



**ACE**  
**Engineering College**

Ankushapur(V), Ghatkesar(M), R.R.Dist - 501301

(Autonomous)

**B.TECH COURSE STRUCTURE & SYLLABUS**

**(Common to CSE, EEE, IT, CSE(DS))**

**(R20)**

**I B. TECH II-SEMESTER**

S.No.	Course Type	Course Code	Course Title	% of Deviation	Periods Per Week			Credits
					L	T	P	
1	BSC	MA201BS	Mathematics - II	20	3	1	0	4
2	BSC	PH202BS	Applied Physics	8	3	1	0	4
3	ESC	CS203ES	Programming for problemSolving	8	3	1	0	4
4	ESC	ME204ES	Engineering Graphics	0	1	0	4	3
5	BSC	PH205BS	Applied Physics Lab	0	0	0	3	1.5
6	ESC	CS206ES	Programming for problemSolving Lab	2	0	0	3	1.5
7	MC	MC207ES	Environmental Science	0	3	0	0	0
8	MC	MC208	Business English	-	2	0	0	0
<b>Total</b>					<b>15</b>	<b>3</b>	<b>10</b>	<b>18</b>

**MA201BS: MATHEMATICS -II**

Unit Numbers	Existing R18 Syllabus	Proposed ACE R20	% of Deviation	Reason/Justification for Deviation	Remarks (if any)
Unit – IV	Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives, Tangent plane and normal line. Vector Identities. Scalar potential functions. Solenoidal and Irrotational vectors.	Gradient, Divergence, Curl, Line integral, conservative fields, Green's theorem, surface area of solids of revolution, surface area, surface integral, Triple integrals and Gauss Divergence theorem, Stokes' theorem (without proofs)	-		R18 Unit– V topics are merged with R20 Unit - IV
Unit –V	Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.	Basic counting, Pigeonhole principle, Permutations and Combinations, Binomial Coefficients, Application of Recurrence Relations, Solution of Recurrence Relations, Generating functions, Inclusion– Exclusion and applications	20	These topics of Unit – V are very much required for all the branches of Engineering and also prerequisite for the trending technologies like Artificial Intelligence, Machine Learning & Data Science and for Better understanding of computer applications	

**MA201BS: MATHEMATICS – II**  
**(ADVANCED CALCULUS& ELEMENTARY COMBINATORICS)(Common**  
**to CE, EEE, ME, ECE, CSE, IT, CSE(IoT), AI&ML, DSE)**

<b>B.Tech. I Year II Semester</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
		<b>L</b>	<b>T</b>	<b>P</b>		<b>C</b>	<b>CIA</b>	<b>SEE</b>
<b>MA201BS</b>	<b>BSC</b>	3	1	-	4	30	70	100
<b>Contact Classes: 45</b>	<b>Tutorial Classes: 15</b>	<b>Practical Classes: Nil</b>			<b>Total Classes: 60</b>			
<b>Prerequisite:</b> Mathematical Knowledge of 12 <sup>th</sup> / Intermediate level								
<p><b>Course Objectives:</b> To learn</p> <ul style="list-style-type: none"> <li>• Methods of solving the differential equations of first and higher order.</li> <li>• Evaluation of multiple integrals and their applications</li> <li>• The physical quantities involved in engineering field related to vector valued functions</li> <li>• The basic properties of vector valued functions and their applications to line, surface and volume integrals</li> <li>• Concept of Recurrence Relations and generating functions</li> </ul>								
<p><b>Course Outcomes:</b> After learning the contents of this paper the student must be able to</p> <ul style="list-style-type: none"> <li>• Identify whether the given differential equation of first order is exact or not</li> <li>• Solve higher differential equation and apply the concept of differential equation to real world problems</li> <li>• Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallel piped</li> <li>• Evaluate the line, surface and volume integrals and converting them from one to another</li> <li>• Apply the concepts of advanced counting techniques</li> </ul>								
<b>Unit: 1</b>	<b>First Order ODE</b>							
Exact, linear and Bernoulli's equations; Applications : Newton's law of cooling, Law of natural growth and decay; Equations not of first degree: equations solvable for p, equations solvable for y, equations solvable for x and Clairaut's type.								
<b>Unit: 2</b>	<b>Ordinary Differential Equations of Higher Order</b>							
Second order linear differential equations with constant coefficients: Non-Homogeneous terms of the type $e^{ax}$ , $\sin ax$ , $\cos ax$ , polynomials in x, $e^{ax}V(x)$ and $x V(x)$ ; method of variation of parameters; Equations reducible to linear ODE with constant coefficients: Legendre's equation, Cauchy-Euler equation.								
<b>Unit: 3</b>	<b>Multivariable Calculus (Integration)</b>							
Evaluation of Double Integrals (Cartesian and polar coordinates); change of order of integration (only Cartesian form); Evaluation of Triple Integrals: Change of variables (Cartesian to polar) for double and (Cartesian to Spherical and Cylindrical polar coordinates) for triple integrals. <b>Applications:</b> Areas (by double integrals) and volumes (by double integrals and triple integrals), Centre of mass and Gravity (constant and variable densities) by double and triple integrals (applications involving cubes, sphere and rectangular parallelopiped).								
<b>Unit: 4</b>	<b>Vector calculus</b>							
Gradient, Divergence, Curl, Line integral, conservative fields, Green's theorem, surface area of solids of revolution, surface area, surface integral, Triple integrals and Gauss Divergence theorem, Stokes' theorem (without proofs)								
<b>Unit: 5</b>	<b>Counting (Recurrence Relations &amp; Elementary Combinatorics)</b>							

Basic counting, Pigeonhole principle, Permutations and Combinations, Binomial Coefficients, Application of Recurrence Relations, Solution of Recurrence Relations, Generating functions, Inclusion – Exclusion and applications

**Text Books:**

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. Kenneth H. Rosen, Discrete Mathematics and Its Applications, McGrawHill.

