

**COURSE STRUCTURE**  
**for**  
**CIVIL ENGINEERING**  
**(B.Tech)**



**PRAGATI ENGINEERING COLLEGE**  
**(Autonomous)**

Permanently Affiliated to JNT University Kakinada and Approved by AICTE, New Delhi,

Accredited by NAAC with “A” Grade

Recognized by UGC 2(f) and 12(b) under UGC act, 1956

1-378, ADB Road, Surampalem – 533 437, Near Peddapuram, E.G.Dist., A.P.

**I Year – I Semester**

S. No.	Sub Code	Subject	L	T	P	C
1	16BH1T01	English – I	3	1	--	3
2	16BH1T03	Mathematics – I	3	1	--	3
3	16BH1T11	Engineering Chemistry	3	1	--	3
4	16CS1T01	Computer Programming using C	3	1	--	3
5	16ME1T01	Engineering Mechanics	3	1	--	3
6	16BH1T13	Environmental Studies	3	1	--	3
7	16BH1L01	English – Communication Skills Lab - I	--	--	3	2
8	16CS1L10	C Programming Lab	--	--	3	2
9	16BH1L05	Engineering/Applied Chemistry Lab	--	--	3	2
<b>Total Credits</b>						<b>24</b>

**I Year – II SEMESTER**

S. No.	Sub Code	Subject	L	T	P	C
1	16BH2T02	English – II	3	1	--	3
2	16BH2T04	Mathematics – II(Mathematical Methods)	3	1	--	3
3	16BH2T06	Mathematics – III	3	1	--	3
4	16ME2T02	Engineering Drawing	3	1	--	3
5	16ME2T03	Elements of Mechanical Engineering	3	1	--	3
6	16BH2T09	Engineering Physics	3	1	--	3
7	16ME2L01	Engineering Workshop & IT Workshop	--	--	3	2
8	16BH2L02	English – Communication Skills Lab - II	--	--	3	2
9	16BH2L03	Engineering/Applied Physics lab	--	--	3	2
10	16BH2L04	Engineering/Applied Physics-VirtualLab-Assignments	--	--	2	---
<b>Total Credits</b>						<b>24</b>



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**I Year I Semester**

**Subject Code: 16BH1T01**

**ENGLISH – I**

**Introduction:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students have to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering. As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed Textbooks are meant for extensive reading for pleasure and profit. Thus, the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

**Objectives:**

To improve the language proficiency of the students in English with emphasis on LSRW skills.

1. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
2. To develop the communication skills of the students in both formal and informal situations.

**LISTENING SKILLS:**

**Objectives:**

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

**SPEAKING SKILLS:**

**Objectives:**

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like role-plays, discussions and debates.
5. To make the students participate in Just a Minute talks.

**READING SKILLS:**

**Objectives:**

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.



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4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

**WRITING SKILLS:**

**Objectives:**

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

**Methodology:**

1. The classes are to be learner-centred where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

**DETAILED TEXTBOOKS:**

- *ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by Orient Blackswan Pvt Ltd*
- *THE COP AND THE ANTHEM BY O. HENRY PUBLISHED BY PERFECTION LEARNING*

**NON-DETAILED TEXTBOOK:**

- *-PANORAMA: A COURSE ON READING, Published by Oxford University Press India*

The course content along with the study material is divided into six units.

**UNIT I:**

1. 'Human Resources' from *English for Engineers and Technologists*.

**Objective:**

To develop human resources to serve the society in different ways.

**Outcome:**



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The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

2. *'An Ideal Family' from Panorama: A Course on Reading*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

**UNIT 2:**

1. *'Transport: Problems and Solutions' from English for Engineers and Technologists.*

Objective:

To highlight road safety measures whatever be the mode of transport.

Outcome:

The lesson motivates the public to adopt road safety measures.

2. *'War' from 'Panorama : A Course on Reading'*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

**UNIT 3:**

Unit 3 has two sections: Unit 3(A ) and 3(B )

**3(A):**

1. *'Evaluating Technology' from English for Engineers and Technologists.*

Objective:

To highlight the advantages and disadvantages of technology.

Outcome:

The lesson creates an awareness in the readers that mass production is ultimately survival.

2. *'The Verger' from 'Panorama : A Course on Reading'*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

*Unit 3(B )*

- 1. *THE COP AND THE ANTHEM BY O.HENRY*

Objective:

To enable students to develop interest in reading and appreciating short stories of different genres.

Outcome:

This lesson motivates students to respond and express the ideas and feelings in the story through oral, written and performative means.

**UNIT 4:**

1. *'Alternative Sources of Energy' from English for Engineers and Technologists.*

Objective:

To bring into focus different sources of energy as alternatives to the depleting sources.

Outcome:

The lesson helps to choose a source of energy suitable for rural India.



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2. '*The Scarecrow*' from *Panorama : A Course on Reading*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills.

**UNIT 5:**

1. '*Our Living Environment*' from *English for Engineers and Technologists*.

Objective:

To highlight the fact that animals must be preserved because animal life is precious.

Outcome:

The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. '*A Village Host to Nation*' from *Panorama : A Course on Reading*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

**UNIT 6:**

1. '*Safety and Training*' from *English for Engineers and Technologists*.

Objective:

To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

Outcome:

The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. '*Martin Luther King and Africa*' from *Panorama : A Course on Reading*

Objective:

To develop extensive reading skill and comprehension for pleasure and profit.

