b> Chapter 11: Structure and unions
32.	Array of Structure		<b>TB2:</b> Chapter 10: Structure and unions
33.	Structure within structure		
34.	Difference between Structure and Unions		
Unit 7	Pointers	--	--
35.	<ul style="list-style-type: none"><li>Idea of pointers</li><li>Defining pointers</li></ul>	<ul style="list-style-type: none"><li>Lectures</li><li>Problem Solving</li><li>Quizzes</li><li>Presentation</li></ul>	<b>TB1:</b> Chapter 10: Pointers
36.	Call by value and call by reference		<b>TB2:</b> Chapter 11: Pointers
37.	Use of Pointers in self-referential structures, Notion of linked list (no implementation)		<b>TB1:</b> Chapter 11: Structure and unions
			<b>TB2:</b> Chapter 13: Dynamic memory allocation and linked
Unit 8	Basic Algorithms	--	--
38.	Notion of order of complexity through example programs (no formal definition required)	<ul style="list-style-type: none"><li>Lectures</li><li>Problem Solving</li><li>Quizzes</li><li>Presentation</li></ul>	<b>RB2:</b> Chapter 9: Sorting and searching
39.	Searching: Sequential search		
40.	Basic Sorting Algorithms : Bubble sort		
41.	Insertion sort		
42.	Selection sort		
43, 44, 45	Beyond classroom activities; including remedial lectures, guest lectures and other extension activities.		

  
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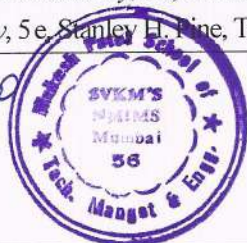
  
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<b>Program: B. Tech. (I.T., Computer, EXTC, Mechanical, Civil, Mechatronics, Data Science)</b>					<b>Semester: II</b>	
<b>Course/Module: Chemistry</b>					<b>Module Code: BTIT02010, BTCO02010, BTET02010, BTME02010, BTCIO2010, BTMA02010, BTDS02010</b>	
<b>Teaching Scheme</b>					<b>Evaluation Scheme</b>	
<b>Classroom Session</b>	<b>Lecture (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Practical/ Group work (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks - 100 in Question Paper)</b>
45	3	1	2	5	Marks Scaled to 50	Marks Scaled to 50
<b>Course Rationale:</b> This course is intended to provide essential concepts in Chemistry. The contents have covered fundamentals of chemistry required for students to apply the subject knowledge in engineering and technological applications.						
<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>1. To familiarize with atomic, molecular structure and chemical bonding of elements</li> <li>2. To introduce electromagnetic spectrum ranges that are applied for various applications.</li> <li>3. To acquaint with periodic properties of elements, thermodynamic parameters, cell emf and Nernst equation.</li> <li>4. To familiarize with stereochemistry and various organic reactions.</li> </ol>						
<b>Course Outcomes:</b> After completion of the course, students would be able to: <ol style="list-style-type: none"> <li>1. Understand periodicity of elements and bonding and reactivity of various molecules.</li> <li>2. Apply techniques to interpret molecular structure and chemical reactions.</li> <li>3. Analyze thermodynamic, electrochemical and stereo-chemical parameters of molecules.</li> <li>4. Evaluate concepts of chemistry for engineering applications.</li> </ol>						
<b>Pedagogy:</b> Experimental learning activities, presentations and lecture method.						
<b>Textbook:</b> TB1. <i>General Chemistry: Principles &amp; Modern applications</i> , 7e, William Harwood, Ralph Petrucci, Prentice Hall Publication 2007. TB2. <i>University Chemistry</i> , 4e, Bruce H. Mahan, Benjamin/Cummings Publishing, 2009. TB3. <i>Principles of Organic Synthesis</i> , 3e, Richard Oswald Chandler Norman, Springer, 2014. TB4. <i>Principles of Instrumental Analysis</i> , 7e, Douglas A. Skoog, James F. Holler & Stanley R. Crouch, Cengage Learning, 2017.						
<b>Reference Books:</b> RB1. <i>Advanced Inorganic Chemistry</i> , 6e, Frank A. Cotton & Geoffrey Wilkinson, Wiley Eastern Ltd., 2007. RB2. <i>Organic Chemistry</i> , 5e, Stanley H. Pine, Tata McGraw Hill, 2008.						

