SYLLABUS IN CIVIL ENGINEERING

Department of Civil Engineering
Andhra University College of Engineering (Autonomous)
Visakhapatnam-530 003
Andhra Pradesh, India
ANDHRA UNIVERSITY  
VISAKHAPATNAM  
COMMON SCHEME OF INSTRUCTION & EXAMINATION  
I/IV B.E/B.TECH (FOUR YEAR COURSE) - SEMESTER SYSTEM  
(With effect from 2006-2007 admitted batch onwards)

**I & II SEMESTERS**

<table>
<thead>
<tr>
<th>CODE NO.</th>
<th>COURSE</th>
<th>Credits</th>
<th>Periods</th>
<th>Exam Hours</th>
<th>Sessional Marks</th>
<th>Exam Marks</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENG 1001</td>
<td>English</td>
<td>2</td>
<td>2+1</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1002</td>
<td>Mathematics – I</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1003</td>
<td>Mathematics – II</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1004</td>
<td>Physics Theory</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1005</td>
<td>Chemistry Theory</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1006</td>
<td>History of Science And Technology</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1007</td>
<td>Comp. Prog. And Num. Met4</td>
<td>4</td>
<td>3</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1008</td>
<td>Engineering Graphics</td>
<td>5</td>
<td>2+4</td>
<td>3</td>
<td>30</td>
<td>70</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1009</td>
<td>Physics Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1010</td>
<td>Chemistry Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1011</td>
<td>Workshop</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>ENG 1012</td>
<td>Programming Laboratory</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>50</td>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>37</strong></td>
<td><strong>39</strong></td>
<td><strong>440</strong></td>
<td><strong>760</strong></td>
<td><strong>1200</strong></td>
<td></td>
</tr>
</tbody>
</table>
The emphasis on English Language is enormously increasing as an effective medium of communication in all sectors the World over. As a consequence of this, the acquisition of effective communication skills in English has become most important to the students to flourish in their careers. In this connection there is a need to train the students to equip themselves with the necessary skills required for effective communication in English thereby enabling them to get a good placement immediately after the completion of their undergraduate courses. To meet the objectives of developing proficiency in English communication skills and developing Listening, Speaking, Reading and Writing (LSRW) skills. The following curriculum is designed for favorable consideration.

CURRICULUM : THEORY AND PRACTICE (LANGUAGE LAB)

1. **A TEXT WITH FOCUS ON SKILLS APPROACH**
   Intended to develop the language skills of Listening, Speaking, Reading and Writing.

2. **VOCABULARY**:
   a) One – Word Substitutes.
   b) Words often Confused – Pairs of Words.
   c) Synonyms and Antonyms.
   d) Foreign Phrases.
   e) Phrasal verbs derived from the following dynamic verbs_Go, Get, Run, Take, Look, Hold, Put, Stand Etc.
   f) Idioms and phrases.

3. **GRAMMAR**:
   a) Error Analysis
      - Correction of Errors in a given sentence – errors in the use of words – errors of indianisms – use of slang – errors in punctuation
   b) Concord
   c) Articles, Prepositions and words followed by prepositions.
   d) Tenses.

4. **Writing skills**:
   1. Précis writing
   2. Note Making
   3. Letter writing.
   5. Preparation of C.V and Resume writing.
   6. Reading Comprehension.
   7. Memo.
   8. Notices/Circulars Agenda and Minutes of a Meeting.
   9. E-Mail etiquette

**Text Book Prescribed**:
In order to improve the proficiency of the student in the acquisition of the above mention skills, the following texts and course content is prescribed.
(selected lessons)

The following lessons are prescribed from the above Text:

i) Astronomy (1)  
ii) Travel and Transport (3)  
iii) Humour (4)  
iv) Environment (6)  
v) Inspiration (7)  
vi) Human Interest (8)

Reference Books Prescribed :  
2. Margaret M Maison, Examine your English, Orient Longman
6. English for Technical Communication K.R Lakshminarayana, SCITECH.
ENG 1002 Mathematics-I

Lectures/week = 3
Exam=3 Hrs,

Sessional Marks =30
Exam. Marks = 70

Partial Differentiation and its applications:

Multiple integrals and their applications:

Solid geometry ( Vector Treatment ):  

Infinite series:  

Fourier series:
Euler’s formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, Change of interval, Odd and even functions – Expansions of odd or even periodic function. Half range series. Parsevel formula, Practical Harmonic analysis.