Outcome:

Acquisition of writing skills

**NOTE:**

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

**OVERALL COURSE OUTCOME:**

1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.
3. Gaining confidence in using English in verbal situations.



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**I Year I Semester**

**Subject Code: 16BH1T03**

**MATHEMATICS – I**

**Course Objectives:**

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

**Course Outcomes: At the end of the Course, Student will be able to:**

1. Determine rank, Eigenvalues and Eigen vectors of a given matrix and solve simultaneous linear equations.
2. Solve simultaneous linear equations numerically using various matrix methods.
3. Solve linear differential equations of first, second and higher order.
4. Calculate total derivative, Jacobian and minima of functions of two variables.

**UNIT I: Linear systems of equations**

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordan- Gauss Jacobi and Gauss Seidel methods.

**Applications:** Finding the current in electrical circuits.

**UNIT II: Eigen values - Eigen vectors**

Eigen values - Eigen vectors– Properties – Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization.

**Applications:** Free vibration of a two-mass system.

**UNIT III–Quadratic forms**

Quadratic forms Reduction of quadratic form to canonical form – Rank - Positive, negative and semi definite- Index – Signature.

**UNIT IV: Differential equations of first order and first degree**

Linear-Bernoulli-Exact-Reducible to exact.

**Applications:** Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

**UNIT V: Linear differential equations of higher order**

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type  $e^{ax}$ ,  $\sin ax$ ,  $\cos ax$ , polynomials in  $x$ ,  $e^{ax} V(x)$ ,  $x^m(x)$  – Method of Variation of parameters.

**Applications:** LCR circuit, Simple Harmonic motion.

**UNIT VI: Partial differentiation**



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Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and McLaurin's series expansion of functions of two variables - Jacobian- Functional dependence.  
**Applications:** Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

**Text Books:**

1. **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India

**Reference Books:**

1. **Micheael Greenberg**, Advanced Engineering Mathematics, 9th edition, Pearson edn
2. **Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
3. **Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
4. **Srimanta Pal, SubodhC.Bhunia**, Engineering Mathematics, Oxford University Press.
5. **Dass H.K., Rajnish Verma. Er**, Higher Engineering Mathematics, S.Chand Co.Pvt. Ltd, Delhi.





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**I year - I semester**

**Subject Code: 16BH111**

**ENGINEERING CHEMISTRY**

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

**UNIT I: HIGH POLYMERS AND PLASTICS**

Polymerisation:- Definition- Types of Polymers - Mechanism of polymerization- Stereo regular polymers- Methods of polymerization(emulsion and suspension)-Physical and Mechanical properties.

Plastics as engineering materials: advantages and limitations- Thermoplastics and Thermosetting plastics Compounding and fabrication (Compression, Injection, Extrusion and Blown Techniques )- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon, Poly methyl Methacrylate (PMMA) and polycarbonates

**Elastomers :-** Natural rubber- Disadvantages- Mastication - compounding and vulcanization - Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes - Applications of elastomers.

Composite materials & Fiber reinforced plastics - Biodegradable polymers - Conducting polymers.

Learning Objectives: Plastics are nowadays used in household appliances; They are also used as composites (FRP) in aerospace and automotive industries.

Outcomes: The advantages and limitations of plastic materials and their use in design would be understood.

**UNIT II: FUEL TECHNOLOGY**

Fuels – Definition –Classification - Characteristics of a good fuel - Calorific value - HCV and LCV - Dulong's formula - Bomb calorimeter – Numerical problems - Coal -- Proximate and Ultimate analysis and their Significance - Liquid fuels - Petroleum- Origin and Refining - Cracking - Synthetic petrol - Petrol knocking - Diesel knocking - Octane and Cetane ratings - Anti-knock agents - Power alcohol

– Bio diesel, Gaseous fuels: - Natural gas, LPG and CNG, Combustion - Calculation of air for the combustion of a fuel, Flue gas analysis – Orsat's apparatus - Numerical problems on combustion

Explosives:- Rocket fuels

Learning Objectives: Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence are introduced to create awareness on the topics.

Outcomes: Fuels which are used commonly and their economics, advantages and limitations can be understood by the students and create awareness on the topics.

**UNIT III: ELECTROCHEMICAL CELLS AND CORROSION**

Galvanic cells - Reversible and irreversible cells - Single electrode potential - Electro chemical series and uses of this series- Standard electrodes (Hydrogen ,Calomel and Glass electrode) - Concentration Cells - Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc - air cells.

Fuel cells: - Hydrogen Oxygen fuel cells - Methanol Oxygen fuel cells

Corrosion :- Definition - Theories of Corrosion (chemical & electrochemical) - Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion - Passivity of metals -Pitting corrosion – Corrosion under insulation -Galvanic series - Factors which



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influence the rate of corrosion –Protection from corrosion -Design and material selection - Cathodic protection - Protective coatings: - Surface preparation - Metallic (galvanizing and tinning) coatings - Methods of application on metals ( Electroplating, Electroless plating).

Learning Objectives: The basics for the construction of galvanic cells are introduced to have understanding on the concepts. Understanding on the concept of Corrosion and Mechanism of Corrosion with Theories like Electrochemical theory. .

Outcomes: Corrosion – its theories and controlling methods can create Understanding and awareness on the topic.

### **UNIT IV: CHEMISTRY OF ADVANCED MATERIALS**

Nano materials:- Introduction - Sol-gel method & chemical reduction method of preparation- Characterization by Brauner Emmett Teller(BET) method, Transmission Electron Microscope (TEM) and Scanning Electron Microscope (SEM)\_ methods - Carbon nano tubes : Types, preparation(*Laser ablation, Chemical vapour deposition methods*), properties and applications, Fullerenes.