**Reference Books:**

1. S. L. Ross, Differential Equations, 3rd Ed., Wiley India, 1984.
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
3. Higher Engineering Mathematics by B V Ramana, TataMcGraw-Hill
4. Discrete Mathematics for Computer Scientists and Mathematicians by Joe R. Mott, AbrahamKandel, Theodore P. Baker, Prentice-Hall of India Pvt.Ltd.

**Web References:**

- 1) SWAYAM Online Courses <https://storage.googleapis.com/uniquecourses/online.html>
- 2) Directory of Open Access Journals <https://doaj.org/>
- 3) Springer Open Journals <https://www.springeropen.com/journals>
- 4) UG/PG MOOCs [http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs\\_courses.php](http://ugcmoocs.inflibnet.ac.in/ugcmoocs/moocs_courses.php)

**E-Text Books:**

- 1) National Digital Library: <https://ndl.iitkgp.ac.in/>
- 2) NCERT Text Books <http://ncert.nic.in/textbook/textbook.htm>
- 3) Directory of Open Access Books <https://www.doabooks.org/>

<b>APPLIED PHYSICS</b>			
<b>(Unit Wise Syllabus Comparison)</b>			
<b>Existing JNTUH R18 Syllabus</b>	<b>Proposed ACE-R20 Autonomous Syllabus</b>	<b>% Deviation with JNTUH R18 Syllabus</b>	<b>Reasons for the Deviation</b>
<b>UNIT - I Quantum Mechanics</b>	<b>UNIT - I Quantum Mechanics</b>		
Introduction to quantum physics, <b>Black body radiation, Planck's law, Photoelectric effect, Compton effect</b> , de- Broglie's hypothesis, Wave- particle duality, Davisson and Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box.	Introduction to quantum physics, de-Broglie's hypothesis, Wave- particle duality, Davidson-Germer experiment, Heisenberg's Uncertainty principle, Born's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box, <b>Bloch's Theorem- Electron motion in a periodic potential-Kronig-Penney Model-Effective Mass- Origin of Energy Bands in solids</b> Classification of materials into conductors, semiconductors and insulators.	<b>8%</b>	The newly incorporated topics of Bloch's theorem and Kronig-Penney model not only give a clear idea on the energy band structure of materials but also provide a better Understanding of the behavior of semiconducting, optoelectronic and dielectric materials.

**Total Deviation = 8%**

**PH102BS/PH202BS : APPLIED PHYSICS**

<b>B. TECH- I YEARI SEMESTER</b>									
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>				<b>Credits</b>	<b>Maximum Marks</b>		
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>		<b>CIA</b>	<b>SEE</b>	<b>TOTAL</b>
<b>PH102BS</b>	<b>BSC</b>	3	1	0	4	30	70	100	
<b>CONTACT CLASSES: 45</b>	<b>TUTORIAL CLASSES: 15</b>	<b>PRACTICAL CLASSES: NIL</b>				<b>TOTAL CLASSES :60</b>			
<b>PREREQUISITES: Intermediate level Physics and Mathematics</b>									
<b>COURSE OBJECTIVES</b>									
<b>To make the student</b>									
<ol style="list-style-type: none"> <li>1. Understand the basic concepts of Quantum Physics</li> <li>2. Learn the basics of semiconductors and operation of devices PN Diode, Zener Diode, BJT.</li> <li>3. Understand basics of direct band gap semiconductors and operation of Opto-Electronic devices.</li> <li>4. Gain knowledge on different ways of production of lasers and the basics of fiber optics</li> <li>5. Get familiarized with the nature of different dielectric and magnetic materials and electromagnetic theory</li> </ol>									
<b>COURSE OUTCOMES:</b>									
<b>After completion of this course the student will be able to</b>									
<ol style="list-style-type: none"> <li>1. Explain the wave-particle duality of both radiation and matter</li> <li>2. Explain the different types of semi-conductors and the operation &amp; characteristics of PN Diode, Zener diode and BJT</li> <li>3. Describe the operation &amp; characteristics of Opto- Electronic devices</li> <li>4. Illustrate the features of a laser beam and its applications and explain fiber optic communication</li> <li>5. Classify various dielectric and magnetic materials and explain the basics of electromagnetic theory</li> </ol>									
<b>UNIT 1: QUANTUM MECHANICS</b>									
Introduction to quantum physics, de-Broglie's hypothesis, Wave-particle duality, Davisson- Germer experiment, Heisenberg's Uncertainty principle, Burn's interpretation of the wave function, Schrodinger's time independent wave equation, Particle in one dimensional box, Bloch's Theorem-Electron motion in a periodic potential- Kronig-Penney Model-Effective Mass-Origin of Energy Bands in Solids- Classification of materials into conductors, semiconductors and insulators.									
<b>UNIT 2: SEMICONDUCTOR PHYSICS</b>									
Intrinsic and Extrinsic semiconductors, Dependence of Fermi level on carrier-concentration and temperature, Carrier generation and recombination, Carrier transport: diffusion and drift, Hall effect, p-n junction diode, Zener diode and their V-I Characteristics, Bipolar Junction Transistor (BJT): Construction, Principle of operation.									
<b>UNIT 3: OPTOELECTRONICS</b>									
Radiative and non-radiative recombination mechanisms in semiconductors, LED and semiconductor lasers: Device structure, Materials, Characteristics and figures of merit, Semiconductor photodetectors: Solar cell, PIN and Avalanche and their structure, Materials, working principle and Characteristics.									