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21/7/2020



- RB3. *Organic Chemistry*, 10e, Graham T. W. Solomons & Craig B. Fryhle, John Wiley, 2009.  
 RB4. *Physical Chemistry*, 9e, Peter. W. Atkins, ELBS/Oxford, 2010.  
 RB5. *March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure*, 7e, Michael B. Smith, John Wiley, 2013.

**Links to websites:**

A. Websites

- <https://chem.libretexts.org/>
- <http://www.spectroscopynow.com/view/index.html>
- <http://www.organic-chemistry.org/namedreactions/>
- [www.nptel.ac.in](http://www.nptel.ac.in)

B. YouTube Videos

- Chemistry Tutorial: Atomic Structure meets the Periodic Table, Atomic School, 2013 (URL: [https://youtu.be/3\\_FJIpKgdV4](https://youtu.be/3_FJIpKgdV4))
- Molecular Shape and Orbital Hybridization, René Van Wyk, 2012 (URL: [https://youtu.be/qraDpWX\\_msY](https://youtu.be/qraDpWX_msY))
- What is Wave Particle Duality? Hongyang Dong, 2016 (URL: <https://youtu.be/pdaBe4FwYVE>)
- Synthesis of Aspirin, NCSSMDDistance Ed, 2011 (URL: <https://youtu.be/Y4NMpO1xI8U>)
- $S_N^1$  reaction, University of Surrey, 2011 (URL: <https://youtu.be/JmcVgE2WKBE>)
- $S_N^2$  reaction, University of Surrey, 2011 (URL: <https://youtu.be/h5xvaP6bIZI>)

**Evaluation Scheme:**

• Tutorial Test/Presentation/viva/quiz	30%
• Mid Term	20%
• Term End Exam	50%
<b>Total</b>	<b>100%</b>

**Session Plan:**

Session	Topics	Pedagogical Tool	Textbook Chapters & Readings
<b>Unit 1</b>	<b>Atomic &amp; Molecular structure</b>	--	--
1-2	Atom structure and limitations of Bohr's model	<b>Article Discussion:</b> Lecture method and discussion Advanced Inorganic Chemistry, 6e, Frank A. Cotton & Gefforey Wilkinson, Wiley Eastern Ltd, 2007.	<b>TB1:</b> Chapter 2: Atoms and the Atomic Theory
3-4	Wave particle duality, De Broglie's principle and numerical problems based on it.	<b>Article Discussion:</b> Lecture method and discussion. <b>Class Activity:</b> solving numericals Advanced Inorganic	<b>TB1:</b> Chapter 2: Atoms and the Atomic Theory





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		Chemistry, 6e, Frank A. Cotton & Gefforey Wilkinson, Wiley Eastern Ltd, 2007.	
5-6	Schrödinger's wave equation (no derivation). Atomic orbital, shapes of s, p, d, f orbitals.	<b>Article Discussion:</b> Lecture method and discussion Advanced Inorganic Chemistry, 6e, Frank A. Cotton & Gefforey Wilkinson, Wiley Eastern Ltd, 2007.	<b>TB1:</b> Chapter 2: Atoms and the Atomic Theory
7-8	Electronic configuration of atoms and Concept of hybridization (sp, sp <sup>2</sup> , sp <sup>3</sup> ) with one example each	<b>Article Discussion:</b> Lecture method and discussion. <b>Class Activity:</b> revision of periodic table, hybridization Advanced Inorganic Chemistry, 6e, Frank A. Cotton & Gefforey Wilkinson, Wiley Eastern Ltd, 2007.	<b>TB1:</b> Chapter 2: Atoms and the Atomic Theory
<b>Unit 2</b>	<b>Chemical bonding</b>	--	--
9-10	Intermolecular forces: Ionic, covalent, co-ordinate bonds and van Der Waals interactions (with one example for each type).	<b>Article Discussion:</b> Lecture method and discussion. Advanced Inorganic Chemistry, 6e, Frank A. Cotton & Gefforey Wilkinson, Wiley Eastern Ltd, 2007.	<b>TB1:</b> Chapter 10: Chemical Bonding
11-12	Introduction to co-ordination chemistry and Co-ordination number and applications (EDTA as a chelating agent and applications in water chemistry).	<b>Article Discussion:</b> Lecture method and discussion. <b>Class Activity:</b> Numerical solving Advanced Inorganic Chemistry, 6e, Frank A. Cotton & Gefforey Wilkinson, Wiley Eastern Ltd, 2007.	<b>TB1:</b> Chapter 10: Chemical Bonding <b>TB5:</b> Chapter 1: Water treatment
<b>Unit 3</b>	<b>Periodic properties of elements</b>	--	--
13-14	Modern (Bohr) periodic table, Nomenclature of s, p, d, f group elements	<b>Article Discussion:</b> Lecture method and discussion.	<b>TB1:</b> Chapter 10: Chemical Bonding