Liquid crystals:- Introduction - Types - Applications

Super conductors:-Type -I, Type II - Characteristics and applications

Green synthesis:- Principles of Green Chemistry - Methods of synthesis (Aqueous Phase Method, Super Critical Fluid Extraction and Phase Transfer Catalysis) with examples - R<sub>4</sub>M<sub>4</sub> principles

Learning Objectives: With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced in

#### **Unit – IV.**

Outcomes: The students will have awareness on now aware of materials like nano materials and fullerenes and their applications. Study on liquid crystals and superconductors can create Understanding for their applications in various fields. The importance of green synthesis create better Understanding for application and also can create better Understanding compared to conventional methods is also explained.

### **UNIT V: WATER TECHNOLOGY**

Hard water:- Reasons for hardness - units of hardness - determination of hardness and alkalinity - Water for steam generation - Boiler troubles - Priming and Foaming, Scale formation, Boiler corrosion, Caustic embrittlement - Internal treatments - Softening of Hard water : Lime - Soda process, Zeolite process and numerical problems based on these processes and Ion Exchange process - Water for drinking purposes Purification - Sterilization and disinfection : Chlorination, Break point chlorination and other methods - Reverse Osmosis and Electro Dialysis.

Learning Objectives: Water is necessary in almost all the industries, more so where steam is generated and also where it is supplied for drinking purposes. Problems associated with Water quality Methods to be used to Control or remove the Hardness

Outcomes: The impurities present in raw water, problems associated with them and how to eliminate them can be understood.

### **UNIT VI: CHEMISTRY OF ENGINEERING MATERIALS**

Refractories: - Definition, classification, characteristics (Thermal conductivity, Porosity, Refractoriness, Refractoriness under load) and failures



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Lubricants: - Definition, function, *Types of lubricants*, properties (Definition and importance)

Cement: - Constituents, manufacturing, hardening and setting, decay of concrete.

*Bio Materials*:- Definition – Characteristics- Applications

Insulators: - Thermal and electrical insulators

Learning Objectives: Materials used in major industries like steel industry, metallurgical industries and construction industries and electrical equipment manufacturing industries are introduced with a Special emphasis on Refractories, Lubricants, Cement, Insulators, Bio materials and fuel cells.

Outcomes: The advantages and limitations of plastic materials and their use in design would be understood. Awareness on commonly used industrial materials can create better Understanding on the Usage of Materials Used for various applications.

**Text Books:**

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

**Reference Books:**

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM



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**I Year - I Semester**

**Subject Code: 16CS1T01**

**COMPUTER PROGRAMMING USING C**

**Learning objectives:**

Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

**UNIT-I:**

**History and Hardware** - Computer Hardware, Bits and Bytes, Components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

**UNIT-II:**

**Introduction to C Programming-** Identifiers, The main () Function, The printf () Function  
**Programming Style** - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

**Assignment** - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

**UNIT -III:**

**Control Flow-Relational Expressions - Logical Operators:**

**Selection:** if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

**Repetition:** Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, while Statement, for Statement, Nested Loops, do-while Statement.

**UNIT-IV**

**Modular Programming:** Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function.

**Case Study:** Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.



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**UNIT-V:**

**Arrays & Strings**

**Arrays:** One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays- Matrices.

**Strings:** String Fundamentals, String Input and Output, String Processing, Library Functions

**UNIT-VI:**

**Pointers, Structures, Files**

**Pointers:** Concept of a Pointer, Initialization of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

**Structures:** Derived types, Structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, typedef, bit-fields.

**Data Files:** Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

**Outcomes:**

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

**Text Books:**

1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
2. Programming in C, B. L. Juneja, Anita Seth, Cengage Delmar Learning India Pvt.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

**Reference Books:**

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, R S Bichkar, University Press, 2012.
3. Programming in C, Reema Thareja, Oxford.
4. C by Example, Noel Kalicharan, Cambridge University Press.

**URLs**

1. <http://nptel.ac.in/courses/106104128/>
2. <http://students.iitk.ac.in/programmingclub/course/#notes>
3. <http://c-faq.com/~scs/cclass/cclass.html>
4. <http://www.youtube.com/watch?v=b00HsZvg-V0&feature=relmfu>
5. <http://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-087-practical-programming-in-c-january-iap-2010/>



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**I Year - I Semester**

**Subject Code: 16ME1T01**

**ENGINEERING MECHANICS**

**Objectives:** The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

**UNIT – I**

**Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.**

Introduction to Engg. Mechanics – Basic Concepts.

**Systems of Forces:** Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

**Friction:** Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction, Problems on wedges.

**UNIT II**

**Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.**

**Equilibrium of Systems of Forces:** Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.

**UNIT – III**

**Objectives : The students are to be exposed to concepts of centre of gravity.**

**Centroid:** Centroids of simple figures (from basic principles ) – Centroids of Composite Figures

**Centre of Gravity:** Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

**UNIT IV**

**Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.**

**Area moments of Inertia:** Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia.

**Mass Moment of Inertia:**

Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

**UNIT – V**

**Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.**



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**Kinematics:** Rectilinear and Curvilinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies, Principle of virtual work.

**UNIT – VI**

**Objectives: The students are to be exposed to concepts of work, energy and particle motion**

**Work – Energy Method:** Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method., Law of conservation of momentum

**TEXT BOOKS :**

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.
2. Engg. Mechanics - S. S. Bhavikatti, New Age International.