<b>UNIT 4:</b>	<b>LASERS AND FIBER OPTICS</b>
<p><b>Lasers:</b> Introduction to interaction of radiation with matter, Coherence, Principle and working of Laser, Population inversion, Pumping, Types of Lasers: Ruby laser, Carbon dioxide (CO<sub>2</sub>) laser, He-Ne laser, Applications of laser. <b>Fiber Optics:</b> Introduction, Optical fiber as a dielectric wave guide, Total internal reflection, Acceptance angle, Acceptance cone and Numerical aperture, Step and Graded index fibers, Losses associated with optical fibers, Applications of optical fibers</p>	
<b>UNIT 5:</b>	<b>ELECTROMAGNETISM &amp; MAGNETIC PROPERTIES OF MATERIALS</b>
<p>Laws of electrostatics, Electric current and the continuity equation, Ampere's and Faraday's laws, Maxwell's equations, Polarization, Permittivity and Dielectric constant, Internal fields in a solid, Clausius-Mosotti equation, Ferroelectrics and Piezoelectric materials. Magnetization, permeability and susceptibility, Classification of magnetic materials, Ferromagnetism and ferromagnetic domains, Hysteresis, Applications of magnetic materials</p>	
<p><b>Text Books:</b></p> <ol style="list-style-type: none"> <li>1. Engineering Physics, B.K. Pandey, S. Chaturvedi - Cengage Learning</li> <li>2. Integrated Electronics by J. Millman and C. Halkias, TMH</li> </ol>	
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Richard Robinett, "Quantum Mechanics" 2<sup>nd</sup> ed. -Oxford.</li> <li>2. J. Singh, Semiconductor Optoelectronics: Physics and Technology, MGH (1995).</li> <li>3. Halliday and Resnick, Physics - Wiley.</li> <li>4. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Kshirsagar - S. Chand</li> </ol>	
<p><b>Web References:</b></p> <ol style="list-style-type: none"> <li>1. <a href="http://web.mit.edu/6.732">web.mit.edu/6.732</a></li> <li>2. <a href="https://learnabout-electronics.org/semiconductors">https://learnabout-electronics.org/semiconductors</a></li> <li>3. <a href="http://www.Aip.org/history/Heisenberg/p08.html">www.Aip.org/history/Heisenberg/p08.html</a></li> <li>4. <a href="https://www.youtube.com/watch?v=wpAA3qeOYiI">https://www.youtube.com/watch?v=wpAA3qeOYiI</a></li> <li>5. <a href="https://www.youtube.com/watch?v=OyC02DWq3mI">https://www.youtube.com/watch?v=OyC02DWq3mI</a></li> <li>6. <a href="https://www.youtube.com/watch?v=KFCgeI4j-Ig">https://www.youtube.com/watch?v=KFCgeI4j-Ig</a></li> <li>7. <a href="http://www.infocobuild.com/education/audio-video-courses/materials-science/optoelectronic-materials-and-devices-iit-kanpur.html#:~:text=Instructors%3A%20Prof.-,Deepak%20Gupta%20and%20Prof.,in%20optoelectronics%20and%20semiconductor%20devices.">http://www.infocobuild.com/education/audio-video-courses/materials-science/optoelectronic-materials-and-devices-iit-kanpur.html#:~:text=Instructors%3A%20Prof.-,Deepak%20Gupta%20and%20Prof.,in%20optoelectronics%20and%20semiconductor%20devices.</a></li> <li>8. <a href="https://circuitglobe.com/light-emitting-diode-led.html">https://circuitglobe.com/light-emitting-diode-led.html</a></li> <li>9. <a href="https://solarlove.org/how-solar-cells-work-components-operation-of-solar-cells/">https://solarlove.org/how-solar-cells-work-components-operation-of-solar-cells/</a></li> </ol>	
<p><b>E-Text Books:</b></p> <ol style="list-style-type: none"> <li>1. <a href="https://www.e-booksdirectory.com/details.php?ebook=11931">https://www.e-booksdirectory.com/details.php?ebook=11931</a></li> <li>2. <a href="https://www.e-booksdirectory.com/details.php?ebook=5855">https://www.e-booksdirectory.com/details.php?ebook=5855</a></li> <li>3. <a href="https://www.e-booksdirectory.com/details.php?ebook=5302">https://www.e-booksdirectory.com/details.php?ebook=5302</a></li> </ol>	