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21/7/2020



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	Trends in physical properties: effective nuclear charge, atomic radii, ionization energy, electron affinity, electronegativity.	Advanced Inorganic Chemistry, 6e, Frank A. Cotton & Gefforey Wilkinson, Wiley Eastern Ltd, 2007.	
15-16	Metallic character, melting-boiling points (definitions for each property with explanation on trends observed in Modern Periodic table	<b>Article Discussion:</b> Lecture method and discussion. Advanced Inorganic Chemistry, 6e, Frank A. Cotton & Gefforey Wilkinson, Wiley Eastern Ltd, 2007.	<b>TB1:</b> Chapter 10: Chemical Bonding
<b>Unit 4</b>	<b>Stereochemistry</b>	--	--
17	Orientation of organic molecule in three dimension, Fischer projection of lactic acid.	<b>Exercise:</b> Fischer projection of lactic acid.	<b>TB3:</b> Chapter 5: Stereochemistry Chapter 6: The Shapes of Molecules—Stereochemistry
18	Concept of chirality and optical activity (dextro, levo) presentation of lactic acid), Symmetry and configuration in a molecule.	<b>Article Discussion:</b> Lecture method and discussion.	<b>TB3:</b> Chapter 5: Stereochemistry Chapter 6: The Shapes of Molecules—Stereochemistry
19	Types of isomers (structural isomers, stereoisomers, enantiomer and diastereomer)	<b>Article Discussion:</b> Lecture method and discussion.	<b>TB3:</b> Chapter 5: Stereochemistry Chapter 6: The Shapes of Molecules—Stereochemistry
20-21	R-S nomenclature- Cahn-Ingold-Prelog convention, diastereomer of achiral compound (cis-trans) eg: 2-butene.	<b>Activity:</b> Assigning R-S nomenclature to molecule	<b>TB3:</b> Chapter 5: Stereochemistry Chapter 6: The Shapes of Molecules—Stereochemistry
<b>Unit 5</b>	<b>Organic Reactions</b>	--	--
22	General organic reactions: Oxidation (Swern oxidation, Oppenauer oxidation).	<b>Activity:</b> Discussion based on Stanley H. Pine, (2008), "Organic Chemistry", Tata McGraw Hill, 5 <sup>th</sup> edition	<b>TB3:</b> Chapter 10: Mechanism of Organic Reactions
23	Reduction (Meerwein-Ponndorf-Verley Reduction, Bechamp reduction).	<b>Activity:</b> Discussion based on Stanley H. Pine, (2008), "Organic Chemistry", Tata	<b>TB3:</b> Chapter 10: Mechanism of Organic Reactions

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21/7/2020





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		McGraw Hill, 5 <sup>th</sup> edition	
24	Amide and ester bond formation (condensation reactions) with one example	<b>Activity:</b> Illustration based on T. W. Graham Solomons, (2009), "Organic Chemistry", John Wiley, 10 <sup>th</sup> edition	<b>TB3:</b> Chapter 10: Mechanism of Organic Reactions
25	Elimination reactions (E1 with one example). Elimination reactions (E2 with one example).	<b>Activity:</b> Illustration based on T. W. Graham Solomons, (2009), "Organic Chemistry", John Wiley, 10 <sup>th</sup> edition	<b>TB3:</b> Chapter 10: Mechanism of Organic Reactions
26	Substitution reactions ( $S_N^1$ , $S_N^2$ with one example) and	<b>Activity:</b> Discussion based on Stanley H. Pine, (2008), "Organic Chemistry", Tata McGraw Hill, 5 <sup>th</sup> edition	<b>TB3:</b> Chapter 10: Mechanism of Organic Reactions
27	Electrophilic reaction in Friedel Crafts alkylation and acylation.	<b>Activity:</b> Discussion based on R.O.C. Norman, (2014), "Principles of Organic Synthesis", Springer, 3 <sup>rd</sup> edition	<b>TB3:</b> Chapter 10: Mechanism of Organic Reactions
28	Synthesis of Aspirin	<b>Activity:</b> Discussion based on R.O.C. Norman, (2014), "Principles of Organic Synthesis", Springer, 3 <sup>rd</sup> edition	<b>TB3:</b> Chapter 10: Mechanism of Organic Reactions
<b>Unit 6</b>	<b>Chemical Thermodynamics and Electrochemistry</b>	--	--
29	Concepts of Internal energy Enthalpy Entropy	<b>Article Discussion:</b> Lecture method and discussion. Physical Chemistry, 9e, Peter. W. Atkins, ELBS/Oxford, 2010.	<b>TB1:</b> Chapter 7: Thermochemistry
30	Concepts of free energy (no derivations)	<b>Article Discussion:</b> Lecture method and discussion. Physical Chemistry, 9e, Peter. W. Atkins, ELBS/Oxford, 2010.	<b>TB1:</b> Chapter 7: Thermochemistry