Text Books:  
1. Higher Engineering Mathematics by B.S.Grewal  

Reference Books:  
ENG 1003 Mathematics-II

Lectures/week = 3
Exam=3 Hrs,

Sessional Marks =30
Exam. Marks = 70

Linear Algebra:

Differential Equations Of First Order And Its Applications:

Linear Differential Equations:

Series solutions of differential equations:

Laplace transforms:

Text Books:
1. Theory of Matrices by Shantinarayanan.
2. Higher Engineering Mathematics by B.S. Grewal

Reference Books:
**ENG. 1004 Physics**

Lectures/week = 3  
Exam=3 Hrs,  
Sessional Marks =30  
Exam. Marks = 70

**Thermodynamics**

**Electromagnetism**
Concept of electric field – Point charge in electric field, dipole in an electric field. Gauss law, some applications, electric potential and field strength, potential due to a point charge and dipole.


**Optics**

Diffraction – Single slit (Qualitative and quantitative treatment).

Polarisation – Polarisation by reflection, refraction and double refraction in uniaxial crystals, Nicol prism, Quarter and Half wave plate, circular and elliptical polarization and detection.

**Lasers and Fibre Optics**
Spontaneous and stimulated emissions, population inversions, Ruby laser, Gas laser, Semiconductor laser, Applications of lasers.

Fibre Optics, Optical Fibre and Total Internal Reflection, Acceptance Angle and cone of a fibre, Fibre optics in communications, Optical parts in Fibre. Fibre Optic Sensors.

**Ultrasonics**
Production of Ultrasonics by Magnetostriction and Piezoelectric effects – Ultrasonics and diffraction pattern, Applications of Ultrasonics.

**Modern Physics**
The quantization of energy, Photoelectric effect, De Broglie concept of matter waves, uncertainty principle, Schrodinger wave equation, application to a particle in a box.
Elementary concepts of Maxwell-Boltzman, Bose-Einstein’s and Fermi Dirac Statistics. Fermi Dirac Distribution function (no derivations).

Free electron theory of metals, Band theory of solids, Kronig Penny Model, Metals, Insulators and Semiconductors. Ferroelectrics and their applications

Super conductivity, Meisner Effect, Types of Superconductors and Applications of Superconductors.

Nanophase materials – Synthesis, characterization of nanostructured materials, properties and applications.

Renewable energies – Solar, wind and tidal – Applications

**Books Recommended**
2. Physics by David Halliday and Robert Resnick – Part I and Part II
3. Modern Engineering Physics by A.S. Vadudeva
4. University Physics by Young and Freedman
5. Materials Science by V. Rajendra and A. Marikani
6. Nonconventional Energy by Ashoke V. Desai
ENG 1005 Chemistry

1. Water Chemistry and pollution:


**Water pollution**: Source – BOD – COD – Sewage treatment - preliminary, primary, secondary and tertiary.

**Air Pollution**: Source – Air pollutants – CO , SOx , NOx , Hydrocarbons and particulates. Acid rain – Green House effect – control of Air pollution (General).

2. Solid State Chemistry:


3. Energy Sources:


**Chemical Energy**: Electrode potential – Calomel electrode – Galvanic cells – primary secondary – Acid and alkaline cells – fuel cells.

**Nuclear Energy**: Fission and fusion – power reactors – Atomic pile applications .


4. Corrosion Chemistry :


5. Fuels and Lubricants:


**Lubricants**: Classification - mechanism - properties of lubricating oils - Selection of lubricants for Engineering applications.

6. Polymers and Plastics:

7. **Building Materials:**

**Portland Cement:** Manufacture - Dry and Wet process. Setting and hardening of cement - Cement concrete - RCC - Decay of concrete - special cements.