## PROGRAMMING FOR PROBLEM SOLVING

S. No.	Course Title	Deviation	Unit Numbers	Existing R18 JNTUH Syllabus	Proposed ACER20 Autonomous Syllabus	% Deviation	Reason / Justification for Deviation	Remarks (If any)
1	Programming for Problem Solving	YES	Unit 5 (Array and Applications)	Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc. Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion, Selection, sort algorithms) Basic concept of order of complexity through the example programs	Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc. Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion, Selection, Quick and Merge sort algorithms) Stack using Arrays and Queue using Arrays Basic concept of order of complexity through the example programs	8%	To get more knowledge on array applications	

**CS103ES/CS203ES: PROGRAMMING FOR PROBLEM SOLVING**

<b>B. Tech I Year II Semester</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>CS103ES/CS203ES</b>	<b>Core</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		3	1	-		4	30	70
<b>Contact Classes: 45</b>	<b>Tutorial Classes: 15</b>	<b>Practical Classes: Nil</b>			<b>Total Classes: 60</b>			
<b>Prerequisite:</b> Basic knowledge of Computer								
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>To understand the various steps in program development.</li> <li>To learn the syntax and semantics of C programming language.</li> <li>To learn the usage of structured programming approach in solving problems.</li> <li>To learn modular programming approach in programming</li> <li>To understand and learn the concept of derived data types.</li> </ul>								
<b>Course Outcomes:</b> <ul style="list-style-type: none"> <li>To write algorithms and to draw flowcharts for solving problems.</li> <li>To convert the algorithms/flowcharts to C programs.</li> <li>To code and test a given logic in C programming language.</li> <li>To decompose a problem into module (functions) and to develop modular reusable code.</li> <li>To use derived data type to write advances C programs.</li> </ul>								
<b>Unit-1</b>	<b>COMPUTER FUNDAMENTALS AND INTRODUCTION TO C LANGUAGE No. of Classes: 15</b>							
<p><b>Introduction to components of a computer system:</b> disks, primary and secondary memory, processor, operating system, compilers, creating, compiling and executing a program etc., Number systems</p> <p><b>Introduction to Algorithms:</b> steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming</p> <p><b>Introduction to C Programming Language:</b> variables (with data types and space requirements), Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion,</p> <p><b>The main method and command line arguments Bitwise operations:</b> Bitwise AND, OR, XOR and NOT operators</p> <p><b>Conditional Branching and Loops:</b> Writing and evaluation of conditionals and consequent branching with if, if-else, switch-case, ternary operator, goto, Iteration with for, while, dowhile loops</p> <p><b>I/O:</b> Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.</p>								
<b>Unit-2</b>	<b>Derived Data Types</b>							
<p><b>Arrays:</b> one and two dimensional arrays, creating, accessing and manipulating elements of arrays <b>Strings:</b> Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings</p> <p><b>Structures:</b> Defining structures, initializing structures, unions, Array of structures</p> <p><b>Pointers:</b> Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list</p>								

(no implementation) <b>Enumeration data type</b>	
<b>Unit-3</b>	<b>Files</b>
<b>Preprocessor:</b> Commonly used Preprocessor commands like include, define, undef, if, ifdef, ifndef <b>Files:</b> Text and Binary files, Creating and Reading and writing text and binary files, Appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.	
<b>Unit-4</b>	<b>Functions</b>
<b>Functions:</b> Designing structured programs, Declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries	
<b>Recursion:</b> Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions	
<b>Dynamic memory allocation:</b> Allocating and freeing memory, Allocating memory for arrays of different data types	
<b>Unit-5</b>	<b>Applications of Arrays &amp; Analysis of algorithms</b>
Algorithms for finding roots of a quadratic equations, finding minimum and maximum numbers of a given set, finding if a number is prime number, etc.	
Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion, Selection, <b>Quick and Merge</b> sort algorithms)	
<b>Stack using Arrays and Queue using Arrays</b>	
Basic concept of order of complexity through the example programs	
<b>Text Books:</b>	
<ol style="list-style-type: none"> <li>1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill</li> <li>2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)</li> </ol>	
<b>Reference Books:</b>	
<ol style="list-style-type: none"> <li>1. 'C Programming: A Modern Approach (2nd Edition)' by K. N. King</li> <li>2. Let us c by Yawanth Kanetkar</li> <li>3. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.</li> <li>4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India</li> <li>5. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)</li> <li>6. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.</li> <li>7. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition</li> </ol>	
<b>Web References:</b>	
<ol style="list-style-type: none"> <li>1. <a href="https://github.com/EbookFoundation/free-programming-books/blob/master/free-programming-books.md#c">https://github.com/EbookFoundation/free-programming-books/blob/master/free-programming-books.md#c</a></li> <li>2. <a href="https://publications.gbdirect.co.uk//c_book/">https://publications.gbdirect.co.uk//c_book/</a></li> </ol>	
<b>E-Text Books:</b>	
<ol style="list-style-type: none"> <li>1. <a href="https://books.goalkicker.com/CBook/">https://books.goalkicker.com/CBook/</a></li> <li>2. <a href="http://www2.cs.uregina.ca/~hilder/cs833/Other%20Reference%20Materials/The%20C%20Programming%20Language.pdf">http://www2.cs.uregina.ca/~hilder/cs833/Other%20Reference%20Materials/The%20C%20Programming%20Language.pdf</a></li> <li>3. <a href="https://www.stormingrobots.com/prod/tutorial/pdf/kingBook-ch1to10.pdf">https://www.stormingrobots.com/prod/tutorial/pdf/kingBook-ch1to10.pdf</a></li> </ol>	