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21/7/2020



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31-32	EMF of Cell, Cell potential, Relation of free energy with EMF of cell	<b>Article Discussion:</b> Lecture method and discussion. Physical Chemistry, 9e, Peter. W. Atkins, ELBS/Oxford, 2010.	<b>TB1:</b> Chapter 2: Electrochemistry
33-34	Derivation of Nernst equation Applicability of Nernst equation	<b>Article Discussion:</b> Lecture method and discussion. Physical Chemistry, 9e, Peter. W. Atkins, ELBS/Oxford, 2010.	<b>TB1:</b> Chapter 2: Electrochemistry
35	Theory of Wet corrosion/ Electrochemical corrosion	<b>Article Discussion:</b> Lecture method and discussion. Physical Chemistry, 9e, Peter. W. Atkins, ELBS/Oxford, 2010.	<b>TB1:</b> Chapter 2: Electrochemistry
<b>Unit 7</b>	<b>Spectroscopic techniques and Applications</b>	--	--
36	Basic Principle of Spectroscopy	<b>Article Discussion:</b> Lecture method and discussion.	<b>TB4:</b> Chapter 13: An Introduction to UV/Vis Spectrometry
37-38	General idea on Electromagnetic radiation , UV-Visible Spectroscopy & applications	<b>Article Discussion:</b> Lecture method and discussion.	<b>TB4:</b> Chapter 13: An Introduction to UV/Vis Spectrometry <b>TB4:</b> Chapter 14: Application of UV/Vis/Spectrometry
39-40	General idea on IR Spectroscopy & applications.	<b>Article Discussion:</b> Lecture method and discussion.	<b>TB4:</b> Chapter 16: An Introduction to IR <b>TB4:</b> Chapter 17: Application of IR
41	Nuclear magnetic resonance & applications.	<b>Article Discussion:</b> Lecture method and discussion.	<b>TB4:</b> Chapter 19: NMR Spectroscopy

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21/7/2020





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42	MRI applications in medicine.	<b>Article Discussion:</b> Lecture method and discussion.	<b>TB4:</b> Chapter 19: NMR Spectroscopy
43, 44, 45	Beyond classroom activities; including remedial lectures, guest lectures and other extension activities.		

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<b>Program:</b> B. Tech. (I.T., Computer, EXTC, Mechanical, Civil, Mechatronics, Data Science)					<b>Semester:</b> II	
<b>Course/Module:</b> Workshop / Manufacturing Practices					<b>Module Code:</b> BTIT02011, BTCT02011, BTET02011, BTME02011, BTCT02011, BTMA02011, BTDS02011	
<b>Teaching Scheme</b>					<b>Evaluation Scheme</b>	
Classroom Session	Lecture (Hours per week)	Tutorial (Hours per week)	Practical/ Group work (Hours per week)	Credit	Internal Continuous Assessment (ICA) (Marks - 50)	Term End Examinations (TEE)
15	1	0	4	3	Marks Scaled to 50	--
<b>Course Rationale:</b> Workshop Practice is a basic practical engineering course. Students are able to perform various operations using hand tool equipment and machineries in various shops. Working in workshop develops the attitude of group working and safety awareness. This course provides miniature industrial environment in the educational institute						
<b>Course Objectives:</b> 1. To impart hands on experience of different workshop practices on various trades. 2. To impart knowledge of basic tools used for different workshop jobs. 3. To introduce basic concepts of electrical and electronic instruments and its applications						
<b>Course Outcomes:</b> After completion of the course, students would be able to: 1. Demonstrate understanding of safety and operation practices in fabrication processes like welding. 2. Apply various hand tool operations like fitting and carpentry for the manufacturing. 3. Inculcate the fundamentals of assembling Electronics and Electrical components.						
<b>Pedagogy:</b> Lectures, Experiential learning activities, Work based learning						
<b>Textbooks:</b> TB1. <i>Mechanical Workshop Practice</i> , 2 e, K.C. John, PHI Learning Pvt. Ltd., 2014. TB2. <i>Manufacturing Technology-Vol I</i> , 4 e, P. N. Rao, Tata McGraw Hill, 2014. TB3. <i>Printed Circuit Boards: Design, Fabrication, assembly and testing</i> , 1 e, R.S. Khandpur, Tata McGraw Hill, 2005.						
<b>Reference Books:</b> RB1. <i>Manufacturing Processes and Systems</i> , 9 e, P.F. Ostwald, John Willy & Sons INC. UK, 2008. RB2. <i>Electrical Workshop: Safety, Commissioning, maintenance and testing of electrical equipment</i> , 3 e, R.P. Singh, IK International Publishing House Pvt. Ltd., 2012.						