**REFERENCES :**

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics, statics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics, statics and dynamics – I.H.Shames, – Pearson Publ.
4. Mechanics For Engineers, statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
5. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston –5th Edn Mc Graw Hill Publ.
6. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum’s outline series - Mc Graw Hill Publ.
7. Singer's Engineering Mechanics: Statics And Dynamics, K. Vijay Kumar Reddy, J.Suresh Kumar, Bs Publications
8. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson , Mc Graw Hill publications
10. [http://nptel.ac.in/courses/Webcourse-contents/IIT-ANPUR/engg\\_mechanics/ui/Course\\_home\\_3.htm](http://nptel.ac.in/courses/Webcourse-contents/IIT-ANPUR/engg_mechanics/ui/Course_home_3.htm)
11. <http://nptel.ac.in/courses/122104015/>
12. <https://www.youtube.com/watch?v=LG0YzGeAFxk>



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**I year - I semester**

**Subject Code: 16BH1T13**

**ENVIRONMENTAL STUDIES**

**UNIT – I**

Course Learning Objectives: Basic understanding of the environment, global problems and ecosystems.  
Course Outcomes: The importance of environment and global environmental problems. The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web.

**Multidisciplinary nature of Environment and Ecology:** Definition, Scope and Importance, *Introduction to Brief works of noted Environmentalists & Naturalists (Wangari Mathai, Salim Ali and Sunderlal Bahuguna)*, Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

**Ecosystems:** Concept of an ecosystem, Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. Classification of ecosystems- characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems: Estuaries and Mangroves

**UNIT – II**

Course Learning Objectives: Overall understanding of the natural resources

Course Outcomes: The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.

**Natural Resources:** Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Laterite, Coal, Sea and River sands.

Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

**UNIT – III**

Course Learning Objectives: Basic understanding of Biodiversity.

Course Outcomes: The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity

**Biodiversity and its conservation:** Definition: genetic, species and ecosystem diversity-classification - Value of biodiversity: consumptive use, productive use, social-Biodiversity at national and local levels.





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India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity.

**UNIT – IV**

Course Learning Objectives: Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities

Course Outcomes: Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, *Heavy Metal pollution*, Soil pollution, Noise pollution, Radioactive pollution: Sources and risks. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Style, Impact of Fire Crackers on Man and his well being.

**Solid Waste Management:** Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e - waste management.

**UNIT – V**

Course Learning Objectives: Awareness on the social issues, environmental legislation and global treaties

Course Outcomes: Social issues both rural and urban environment and the possible means to combat the challenges. The environmental legislations of India and the first global initiatives towards sustainable development.

**Social Issues and the Environment:** Urban problems related to energy -Water conservation- *Coastal Regulatory zone management*, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air(Prevention and Control of Pollution) Act. Water (Prevention and control of Pollution) Act - Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

**UNIT – VI**

Course Learning Objectives: An understanding of the environmental impact of developmental activities

Course Outcomes: About environmental assessment and the stages involved in EIA and the environmental audit. Self Sustaining Green Campus with Environment Friendly aspect of – Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking & Curriculum.

**Environmental Management:** Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. *Environmental Modeling: Definition (Box Model and Gaussian Plume Modeling)*, Ecotourism, Green Campus – Green business, Green politics and *Green Building*.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.



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**TEXT BOOKS:**

1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada
2. Environmental Studies, R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
3. Environmental Studies, P.N. Palanisamy, P. Manikandan, A. Geetha, and K.Manjula Rani;  
Pearson Education, Chennai

**REFERENCE:**

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi
4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014
5. Environmental pollution, Monitoring and Control by Khopkar.S.M, New Age Publishers.
6. *A Text Book of Fundamentals of Ecology, E.P.Odam, Philadelphia: W.B. Saunders Company.*



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**I Year - I Semester**

**Subject Code:16BH1L01**

**ENGLISH - COMMUNICATION SKILLS LAB- I**

**PRESCRIBED LAB MANUAL FOR SEMESTER I:**

*'INTERACT: English Lab Manual for Undergraduate Students'*, Published by Orient Black swan Pvt Ltd.

**Objectives:**

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

**Outcome:**

A study of the communicative items in the laboratory will help the students become successful in the competitive world. The course content along with the study material is divided into six units.

**UNIT 1:**

1. WHY study Spoken English?
2. Making Inquiries on the phone, thanking and responding to Thanks -- Practice work.

**UNIT 2:**

1. Responding to Requests and asking for Directions -- Practice work.

**UNIT 3:**

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing -- Practice work.

**UNIT 4:**

1. Letters and Sounds -- Practice work.

**UNIT 5:**

1. The Sounds of English -- Practice work.

**UNIT 6:**

1. Pronunciation
2. Stress and Intonation -- Practice work

**Reference Books:**

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education



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**I Year - I Semester**

**Subject Code:16CS1L10**

**C PROGRAMMING LAB**

**OBJECTIVES:**

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures a File programming.
- Acquire knowledge about the basic concept of writing a program.
- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.
- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.
- Role of Functions involving the idea of modularity.