**ME104ES/ME204ES: ENGINEERING GRAPHICS**

<b>B.Tech. I Year II Semester</b>								
<b>Course Code</b>	<b>Category</b>	<b>Hours/Week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
<b>ME104ES/ME204ES</b>	<b>ESC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		1	0	4		3	30	70
<b>Contact Classes: 15</b>	<b>Tutorial Classes: 0</b>	<b>Practical Classes: 60</b>			<b>Total Classes: 75</b>			
<b>Prerequisite:</b> Fundamental mathematical knowledge and thinking ability.								
<b>Course Objectives:</b>								
<ul style="list-style-type: none"> <li>To provide basic concepts in engineering drawing.</li> <li>To impart knowledge about standard principles of orthographic projection of objects.</li> <li>To draw sectional views and pictorial views of solids.</li> </ul>								
<b>Course Outcomes:</b> At the end of the course, the student will be able to:								
<ul style="list-style-type: none"> <li>Preparing working drawings to communicate the ideas and information.</li> <li>Read, understand and interpret engineering drawings.</li> </ul>								
<b>Unit - 1</b>	<b>Introduction to Engineering Drawing</b>							
Principles of Engineering Graphics and their Significance, Conic Sections including the Rectangular Hyperbola – General method only. Cycloid, Epicycloid and Hypocycloid, Scales – Plain & Diagonal.								
<b>Unit - 2</b>	<b>Orthographic Projections</b>							
Principles of Orthographic Projections – Conventions – Projections of Points and Lines, Projections of Plane regular geometric figures.— Auxiliary Planes.								
<b>Unit - 3</b>	<b>Projections of Regular Solids</b>							
Projections of Regular Solids – Auxiliary Views - Sections or Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views – Sections of Sphere.								
<b>Unit - 4</b>	<b>Development of Surfaces of Right Regular Solids</b>							
Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid and Cone, Intersection of Solids: Intersection of – Prism vs Prism- Cylinder Vs Cylinder.								
<b>Unit - 5</b>	<b>Isometric Projections</b>							
<b>Isometric Projections:</b> Principles of Isometric Projection – Isometric Scale – Isometric Views								
–Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines. Isometric Projection of Spherical Parts. Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions <b>Introduction to CAD: (For Internal Evaluation Weightage only)</b>								
Introduction to CAD Software Package Commands.- Free Hand Sketches of 2D- Creation of 2D Sketches by CAD Package.								
<b>Text Books</b>								
<ol style="list-style-type: none"> <li>Engineering Drawing N.D.Bhatt/Charotar.</li> <li>Engineering Drawing / N. S. Parthasarathy and VelaMurali/Oxford.</li> </ol>								
<b>Reference Books</b>								
<ol style="list-style-type: none"> <li>Engineering Drawing / Basant Agrawal and McAgrawal/McGrawHill.</li> <li>Engineering Drawing/ M. B. Shah, B.C. Rane/Pearson.</li> <li>Computer Aided Engineering Drawing – K Balaveera Reddy et al –CBS Publishers.</li> </ol>								

**Web References:**

1. <http://www.ndl.iitkgp.ac.in/>

**E-Text Books:**

1. <http://www.pdfdrive.com/engineering-drawing-books.html>
2. <http://www.examupdates.in/engineering-drawing-text-book/>

**PH105BS/PH205BS: APPLIED PHYSICS LAB**

<b>B. Tech I Year II Semester</b>								
<b>Course code</b>	<b>Category</b>	<b>Hours/ week</b>			<b>Credits</b>	<b>Maximum Marks</b>		
		<b>L</b>	<b>T</b>	<b>P</b>		<b>C</b>	<b>CIA</b>	<b>SEE</b>
<b>PH 105BS / PH205 BS</b>	<b>BS</b>	-	-	<b>3</b>	<b>1.5</b>	30	70	100
		<b>Contact Classes: Nil</b>		<b>Tutorial Classes: Nil</b>		<b>Practical Classes: 39</b>		<b>Total Classes:39</b>
<b>Prerequisites:</b> none								
<b>Course Objectives:</b> To make the student								
<ol style="list-style-type: none"> <li>1. To gain knowledge by applying the experimental methods to correlate with the theoretical concepts</li> <li>2. To learn the usage of various electrical, magnetic and optical tools for measuring related parameters</li> <li>3. To Apply the analytical techniques and graphical analysis to the experimental data</li> <li>4. To develop intellectual communication skills and discuss the basic principles of scientific concepts in a group</li> </ol>								
<b>Course Outcomes:</b>								
At the end of this course, the student will be able to								
<ol style="list-style-type: none"> <li>1. Operate different sets of measuring tools and techniques</li> <li>2. Compute relevant physical quantities from the observed measurements and interpret through graphical methods in experiments using LCR, RC, LED, Solar Cell, Laser Diode circuit boards</li> <li>3. Compare the experimental results with their theoretical counterparts</li> <li>4. Demonstrate basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results</li> </ol>								
<b>List of Experiments:</b>								
<ol style="list-style-type: none"> <li>1) Charging, discharging and time constant of an R-C circuit</li> <li>2) L-C-R circuit – Resonance &amp; Q-factor</li> <li>3) Magnetic field along the axis of current carrying coil – Stewart and Gees method</li> <li>4) Study the characteristics of a LED</li> <li>5) Study the characteristics of a LASER diode</li> <li>6) Bending losses of fibers &amp; Evaluation of numerical aperture of a given fibre</li> <li>7) Energy gap of a material of p-n junction</li> <li>8) Hall Effect- Determination of Hall Coefficient</li> <li>9) Solar Cell-I-V Characteristics and Fill Factor</li> <li>10) Photoelectric Effect- Determination of Planck's Constant</li> </ol>								
<b>(Any eight experiments to be mandatory performed by the student)</b>								
<b>List of Equipment Required:</b>								
Function Generators Battery Eliminators Ammeters Rheostats LCR Circuit Boards R-CCircuit Boards Laser Characteristics- Circuit Boards LED characteristics Boards Energy Gap Kits Optical								