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2/7/2020





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<b>Links to websites:</b>			
<ul style="list-style-type: none"> <li>• <a href="https://www.mycarpentry.com/carpentry-tools.html">https://www.mycarpentry.com/carpentry-tools.html</a></li> <li>• <a href="http://www.weldingtypes.net/">http://www.weldingtypes.net/</a></li> </ul>			
<b>Evaluation Scheme:</b>			
<ul style="list-style-type: none"> <li>• Mechanical Workshop: 60%</li> <li>• Electronics Workshop: 40%</li> <li><b>Total: 100%</b></li> </ul>			
<b>Session Plan:</b>			
Session	Topics	Pedagogical Tool	Textbook Chapters & Readings
<b>Unit 1</b>	<b>Introduction to Workshop Practices and Processes</b>	--	--
1.	Workshop Processes for Practice and Safety Measures	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Charts demonstrating safe practise</li> <li>• Application-based videos</li> </ul>	<b>TB1:</b> Chapter 2: Workshop Practise and Record Writing
<b>Unit 2</b>	<b>Manufacturing Methods</b>	--	--
2.	Manufacturing Methods	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Application-based videos</li> </ul>	<b>TB1:</b> Chapter 1: Workshop Process <b>TB2:</b> Chapter 1: Introduction
3.	Metal Casting & Metal drawing	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Application-based videos</li> </ul>	<b>TB1:</b> Chapter 1: Workshop Process <b>TB2:</b> Chapter 3: Metal- Casting Process Chapter 4: Gating system for casting Chapter 5: Melting and casting Quality
4.	Forming-Rolling, Forging, Extrusion	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Application-based videos</li> </ul>	<b>TB1:</b> Chapter 1: Workshop Process <b>TB2:</b> Chapter 1: Introduction
5.	Welding	<ul style="list-style-type: none"> <li>• Lectures</li> <li>• Application-based videos</li> <li>• Preparing job as per specification</li> </ul>	<b>TB1:</b> Chapter 1: Workshop Process & Chapter 4: ARC Welding <b>TB2:</b> Chapter 9: Welding