**Refractories:** Classifications - properties - Engineering applications.

**Ceramics:** Classification - Properties - uses.

**Prescribed Text Books**

5. Material Science and Engineering V. Raghavan - Prentice-Hall India Ltd.,
ENG 1006 History of Science and Technology

Lectures/week = 3
Exam=3 Hrs,
Sessional Marks =30
Exam. Marks = 70

1. Historical Perspective :

2. Polices and Plans After Independence :
Nehru’s vision of Science for Independent India, Science and Technology Developments in the New Era Science and Technology Developments during the Five Year Plan Periods and Science and Technology Policy Resolutions.

3. Research and Development (R&D) in India :

4. Science and Technological Developments in Major Areas :
Space – Objectives of Space Programms, Geostationary Satellite Services – INSAT System and INSAT Services Remote Sensing Applications, Launch Vehicle Technology
Defense Research --- Spin –off Technologies for Civilian Use;
Biotechnology--Applications of Biotechnology in – Medicine, Biocatalysts, Agriculture, Food, Fuel and Fodder, Development of Biosensors and Animal Husbandry;

5. Nexus Between Technology Transfer and Development :
Transfer of Technology—Types, Methods, Mechanisms, Process, Channels and Techniques: Appropriate Technology, Technology Assessment, Technological Forecasting, Technological Innovations and Barriers of Technological Change.

Test Books :
1. Kalpana Rajaram , Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi-58.

Reference Books :
ENG 1007 Computer Programming and Numerical Methods

Lectures/week = 3  
Exam=3 Hrs,  

Sessional Marks =30  
Exam. Marks = 70

Objectives:
To make the student familiar with programming in C and enable the student to implement the numerical methods described in this course using C as Programming Language

Section A

Computer Programming in C


Functions: Concept of a function – Parameters and how they are passed – Automatic Variables – Recursion – Scope and extent of variables. Writing programs using recursive and non-recursive functions.

Arrays and Strings: Single and multidimensional arrays-Character array as a string-Functions on strings. Writing C Programmes using arrays and for string manipulation.

Structures: Declaring and using structures-Operations on structures – Arrays of structures-User defined data types-Pointers to using files.


Section B

Computer Oriented Numerical Methods

2. Representation for Characters and Numbers: Representation for integer and real numbers. Effect of finite representation on arithmetic operations for example overflow, underflow, associativity and normalization. Some elementary methods for overcoming these limitations.
4. Solutions of simultaneous Algebraic Equations; Gauss elimination method and Gauss Seidal methods.
5. Interpolation: Lagrange’s Interpolation and difference table methods.

Books:
1. Section A: Programming with C by K.R.Venugopal & Sudeep R Prasad
2. Section B: Introduction to Numerical Methods by S.S Sastry
3. Elementary Numerical Methods by S.D.Conte

Reference:
1. C Programming Language by Kerningham & Ritchie
Introduction:
Drawing Instruments and uses. Lettering scales in common use.

Curves:
Curves used in Engineering Practice, conic sections, construction of conics by different methods, rectangular-hyperbola, cycloidal curves, trochoids, epi and hypo-cycloids. involutes and Archemedian spiral.

Orthographic Projections:
Projection of points, projection of straight lines, traces of a line, projection of planes and projection on auxiliary planes.

Solids and Developments:
Projection of solids in simple positions, projection of solids with axis inclined to one of the reference planes and parallel to the other, projection of solids with axis inclined to both the reference planes. Projection of spheres. Development of surfaces of solids. Development of transition piece connecting a square and circular pipe. Helices and screw threads.

Sections and Intersections:
Sections of different solids and true shape of sections. Intersection of surfaces-simple problems with cylinders, prisms and cones.

Isometric and Perspective Projections:

Textbook:
1. Elements of Engineering Drawing by N.D. Bhatt

Reference:
ENG 1009 Physics Laboratory

Practicals/week = 3
Exam=3 Hrs,

Sessional Marks =50
Exam. Marks = 50

12 of the following experiments must be completed:

1. Lee’s method - determination of coefficient of thermal conductivity of a bad conductor
2. Melde’s experiment - determination of the frequency of an electrically maintained tuning fork.
4. Diffraction grating - determination of wavelengths in mercury line spectrum using spectrometer
5. Determination of Cauchy’s constants using Spectrometer and mercury light.
6. Wedge method - det. of thickness of a paper by forming parallel interference fringes.
7. Michelson’s interferometer - a) det. of wavelength of light b) Resolution of spectral lines.
8. Det. of □□ using calcite crystal.
9. Optical Bench – a) Young’s double slit b) Lloyd’s mirror c) biprism d) diffraction at an edge e) Thickness of wire
11. Variation of magnetic field along the axis of current carrying circular coil – Stewart and Gee’s apparatus
12. Calibration of voltmeter using potentiometer
13. Carey Foster’s bridge a) laws of resistance b) temperature coefficient of resistance
15. Calendar and Barnes method – determination of specific heat of water
16. Hall effect – a) Determination of hall coefficient B) determination of charge density
17. Photoelectric effect – a) characteristics of photoelectric cell b) det. of Planck’s const.
18. Determination of Rydberg constant using hydrogen discharge tube
19. Determination of e/m of am electron – Thomson’s method
ENG 1010 Chemistry Laboratory

Practicals/week = 3
Exam=3 Hrs,

Sessional Marks =50
Exam. Marks = 50

List of Experiments:

01. Determination of Sodium Carbonate.
02. Determination of Sulfuric acid using a strong base.
03. Estimation of Iron (II) using Potassium Permanganate.
05. Determination of volume strength of Hydrogen Peroxide.
06. Estimation of Calcium in a sample of Portland cement.
07. Estimation of Chromium (VI) using Ferrous Ammonium Sulphate.
08. Estimation of Copper (II) using Sodium thiosulphate.
09. Analysis of Bleaching powder for Chlorine content.
11. Determination of hardness of a water sample (EDTA Method).
12. Determination of alkalinity of a water sample.

Demonstration Experiments:

14. Preparation of Copper pigment.
15. Preparation of Phenol-Formaldehyde resin.
17. Digital potentiometer.
ENG 1011 Workshop

Practicals/week = 3
Exam=3 Hrs,

Sessional Marks =50
Exam. Marks = 50

1. **Carpentry:**
Bench work, tools used in carpentry.
Jobs for class work – half lap joint, mortise and tenon joint, half –lap dovetail joint, corner dovetail joint, bridle joint.

2. **Sheet Metal:**
Tools used in sheet metal work. Laying developments of sheet metal jobs, soldering.
Jobs for class work – square tray, taper side tray, funnel, elbow pipe.

3. **Fitting:**
Tools used in fitting work. Different files, chisels, hammers and bench vice.
Jobs for class work – hexagon, rectangular, circular and triangular fits. External and internal threads with dies and taps.

**Reference**
1. Elements of Workshop technology, Vol.1 by S.K. and H.K. Hajra Choudary
1. Write a program to read x, y coordinates of 3 points and then calculate the area of a triangle formed by them and print the coordinates of the three points and the area of the triangle. What will be the output from your program if the three given points are in a straight line?

2. Write a program, which generates 100 random integers in the range of 1 to 100. Store them in an array and then print the arrays. Write 3 versions of the program using different loop constructs. (e.g. for, while, and do while)

3. Write a set of string manipulation functions e.g. for getting a sub-string from a given position, Copying one string to another, Reversing a string, adding one string to another.

4. Write a program which determines the largest and the smallest number that can be stored in different data types like short, int., long, float and double. What happens when you add 1 to the largest possible integer number that can be stored?

5. Write a program, which generates 100 random real numbers in the range of 10.0 to 20.0, and sort them in descending order.

6. Write a function for transposing a square matrix in place (in place means that you are not allowed to have full temporary matrix).

7. First use an editor to create a file with some integer numbers. Now write a program, which reads these numbers and determines their mean and standard deviation.

8. Given two points on the surface of the sphere, Write a program to determine the smallest arc length between them.

9. Implement bisection method to find the square root of a given number to a given accuracy.

10. Implement Newton Raphson method to det. a root of polynomial equation.

11. Given a table of x and corresponding f(x) values, write a program which will determine f(x) value at an intermediate x value using Lagrange’s interpolation.

12. Write a function which will invert a matrix.

13. Implement Simpson’s rule for numerical integration.


15. Write a program to solve a set of linear algebraic equations.