Fiber Kits  
Hall Effect circuit  
Boards Photoelectric  
effect circuitBoards

**Text Books:**

1. C. L. Arora, "Practical Physics", S. Chand & Co., New Delhi, 3rd Edition, 2012.
2. Vijay Kumar, Dr. T. Radhakrishna, "Practical Physics for Engineering Students", SM Enterprises, 2nd Edition, 2014
- 3 Y. Aparna, K. Venkateswarao, "Engineering Physics Lab Manual", VGS Book links 2010

**Reference Books:**

1. C.F. Coombs, "Basic Electronic Instrument Handbook", McGraw-Hill Book Co., 1972.
2. C.H. Bernard and C.D. Epp, John Wiley and Sons, "Laboratory Experiments in College Physics" Inc., New York, 1995.

**Web References:**

1. <https://www.scribd.com/doc/143091652/engineering-physics-lab>
2. [https://www3.nd.edu/wzech/LabManual\\_0907c.pdf](https://www3.nd.edu/wzech/LabManual_0907c.pdf)
3. <https://www.morebooks.de/store/gb/book/engineering-physics-lab-manual/isbn/978-3-330-34402>.

## PROGRAMMING FOR PROBLEM SOLVING LAB

S.No	Course Title	Deviati on	Unit Numbers	Existi ngR18 JNTU H Syllabu s	Proposed ACE R20 Autonomous Syllabus	% Deviati on	Reason / Justification forDeviation	Re ma rks ( If any )
1	<b>Program ming for Problem Solving Lab</b>	<b>YES</b>	<b>Unit-1</b>	--	<b>For all the Programs writing Algorithm and drawing Flow chart is Mandatory.</b>	<b>2%</b>	<b>Added tasks on flow charts and algorithms to make students well knowledge to write algorithms and to draw flow charts for various programs</b>	

## CS106ES/CS206ES: PROGRAMMING FOR PROBLEM SOLVING LAB

<b>B.Tech. I Year II Semester</b>								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
CS106ES/CS206ES	HSMC	L	T	P	C	CIA	SEE	Total
		0	0	3	1.5	30	70	100
<b>Contact Classes: 0</b>	<b>Tutorial Classes: 0</b>	<b>Practical Classes: 45</b>			<b>Total Classes: 45</b>			
<b>Prerequisite:</b> Basic Knowledge of Computer								
<p><b>Course Objectives:</b> The students will learn the following:</p> <ul style="list-style-type: none"> <li>• To work with an IDE to create, edit, compile, run and debug programs</li> <li>• To analyze the various steps in program development.</li> <li>• To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.</li> <li>• To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.</li> <li>• To Write programs using the Dynamic Memory Allocation concept.</li> <li>• To create, read from and write to text and binary files</li> </ul>								
<b>For all the Programs writing Algorithm and drawing Flow chart is Mandatory.</b>								
<p><b>List of Experiments:</b></p> <p><b>Basic programs</b></p> <ol style="list-style-type: none"> <li>1. Write a simple program that prints the results of all the operators available in C (including pre/ postincrement , bit wise and/or/not , etc.). Read required operand values from standard input.</li> <li>2. Write a simple program that converts one given data type to another using auto conversion and casting. Take the values form standard input.</li> <li>3. Write a program to convert temperature from Fahrenheit to Celsius and vise versa.</li> <li>4. A building has 10 floors with a floor height of 3 meters each. A ball is dropped from the top of the building. Find the time taken by the ball to reach each floor. (Use the formula <math>s = ut + (1/2)at^2</math> where u and a are the initial velocity in m/sec (= 0) and acceleration in <math>m/sec^2</math> (= 9.8m/s<sup>2</sup>)).</li> <li>5. Write a C program to find simple and compound interest.</li> <li>6. Write a C program to find Gross salary of an Employee.</li> </ol> <p><b>Decision Making statements</b></p> <ol style="list-style-type: none"> <li>1. Write a program for find the max and min from the three numbers using if-else.</li> <li>2. Write a C program, which takes two integer operands and one operator from the user, performs the operation and then prints the result.(Consider the operators +,-,*, /, % and use Switch Statement)</li> <li>3. Write program that declares Class awarded for a given percentage of marks, where mark &lt;40%= Failed, 40% to &lt;60% = Second class, 60% to &lt;70%=First class, &gt;= 70% = Distinction. Read percentage from standard input.</li> <li>4. Write a C program to find the roots of a Quadratic equation.</li> <li>5. Write a C program to find grade of a student using else if ladder.</li> <li>6. C program to read weekday number and print weekday name using switch.</li> </ol> <p><b>Loop: 1.</b> Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows=3, the output</p>								



### **Arrays**

1. Write a C program to find the minimum, maximum and average in an array of integers.
2. Write a functions to compute mean, variance, Standard Deviation, sorting of n elements in single dimension array.
3. Write a C program that uses functions to perform the following:
  - i. Addition of Two Matrices
  - ii. Multiplication of Two Matrices
4. Write a C program to merge two arrays into a single array.
5. Write a C program to implement Stack using array.
6. Write a C program to implement Queue using array.