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			process Chapter 10: Other fabrication process
<b>Unit 3</b>	<b>Machining Methods</b>	--	--
6.	Machining Operations	<ul style="list-style-type: none"> <li>Lectures</li> <li>Application-based videos</li> </ul>	<b>TB1:</b> Chapter 10: Turning
7.	CNC machining	<ul style="list-style-type: none"> <li>Lectures</li> <li>Application-based videos</li> </ul>	<b>RB1:</b> Chapter 28: Computer Numerical Control Systems
<b>Unit 4</b>	<b>Fitting Operations</b>	--	--
8.	Use and setting of fitting tools for chipping, cutting, filing, Marking, center punching, drilling, tapping.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Application-based videos</li> <li>Prepare job as per specification</li> </ul>	<b>TB1:</b> Chapter 3: Fitting
9.	Carpentry- Use and setting of carpentry hand tools like hacksaws, jackplanes, chisels and gauges for construction of various joints.	<ul style="list-style-type: none"> <li>Lectures</li> <li>Application-based video</li> <li>Prepare job as per specification</li> </ul>	<b>TB1:</b> Chapter 6: Carpentry
<b>Unit 5</b>	<b>Printed Circuit Boards</b>	--	--
10.	Printed Circuit boards Designing	<ul style="list-style-type: none"> <li>Lectures</li> <li>Demonstration of tools</li> </ul>	<b>TB3:</b> Chapter 1: Basics of Printed Circuit Board
11.	PCB Applications; Manufacturing sequence	<ul style="list-style-type: none"> <li>Hands on practice on PCB circuit design with EDA tools.</li> <li>Prepare job as per specification</li> </ul>	<b>TB3:</b> Chapter 1: Basics of Printed Circuit Board
<b>Unit 6</b>	<b>Soldering Techniques</b>	--	--
12.	Introduction to joining processes and soldering	<ul style="list-style-type: none"> <li>Lectures</li> <li>Prepare job as per specification</li> </ul>	<b>TB3:</b> Chapter 13: Soldering, Assembly and Re-working technique
13.	Soldering Techniques and circuit assembly	<ul style="list-style-type: none"> <li>Lectures</li> <li>Mounting and installation of electronic circuits, wiring of subassemblies</li> <li>Prepare job as per specification</li> </ul>	<b>TB3:</b> Chapter 2: Electronic Component

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*21/7/2020*



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Unit 7	Wiring Systems	--	--
14.	Electrical Wiring Systems	<ul style="list-style-type: none"> <li>Lectures</li> <li>Experiential learning activities</li> </ul>	<b>RB2:</b> Chapter 13: Electrical Wiring Systems
15.	Beyond classroom activities; including remedial lectures, guest lectures and other extension activities.		

  
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<b>Program:</b> B. Tech. (I.T., Computer, EXTC, Mechanical, Civil, Mechatronics, Data Science)					<b>Semester:</b> II	
<b>Course/Module:</b> English					<b>Module Code:</b> BTIT02012, BTCT02012, BTET02012, BTME02012, BTCIO2012, BTMA02012, BTDS02012	
<b>Teaching Scheme</b>					<b>Evaluation Scheme</b>	
<b>Classroom Session</b>	<b>Lecture (Hours per week)</b>	<b>Tutorial (Hours per week)</b>	<b>Practical/ Group work (Hours per week)</b>	<b>Credit</b>	<b>Internal Continuous Assessment (ICA) (Marks - 50)</b>	<b>Term End Examinations (TEE) (Marks - 100 in Question Paper)</b>
30	2	0	2	3	Marks Scaled to 50	Marks Scaled to 50
<b>Pre-requisite:</b> Knowledge of Senior Secondary Level English						
<b>Course Rationale:</b> The syllabus aims to develop a sound understanding of the basic concepts of English Language usage. Also, the course prepares the students for developing their interpersonal communication, eventually leading to enhanced employability skills.						
<b>Course Objectives:</b> <ol style="list-style-type: none"> <li>To equip students with the knowledge of basic concepts of English language</li> <li>To build learners' vocabulary for effective speaking and writing</li> <li>To inculcate and strengthen learners' technical writing skills</li> <li>To enhance the learners' communication skills for employability through adequate exposure to exercises in reading, writing, listening and speaking</li> </ol>						
<b>Course Outcomes:</b> After completion of the course, students would be able to: <ol style="list-style-type: none"> <li>Understand the basic rules governing English with a purpose to apply them effectively, with a substantially increased vocabulary base</li> <li>Apply the rules governing English to communicate effectively, professionally and persuasively in professional settings</li> <li>Create formal, persuasive and professional written documents and business presentations</li> <li>Evaluate and analyze different socio-cultural and professional contexts as per the need of the industry and apply appropriate communication strategies in response to them.</li> </ol>						
<b>Pedagogy:</b> Classroom teaching, classroom exercises and discussion, written assignments, practice worksheets, presentations and role play						
<b>Textbooks:</b> TB1. <i>Business Communication Today</i> , 10e, Bovee, Thill and Chaturvedi, Pearson Education, 2011. TB2. <i>Technical Communication</i> , 3e, Dr. Meenakshi Raman and Dr. Sangeeta Sharma, Oxford University Press, 2015. TB3. <i>The McGraw Hill Handbook of English Grammar and Usage</i> , 1e, Lester, Mark and Beason, Larry, McGraw						

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21/7/2020





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Hill Education 2017.