**Programming**

**Exercise - 1 Basics**

- a) What is an OS Command, Familiarization of Editors - vi, Emacs
- b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man
- c) Write a C Program to perform Adding, Subtraction, Multiplication and Division of two numbers from Command line

**Exercise - 2 Basic Math**

- a) Write a C Program to Simulate 3 Laws at Motion
- b) Write a C Program to convert Celsius to Fahrenheit and vice versa

**Exercise - 3 Control Flow - I**

- a) Write a C Program to Find Whether the Given Year is a Leap Year or not.
- b) Write a C Program to Add Digits & Multiplication of a number

**Exercise – 4 Control Flow - II**

- a) Write a C Program to Find Whether the Given Number is
  - i. Prime Number
  - ii. Armstrong Number
- b) Write a C program to print Floyd Triangle
- c) Write a C Program to print Pascal Triangle

**Exercise – 5 Functions**

- a) Write a C Program demonstrating of parameter passing in Functions and returning values.
- b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

**Exercise – 6 Control Flow - III**

- a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch...case
- b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

**Exercise – 7 Functions - Continued**



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Write a C Program to compute the values of  $\sin x$  and  $\cos x$  and  $e^x$  values using Series expansion. (use factorial function)

**Exercise – 8 Arrays**

Demonstration of arrays

- a) Search-Linear.
- b) Sorting-Bubble, Selection.
- c) Operations on Matrix.

**Exercises - 9 Structures**

- a) Write a C Program to Store Information of a Movie Using Structure
- b) Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
- c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

**Exercise - 10 Arrays and Pointers**

- a) Write a C Program to Access Elements of an Array Using Pointer
- b) Write a C Program to find the sum of numbers with arrays and pointers.

**Exercise – 11 Dynamic Memory Allocations**

- a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
  - b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.
- Understand the difference between the above two programs.

**Exercise – 12 Strings**

- a) Implementation of string manipulation operations **with** library function.
  - i) copy
  - ii) concatenate
  - iii) length
  - iv) compare
- b) Implementation of string manipulation operations **without** library function.
  - i) copy
  - ii) concatenate
  - iii) length
  - iv) compare

**Exercise -13 Files**

- a) Write a C programming code to open a file and to print its contents on screen.
- b) Write a C program to copy files

**Exercise - 14 Files Continue**

- a) Write a C program merges two files and stores their contents in another file.
- b) Write a C program to delete a file.



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**OUTCOMES:**

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
- Analysing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Understand and apply the in-built functions and customized functions for solving the problems.
- Understand and apply the pointers, memory allocation techniques and use of files for dealing with variety of problems.
- Document and present the algorithms, flowcharts and programs in form of user-manuals
- Identification of various computer components, Installation of software

**Note:**

- a) All the Programs must be executed in the Linux Environment. (Mandatory)**
- b) The Lab record must be a print of the LATEX (.tex) Format.**



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**I year - I semester**

**Subject Code: 16BH1L05**

**ENGINEERING/APPLIED CHEMISTRY LAB**

1. Introduction to chemistry laboratory – Molarity, Normality, Primary, Secondary standard solutions, Volumetric titrations, Quantitative analysis, Quantitative analysis etc.,
2. Trial experiment – Estimation of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solutions
3. Estimation of KMnO<sub>4</sub> using standard Oxalic acid solution.
4. Estimation of Ferric iron using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution
5. Estimation of Copper using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
6. Estimation of Total Hardness water using standard EDTA solution.
7. Estimation of Copper using standard EDTA solution.
8. Estimation of Copper using Colorimeter
9. Estimation of pH of the given sample solution using pH meter.
10. Conductometric Titrations between strong acid and strong base
11. Conductometric Titrations between strong acid and Weak base
12. Potentiometric Titrations between strong acid and strong base
13. Potentiometric Titrations between strong acid and Weak base
14. Estimation of Zinc using standard potassium ferrocyanide solution
15. Estimation of Vitamin – C

**STANDARD BOOKS :**

1. Dr. Jyotsna Cherukuis (2012) Laboratory Manual of Engineering Chemistry-II, VGS Techno Series
2. Chemistry Practical Manual, Lorven Publications
3. K. Mulkanti (2009) Practical Engineering Chemistry, B.S. Publication



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**I year - II semester**

**Subject Code: 16BH2T02**

**ENGLISH-II**

**Introduction:**

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students have to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The non-detailed Textbooks are meant for extensive reading for pleasure and profit. Thus the stress in the syllabus is primarily on the development of communicative skills and fostering of ideas.

**Objectives:**

1. To improve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

**LISTENING SKILLS**

**Objectives:**

1. To enable the students to appreciate the role of listening skill and improve their pronunciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

**SPEAKING SKILLS**

**Objectives:**

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like role-plays, discussions and debates.
5. To make the students participate in Just a Minute talks.

**READING SKILLS**

**Objectives:**

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.





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**WRITING SKILLS**

**Objectives:**

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

**Methodology:**

1. The classes are to be learner-centred where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher intervention is permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches) of Pragati Engineering College, Surampalem from the academic year 2016-17 (R-16 Regulations)

**DETAILED TEXTBOOK:**

- *ENGLISH ENCOUNTERS* Published by Maruthi Publishers.
- A BETTER INDIA, A BETTER WORLD by N.R. Narayana Murthy, Published by: Penguin Books India Pvt. Ltd.

**DETAILED NON-DETAIL:**

- *THE GREAT INDIAN SCIENTISTS*, Published by Cengage learning

The course content along with the study material is divided into six units.

**UNIT 1:**

1. 'The Greatest Resource- Education' from *English Encounters*

Objective:

Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.



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Outcome:

The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. '*A P J Abdul Kalam*' from *The Great Indian Scientists*.