### **Sorting and Searching:**

1. Write a C program that uses non recursive function to search for a Key value in a given list of integers using linear search method.
2. Write a C program that uses non recursive function to search for a Key value in a given sorted list of integers using binary search method.
3. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
4. Write a C program that sorts the given array of integers using selection sort in descending order
5. Write a C program that sorts the given array of integers using insertion sort in ascending order
6. Write a C program that sorts the given array of integers using merge sort and quick sort in ascending order

### **Pointers & Dynamic Memory Allocation**

1. Transpose of a matrix with memory dynamically allocated for the new matrix as row and column counts may not be same.
2. Write a program for reading elements using pointer into array and display the values using array.
3. Write a program for display values reverse order from array using pointer.
4. Write a program through pointer variable to sum of n elements from array.

### **Strings:**

1. Write a C program to convert a Roman numeral ranging from I to L to its decimal equivalent.
2. Write a C program that converts a number ranging from 1 to 50 to Roman equivalent
3. Write a C program that uses functions to perform the following operations:
  - a. To insert a sub-string in to a given main string from a given position.
  - b. To delete n Characters from a given position in a given string.
4. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)
5. Write a C program that displays the position of a character ch in the string S or - 1 if S doesn't contain ch.
6. Write a C program to count the lines, words and characters in a given text.
7. Write a C program that sorts a given array of names

### **Structures**

1. Define a structure for Student with Sno, Sname, marks of three subjects, avg. Write a C program to read 4 students information and display grade of the student.
2. Define a structure called books with book name, author, price, pages, and

edition. Write a C program to read and display a book information using pointer.

3. Define a structure for complex number. Write functions on complex numbers (addition, subtraction, multiplication, division, complex conjugate) and implement them in a menu driven style.

**Files:**

1. Write a C program to display the contents of a file to standard output device.
2. Write a C program which copies one file to another, replacing all lowercase characters with their upper case equivalents.
3. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.
4. Write a C program that does the following:  
It should first create a binary file and store 10 integers, where the file name and 10 values are given in the command line. (hint: convert the strings using atoi function) Now the program asks for an index and a value from the user and the value at that index should be changed to the new value in the file. (hint: use fseek function) The program should then read all 10 values and print them back.
5. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).
6. Write a C program to display first n characters of a file in reverse order.

**List of Equipment/Software (with Specifications or Range) Required:**

A Computer System with Ubuntu operating system and GCC Compiler

**References**

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice
4. Hall of India
5. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression)
6. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
7. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition

## MC107ES/MC207ES: ENVIRONMENTAL SCIENCE

<b>B.Tech. I Year II Semester</b>								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
<b>MC107ES/ MC207ES</b>	<b>MC</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		3	-	-	0	30	70	100
<b>Contact Classes: 45</b>	<b>Tutorial Classes: Nil</b>	<b>Practical Classes: Nil</b>			<b>Total Classes: 45</b>			
<b>Prerequisite:</b> Nil								
<b>Course Objectives:</b> <ul style="list-style-type: none"> <li>• Understanding the importance of ecological balance for sustainable development.</li> <li>• Understanding the impacts of developmental activities and mitigation measures.</li> <li>• Understanding the environmental policies and regulations</li> </ul>								
<b>Course Outcomes:</b> <ul style="list-style-type: none"> <li>• Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development</li> </ul>								
<b>Unit - 1</b>	<b>Ecosystems</b>							
<b>Ecosystems:</b> Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.								
<b>Unit - 2</b>	<b>Natural Resources &amp; Energy resources</b>							
<b>Natural Resources: Classification of Resources:</b> Living and Non-Living resources, <b>water resources:</b> use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. <b>Mineral resources:</b> use and exploitation, environmental effects of extracting and using mineral resources <b>Land resources:</b> Forest resources <b>Energy resources:</b> growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.								
<b>Unit - 3</b>	<b>Biodiversity And Biotic Resources</b>							
<b>Biodiversity And Biotic Resources:</b> Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.								
<b>Unit - 4</b>	<b>Environmental Pollution and Control Technologies</b>							
<b>Environmental Pollution and Control Technologies: Environmental Pollution:</b> Classification of pollution, <b>Air Pollution:</b> Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. <b>Water pollution:</b> Sources and types of pollution, drinking water quality standards. <b>Soil Pollution:</b> Sources and types, Impacts of modern agriculture, degradation of soil. <b>Noise Pollution:</b> Sources and Health hazards, standards, <b>Solid waste:</b> Municipal Solid Waste management, composition and characteristics of e- Waste and its management. <b>Pollution control technologies:</b> Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. <b>Global Environmental Issues and Global Efforts:</b> Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and								

desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

**Unit - 5**

**Environmental Policy, Legislation & EIA**

**Environmental Policy, Legislation & EIA:** Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).

**Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

**Text Books:**

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.  
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

**Reference Books:**

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt.Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS Publications.