**Reference Books:**

RB1. *A Practical English Grammar*, 4e, 1986 Edition, Thomson and Martinet, Oxford, 1997.

RB2. *Oxford Guide to Effective Writing and Speaking*, Seely, John, Oxford University Press, 2013.

**Links to websites:**

- <https://www.britishcouncil.in/>
- <https://www.mindtools.com/>

**Evaluation Scheme:**

• Tutorial Test/Presentation/viva/quiz	30%
• Mid Term	20%
• Term End Exam	50%
<b>Total</b>	<b>100%</b>

**Session Plan:**

Session	Topics	Pedagogical tool	Textbook Chapters & Readings
<b>Unit 1</b>	<b>Vocabulary Building</b>	--	--
1.	The concept of Word Formation	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> </ul>	<b>TB1:</b> Chapter:(appended) Handbook of Grammar, Chapter:(appended) Mechanics and Usage
2.	Root words from foreign languages and their use in English	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> </ul>	<b>TB2:</b> Chapter 17: Grammar and Vocabulary Development
3.	Acquaintance with prefixes and suffixes from foreign languages in English to form derivatives; Synonyms, antonyms, and standard abbreviations	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> </ul>	<b>TB2:</b> Chapter 17: Grammar and Vocabulary Development
<b>Unit 2</b>	<b>Basic Writing Skills</b>	--	--
4.	Sentence Structures; Use of phrases and clauses in sentences	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> </ul>	<b>TB1:</b> Chapter:(appended) Handbook of Grammar Chapter:(appended) Mechanics and Usage <b>TB2:</b> Chapter 11: Elements of Effective Writing

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21/7/2020



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5.	Importance of proper punctuation	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> </ul>	<b>TB1:</b> Chapter:(appended) Handbook of Grammar Chapter:(appended) Mechanics and Usage <b>TB2:</b> Chapter 11: Elements of Effective Writing
6.	Principles of effective writing (including techniques for writing precisely)	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> <li>• Written Assignments</li> </ul>	<b>TB2:</b> Chapter 11: Elements of Effective Writing <b>RB2:</b> Chapter 4: The Process of Writing
7.	Organizing principles of paragraphs in documents	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> <li>• Written Assignments</li> </ul>	<b>TB2:</b> Chapter 11: Elements of Effective Writing <b>RB2:</b> Chapter 4: The Process of Writing
<b>Unit 3</b>	<b>Identifying Common Errors in Writing</b>	--	--
8.	Subject-verb agreement	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> </ul>	<b>TB1:</b> Chapter:(appended) Handbook of Grammar, Chapter:(appended) Mechanics and Usage <b>TB2:</b> Chapter 17: Grammar and Vocabulary Development <b>TB3:</b> Chapter: Part II-Topic 7 Subject Verb Agreement
9.	Noun-pronoun agreement	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> </ul>	<b>TB1:</b> Chapter:(appended) Handbook of Grammar,

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21/7/2020





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		<ul style="list-style-type: none"> <li>Practice worksheets</li> </ul>	Chapter:(appended) Mechanics and Usage <b>TB2:</b> Chapter 17: Grammar and Vocabulary Development
10.	Misplaced modifiers	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Classroom Exercises</li> <li>Practice worksheets</li> </ul>	<b>TB3:</b> Chapter: Part II Topic 10 Modification
11.	Articles Prepositions	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Classroom Exercises</li> <li>Practice worksheets</li> </ul>	<b>TB1:</b> Chapter:(appended) Handbook of Grammar, Chapter:(appended) Mechanics and Usage <b>TB2:</b> Chapter 17: Grammar and Vocabulary Development <b>RB1:</b> Chapter 1: Articles Chapter 9: Prepositions
12.	Redundancies – words, phrases and usage; Clichés – words, phrases and usage	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Classroom Exercises</li> <li>Practice worksheets</li> </ul>	<b>TB2:</b> Chapter 11: Elements of Effective Writing
<b>Unit 4</b>	<b>Nature and Style of Sensible Writing</b>	--	--
13.	Describing – technical description of objects, processes and instruction writing	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Classroom Exercises</li> <li>Practice worksheets</li> <li>Written Assignments</li> </ul>	<b>TB2:</b> Chapter 11: Elements of Effective Writing Chapter 16: Research Paper and Technical Descriptions