Objective:

The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

Outcome:

Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

**UNIT 2:**

1. '*A Dilemma*' from *English Encounters*

Objective:

The lesson centres on the pros and cons of the development of science and technology.

Outcome:

The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. '*C V Raman*' from *The Great Indian Scientists*.

Objective:

The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

Outcome:

The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

**UNIT 3:**

*Unit 3 has two sections: Unit 3(A) and 3(B)*

**3 (A)**

1. '*Cultural Shock*': *Adjustments to new Cultural Environments* from *English Encounters*.

Objective:

The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences

Outcome:

The lesson imparts the students to manage different cultural shocks due to globalization.

2. '*Homi Jehangir Bhabha*' from *The Great Indian Scientists*.

Objective:

The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear program as architect.

Outcome:

The seminal contributions of Homi Jehangir Bhabha to Indian nuclear program provide an aspiration to the readers to serve the nation and strengthen it.

Unit 3 (B)

1. 'What can we learn from West?' from *A Better India, A Better World*

Objective:

To enable students to appreciate the differences in cultural perspectives.

Outcome:

This lesson motivates students to develop a multicultural outlook and appreciate the diverse cultures.

**UNIT 4:**

1. '*The Lottery*' from *English Encounters*.

Objective:



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The lesson highlights insightful commentary on cultural traditions.

Outcome:

The theme projects society's need to re examine its traditions when they are outdated.

2. '*Jagadish Chandra Bose*' from *The Great Indian Scientists*.

Objective:

The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

Outcome:

The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

**UNIT 5:**

1. '*The Health Threats of Climate Change*' from *English Encounters*.

Objective:

The essay presents several health disorders that spring out due to environmental changes

Outcome:

The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. '*Prafulla Chandra Ray*' from *The Great Indian Scientists*.

Objective:

The lesson given is an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

Outcome:

Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

**UNIT 6:**

1. '*The Chief Software Architect*' from *English Encounters*

Objective:

The lesson supports the developments of technology for the betterment of human life.

Outcome:

Pupil gets inspired by eminent personalities who toiled for the present day advancement of software development.

2. '*Srinivasa Ramanujan*' from *The Great Indian Scientists*.

Objective:

The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

Outcome:

The lesson provides inspiration to the readers to think and tap their innate talents



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**I year - II semester**

**Subject Code: 16BH2T04**

**MATHEMATICS – II**  
**(Mathematical Methods)**

**Course Objectives:**

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

**Course Outcomes:At the end of the Course, Student will be able to:**

1. Solve the numerical problems which will be the platform for engineering problems.
2. Determine Fourier series, Fourier Transforms of the given functions.
3. Solving the higher order partial differential equations.

**UNIT I: Solution of Algebraic and Transcendental Equations**

Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (Onevariable and simultaneous Equations).

**UNIT II: Interpolation**

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences- Backward differences –Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.

**UNIT III: Numerical Integration and solution of Ordinary Differential equations**

Trapezoidal rule- Simpson's 1/3rd and 3/8th rule-Solution of ordinary differential equations by Taylor's series Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

**UNIT IV: Fourier Series**

Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

**UNIT V: Fourier Transforms**

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

**UNIT VI: Partial Differential Equations**

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations. Classification of second order partial differential equations.

**Applications:** Method of separation of Variables- Solution of One dimensional Wave, Heat and twodimensional Laplace equations.



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**Text Books:**

1. **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

**Reference Books:**

1. **Dean G. Duffy**, Advanced engineering mathematics with MATLAB, CRC Press
2. **V.Ravindranath and P.Vijayalakshmi**, Mathematical Methods, Himalaya Publishing House.
3. **David Kincaid, Ward Cheney**, Numerical Analysis-Mathematics of Scientific Computing, 3rd Edition, Universities Press.
4. **Srimanta Pal, Subodh C. Bhunia**, Engineering Mathematics, Oxford University Press.
5. **Dass H.K., Rajnish Verma. Er.**, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.



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**I year - II semester**

**Subject Code: 16BH2T06**

**MATHEMATICS – III**

**Course Objectives:**

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

**Course Outcomes: At the end of the Course, Student will be able to:**

1. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
2. Determine double integral over a region and triple integral over a volume.
3. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

**UNIT I: Laplace transforms**

Laplace transforms of standard functions - Shifting theorems - Transforms of derivatives and integrals – Unit step function – Dirac's delta function.

**UNIT II: Inverse Laplace transforms**

Inverse Laplace transforms – Shifting Theorems - Transforms of derivatives and integrals - Convolution theorem (without proof).

**Applications:** Solving ordinary differential equations (initial value problems) using Laplace transforms.

**UNIT III: Multiple integrals**

Curve tracing: Cartesian, Polar and Parametric forms.

Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.

**Applications:** Finding Areas and Volumes.

**UNIT IV: Special functions**

Beta and Gamma functions - Properties - Relation between Beta and Gamma functions - Evaluation of improper integrals.

**Applications:** Evaluation of integrals.

**UNIT V: Vector Differentiation**

Gradient - Divergence - Curl - Laplacian and second order operators - Vector identities.

**Applications:** Equation of continuity, potential surfaces

**UNIT VI: Vector Integration**

Line integral – Work done – Potential function – Area - Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.



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**Applications:** Work done, Force.

**Text Books:**

1. **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.
3. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.