**Web References:**

1. Fundamental concepts in Environmental Studies by Dr.D.DMishra
2. Basis of Environmental Science by Micheal Allaby

**E-Text Books:**

1. [ebook] A Text Book of environmental studies by Shashi Chawla - Meripustak.com
2. [ebook] A Text Book of environmental studies by Dr.D.K.Asthana <https://books.google.co.in>

## MC108/MC208: BUSINESS ENGLISH

<b>B.Tech. I Year II Semester</b>								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
<b>MC108/MC208</b>	MC	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>CIA</b>	<b>SEE</b>	<b>Total</b>
		2	0	0	0	30	70	100
<b>Contact Classes: 30</b>	<b>Tutorial Classes: -</b>	Practical Classes: Nil				Total Classes: 30		
<p><b>Prerequisite:</b> Knowledge of functional English, basics in grammar, understanding of LSRW skills</p> <p>Course Objectives: To teach students how to apply the knowledge of grammar in everyday usage, illustrate the significance of communication in professional life and emphasize the need to be a continuous learner in the context of globalization.</p> <p><b>Course Outcomes:</b> Students should be able to</p> <ol style="list-style-type: none"> <li>1. Use English Language effectively in spoken and written forms.</li> <li>2. Comprehend the given texts and respond appropriately in formal and informal situations.</li> <li>3. Communicate confidently in various contexts and different cultures.</li> <li>4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills to perform effectively in personal and professional contexts.</li> </ol>								
<b>Unit - 1</b>		<b>COMMUNICATION</b>						
<p><b>Reading:</b> Goal of Reading, General Strategies for Reading Comprehension, Previewing, Predicting, Identifying the main Idea, Questioning, Making Inferences, Visualizing</p> <p><b>Listening:</b> A conversation on phone, Listening to a travel anecdote</p> <p><b>Writing:</b> Filling in an application form, Writing emails</p> <p><b>Speaking:</b> Breaking the Ice, JAM sessions</p> <p>Vocabulary: Word Formation : Homophones, Homonyms, Homographs</p>								
<b>Unit - 2</b>		<b>DEVELOPMENT AND TRAINING</b>						
<p><b>Reading:</b> Reading between the Lines, Reading and answering a quiz</p> <p><b>Listening:</b> Listening to an Interview on Radio, A conversation between colleagues</p> <p><b>Writing:</b> Letters- responding to an invitation, letter of enquiry, letter of apology</p> <p><b>Speaking:</b> Role Play: How to make decisions, Giving the summary of an article, Descriptions</p> <p>Vocabulary: Synonyms and Antonyms, One-word substitutes</p>								
<b>Unit - 3</b>		<b>CORPORATE CULTURE</b>						
<p><b>Reading:</b> Reading beyond the lines, An article on the power of customers' opinions online</p> <p><b>Listening:</b> Working in Teams, Talking about Meetings</p> <p><b>Writing:</b> A memo asking for suggestions, Minutes of the meetings</p> <p><b>Speaking:</b> Discussion- How to make work place more ecofriendly?</p> <p>Vocabulary: Technical or business vocabulary, emails and website terms</p>								

<b>Unit - 4</b>	<b>BEING PERSUASIVE</b>
<p><b>Reading:</b> Reading for Negative Facts, the art of agreeing and disagreeing  <b>Listening:</b> What makes people persuasive, People negotiating a sale at a trade fair  <b>Writing:</b> A survey report, completing a business report  <b>Speaking:</b> Things that are important when making a presentation, short presentations  <b>Vocabulary:</b> Cohesive Devices or Linkers, Collocations</p>	
<b>Unit - 5</b>	<b>THINKING GLOBALLY</b>
<p><b>Reading:</b> Thinking outside the box, Reading and comparing two articles, Ways of using social media  <b>Listening:</b> Thinking Globally, Social Media and Customers, Netiquette  <b>Writing:</b> Mail for a Job application  <b>Speaking:</b> How to use social media for your professional enhancement  <b>Vocabulary:</b> Avoiding Clichés, Idioms and Phrases</p>	
<p><b>Reference Books:</b></p> <ol style="list-style-type: none"> <li>1. Swan, M. (2016). Practical English Usage. Oxford University Press.</li> <li>2. Kumar, S and Lata, P.(2018). Communication Skills. Oxford University Press.</li> <li>3. Wood, F.T. (2007).Remedial English Grammar.Macmillan.</li> <li>4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.</li> <li>5. Hamp-Lyons, L. (2006).Study Writing. Cambridge University Press.</li> <li>6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. OxfordUniversity Press.</li> </ol>	
<p><b>Web References:</b></p> <ol style="list-style-type: none"> <li>1. <a href="http://elt.oup.com/learningresources">elt.oup.com/learningresources</a></li> <li>2. <a href="http://www.cambridgeenglishonline.org">www.cambridgeenglishonline.org</a></li> <li>3. <a href="http://www.eslcafe.com">www.eslcafe.com</a></li> <li>4. <a href="http://bbc.co.uk/worldservice/learningenglish">bbc.co.uk/worldservice/learningenglish</a></li> <li>5. <a href="http://www.manythings.org">www.manythings.org</a></li> </ol>	
<p><b>E-Text Books:</b></p> <ol style="list-style-type: none"> <li>1. The secret to perfecting your grammar - Bloomsbury International</li> </ol>	