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14.	technical description of processes and instruction writing	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> <li>• Written Assignments</li> </ul>	<b>TB2:</b> Chapter 11: Elements of Effective Writing Chapter 16: Research Paper and Technical Descriptions
15.	Defining and Classifying	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> <li>• Written Assignments</li> </ul>	<b>TB2:</b> Chapter 11: Elements of Effective Writing Chapter 16: Research Paper and Technical Descriptions
16.	Providing examples or evidence – building an effective argument	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> <li>• Written Assignments</li> </ul>	<b>TB1:</b> Chapter 5: Writing Business Messages Chapter 10: Writing Persuasive Messages <b>TB2:</b> Chapter 11: Elements of Effective Writing
17.	Writing introduction and conclusion	<ul style="list-style-type: none"> <li>• Classroom</li> <li>• Teaching</li> <li>• Classroom Exercises</li> <li>• Practice worksheets</li> <li>• Written Assignments</li> </ul>	<b>TB1:</b> Chapter 5: Writing Business Messages Chapter 10: Writing Persuasive Messages <b>TB2:</b> Chapter 11: Elements of Effective Writing <b>RB2:</b> Chapter 4: The Process of Writing

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Unit 5	Writing Practices	--	--
18.	Comprehension	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Classroom Exercises</li> <li>Practice worksheets</li> <li>Written Assignments</li> </ul>	<b>TB2:</b> Chapter 10: Reading Comprehension Chapter 11: Elements of Effective Writing
19.	Précis Writing	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Classroom Exercises</li> <li>Practice worksheets</li> <li>Written Assignments</li> </ul>	<b>TB2:</b> Chapter 12: The Art of Condensation
20.	Essay Writing	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Classroom Exercise</li> <li>Practice worksheets</li> <li>Written Assignments</li> </ul>	<b>TB2:</b> Chapter 11: Elements of Effective Writing <b>RB2:</b> Chapter 4: The Process of Writing
Unit 6	Oral Communication	--	--
21.	Listening – process of listening, types of listening, barriers to listening	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Listening Exercises</li> </ul>	<b>TB2:</b> Chapter 4: Active Listening
22.	Listening – barriers to listening, steps to improve listening skills and listening comprehension	<ul style="list-style-type: none"> <li>Classroom</li> <li>Teaching</li> <li>Listening Exercises</li> </ul>	<b>TB2:</b> Chapter 4: Active Listening
23.	Paralinguistic – Pronunciation, Intonation, Stress (Primary and Secondary) and Rhythm	<ul style="list-style-type: none"> <li>Classroom</li> <li>Teaching</li> <li>spoken practice Exercises</li> </ul>	<b>TB2:</b> Chapter 1: Basics of Technical Communication
24.	Common everyday situational conversations	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>spoken practice Exercises</li> <li>Role plays</li> </ul>	<b>TB2:</b> Chapter 5: Effective Speaking Chapter 6: Conversations and Dialogues
25.	Communication at Workplace – Formal and Informal	<ul style="list-style-type: none"> <li>Classroom Teaching</li> <li>Classroom Discussion</li> </ul>	<b>TB1:</b> Chapter 1: Understanding the

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		<ul style="list-style-type: none"> <li>• Written Assignments</li> </ul>	Foundations of Business Communication <b>TB2:</b> Chapter 1: Basics of Technical Communication
26.	Organizational Barriers to Communication	<ul style="list-style-type: none"> <li>• Classroom</li> <li>• Teaching</li> <li>• Classroom Discussion</li> <li>• Written Assignments</li> </ul>	<b>TB2:</b> Chapter 1: Basics of Technical Communication
27.	Interviews – preparation; and effective communication before, during and after an interview (including telephonic interviews)	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• Mock Interview</li> <li>• Role Plays</li> </ul>	<b>TB1:</b> Chapter 18 & 19: Writing Employment Messages and Interviewing for Jobs <b>TB2:</b> Chapter 8: Interviews
28.	Formal Presentations	<ul style="list-style-type: none"> <li>• Classroom Teaching</li> <li>• PPT Presentations</li> <li>• Student Practice Presentations</li> </ul>	<b>TB1:</b> Chapter 2: Mastering Team and Interpersonal Communication Chapter 16 & 17: Designing and Delivering Oral and Online Presentations <b>TB2:</b> Chapter 7: Formal Presentations
29,30	Beyond classroom activities; including remedial lectures, guest lectures and other extension activities.		

Signature

(Prepared by Concerned Faculty/HOD)



Signature

(Approved by Dean)