**Reference Books:**

1. **Greenberg**, Advanced Engineering Mathematics, 2nd edition, Pearson edn
2. **Peter O'Neil**, Advanced Engineering Mathematics, 7th edition, Cengage Learning.
3. **D.W. Jordan and T.Smith**, Mathematical Techniques, Oxford University Press.
4. **Srimanta Pal, Subodh C. Bhunia**, Engineering Mathematics, Oxford University Press.
5. **Dass H.K., Rajnish Verma. Er.**, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.



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**I year - II semester**

**Subject Code: 16ME2T02**

**ENGINEERING DRAWING**

**Objective:** Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

**Unit I**

**Objective:** To introduce the students to use drawing instruments and to draw polygons, Engineering Curves.

**Polygons:** Constructing regular polygons by general methods, inscribing and describing polygons on circles.

**Curves:** Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

**Unit II**

**Objective:** To introduce the students to use scales and orthographic projections, projections of points.

**Scales:** Plain scales, diagonal scales and vernier scales

**Orthographic Projections:** Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants. Projections of lines, lines parallel either to the reference planes (HP, VP or PP)

**Unit III**

**Objective:** The objective is to make the students draw the projections of simple lines inclined to one or both the planes.

Projections of lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT.

**Unit IV**

**Objective:** The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

**Unit V**

**Objective:** The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

**Unit VI**

**Objective:** The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views, Conversion of orthographic views to isometric views.





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**TEXT BOOKS:**

1. Engineering Drawing by N.D. Bhatt, Chariot Publications
2. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age International

**REFERENCE BOOKS:**

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers
5. <http://nptel.ac.in/courses/112103019/>
6. <http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html>
7. <http://www.engineeringdrawing.org>

**Course Outcomes:**

- Provides the students with a background in descriptive geometry, orthographic & isometric projection, engineering drawing techniques. Points, lines and plane relationships in projection, multi-view engineering drawings, basic dimensioning, engineering applications.
- Student's ability to perform basic sketching techniques will improve. Students will be able to draw orthographic projections.
- Student's ability to convert sketches to engineered drawings will increase.



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**I year - II semester**

**Subject Code: 16ME2T03**

**ELEMENTS OF MECHANICAL ENGINEERING**

**Learning Objectives:** The content of this course shall provide the student the basic concepts of various mechanical systems and exposes the student to a wide range of equipment and their utility in a practical situation. It shall provide the fundamentals of Steam, I.C. Engines, compressors, manufacturing methods and transmission systems that usually exist in engineering.

**UNIT –I:**

Steam boilers: Classification of boilers, essentialities of boilers, selection of different types of boilers, study of boilers, boiler mountings and accessories. Performance of boilers. Working principle of steam turbines.

**UNIT-II:**

Metal joining: arc welding, resistance welding, gas welding, brazing and soldering

Metal forming: forging – operations, rolling and extrusion principles

Machine tools: lathe classification, specifications, and operations.

Casting: Steps involved in making a casting – Advantages and applications. – Patterns and Pattern making

**UNIT-III:**

Reciprocating and rotary air compressors: uses of compressed air, types, working principle, work done, simple problems.

Refrigeration: concepts, principle of refrigeration and types of refrigeration.

**UNIT-IV:**

Internal combustion engines: classification of IC engines, basic engine components and nomenclature, working principle of engines, Four strokes and two stroke petrol and diesel engines, comparison of CI and SI engines, comparison of four stroke and two stroke engines, simple problems such as indicated power, brake power, friction power, specific fuel consumption, brake thermal efficiency, indicated thermal efficiency and mechanical efficiency.

**UNIT-V:**

Belts –Ropes and chains: belt and rope drives, velocity ratio, slip, length of belt , open belt and cross belt drives, ratio of friction tensions, centrifugal tension in a belt, power transmitted by belts and ropes, initial tensions in the belt, simple problems.

**Unit VI**

Gears: classification of gears, gear ratio, law of gearing, gear profiles, applications.

Gear trains: classification of gears, gear trains velocity ratio, simple, compound and reverted gear trains and simple problems.



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**Outcomes:**

- After completing the course, the student shall be able to understand the applications of different mechanical elements and manufacturing processes.
- The performance of components like Boiler, I.C Engine, Compressors.
- Power transmission by belt, rope, chain and gear trains.

**Text Books:**

1. Mechanical Engineering Science K R Gopala Krishna, Subhas publications
2. Thermal Engineering, Ballaney,P.L., Khanna Publishers, 2003
3. Elements of Mechanical Engineering, A.R.Asrani, S.M.Bhatt and P.K.Shah, B.S. Publs.
4. Elements of Mechanical Engineering, M.L.Mathur, F.S.Metha & R.P.Tiwari Jain Brothers Publs., 2009.
5. Production Technology by P.N.Rao by I & II McGraw-Hill publications

**Reference Book:**

1. Theory of Machines, S.S. Rattan, Tata McGraw Hil , 2004 & 2009.



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**I year - II semester**

**Subject Code: 16BH2T09**

**ENGINEERING PHYSICS**

**COURSE OBJECTIVES:** Physics curriculum which is re-oriented to the needs of non Circuital branches of graduate engineering courses.. That serves as a transit to understand the branch specific advanced topics. The courses are designed to:

- Impart concepts of Optical Interference, Diffraction and Polarization required to design instruments with higher resolution - Concepts of coherent sources, its realization and utility optical instrumentation.
- Study the Structure-property relationship exhibited by solid crystal materials for their utility.
- Tap the Simple harmonic motion and its adaptability for improved acoustic quality of concert halls.
- To explore the Nuclear Power as a reliable source required to run industries
- To impart the knowledge of materials with characteristic utility in appliances.

**UNIT-I**

***Objective: To impart knowledge on interference phenomenon and utilising it to design of instruments in Engineering applications.***

***Outcome: The students will learn to apply the concepts of interference undergo analysis of optical effects and contribute to engineering applications.***

**INTERFERENCE:** Introduction-Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry)- Interference in wedge shaped films – Newton’s rings –working principle of Interferometer, applications

**UNIT-II**

***Objective: To impart knowledge on diffraction phenomenon to design optical instruments for Engineering applications.***

***Outcome: The students will learn to study diffraction pattern of light to utilize in the analysis of the materials and their properties.***

**DIFFRACTION:** Introduction -Fraunhofer diffraction at single slit - Cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes- applications.

**UNIT-III**

***Objective:***

- ***To impart knowledge on types of polarization, types of polarizing materials and their effects to study and design of optical instruments.***
- ***To impart knowledge on the lasers & their working principle***

***Outcome: The students will learn polarization phenomenon, Lasers and their practical implications in engineering applications.***

**POLARIZATION:** Introduction -Types of Polarization – Methods of production – double refraction-Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polari meter (Sacharimeter)-applications.

**LASERS:** Introduction- Characteristics– Stimulated emission – Einstein’s Transition Probabilities- Pumping schemes - Ruby laser – Helium Neon laser-applications of lasers



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**UNIT-IV**

**Objective:** *To impart knowledge on fundamentals of acoustic principles & methods of production of Ultrasonic waves and study their practical applications.*

**Outcome:** *The student will learn the basics of architectural acoustics for structural designing & production of Ultrasonic waves for practical applications.*

**ACOUSTICS:** Introduction- Acoustics of concert hall- . Reverberation time – Sabine’s formula - Absorption Coefficient and its Measurement- Effecting factors and Remedies.

**ULTRASONICS:** Introduction -Production by Magnetostriction & Piezo electric effect- Detection Methods- Ultrasonic transducers -Non Destructive Testing-Applications.

**UNIT-V**

**Objective:** *To impart knowledge on study of structure of materials, property relationship exhibited by the solid state materials for their utility and to explore the nuclear power as a reliable source required to run industries*

**Outcomes.**

- *The students will learn the structures and properties of solid state materials.*
- *The students will learn the fundamentals of Nuclear Physics & production of nuclear energy using technology.*

**CRYSTALLOGRAPHY & X-RAY DIFFRACTION:** Introduction-Basis and lattice – Unit cell - Coordination number -Bravais lattice-Crystal Systems- Packing fractions –Crystal directions and planes-Miller indices – Separation between successive (h k l) planes – Bragg’s law - Bragg’s X-ray spectrometer.

**NUCLEAR ENERGY – SOURCE OF POWER:** Mass defect & Binding Energy – Fusion and Fission as sources – Fast breeder Reactors.

**UNIT-VI**

**Objective:** *To impart knowledge on materials with characteristic utility in appliances.*

**Outcome:** *The students will learn effects of magnetic & dielectric properties of materials & will apply such materials in various applications of engineering.*

**MAGNETISM:** Introduction-Basics of Magnetism-Origin of Magnetic Moment -Classification of Magnetic Materials- Weiss theory-Domain Theory-Hysteresis- Eddy Current Losses- -Hard and soft Magnetic materials- applications

**DIELECTRICS:** Electric Polarization – Dielectrics in DC and AC fields – Internal field – Clausius - Mosotti Equation - Loss, Breakdown and strength of dielectric materials – Ferroelectric Hysteresis and applications.

**COURSE OUTCOME:** *Construction and working details of instruments, ie., Interferometer, Diffract meter and Polarimeter are learnt. Study Acoustics, crystallography magnetic and dielectric materials enhances the utility aspects of materials.*

**Text Books:**

1. *A Text book of Engineering Physics – by Dr. M.N.Avadhanulu and Dr.P.G.Kshirasagar, S.Chand & Company Ltd., (2014)*
2. *Physics for Engineers by M.R.Srinasan, New Age international publishers (2009)*

**Reference books:**

1. *Physics by Resnick, Halliday & Krane, Volume I & II, John Wiley & sons (2002)*
2. *Engineering Physics by D.K. Bhattacharya and Poonam Tandon, Oxford press (2015)*
3. *Applied Physics by P.K. Palanisamy, Scitech publications (2014)*
4. *Lasers and Non-Linear optics by B.B. Laud, Newage international publishers (2008)*



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**I year - II semester**

**Subject Code: 16ME2L01**

**ENGINEERING WORKSHOP & IT WORKSHOP**

**ENGINEERING WORKSHOP:**

**Course Objective:** To impart hands-on practice on basic engineering trades and skills.

**Note:** At least two exercises to be done from each trade.

**Trade:**

**Carpentry**

1. T-Lap Joint
2. Cross Lap Joint
3. Dovetail Joint
4. Mortise and Tenon Joint

**Fitting**

1. V Fit
2. Square Fit
3. Half Round Fit
4. Dovetail Fit

**Black Smithy**

1. Round rod to Square
2. S-Hook
3. Round Rod to Flat Ring
4. Round Rod to Square headed bolt

**House Wiring**

1. Parallel / Series Connection of three bulbs
2. Stair Case wiring
3. Florescent Lamp Fitting
4. Measurement of Earth Resistance

**Tin Smithy**

1. Taper Tray
2. Square Box without lid
3. Open Scoop
4. Funnel

**IT WORKSHOP**

**OBJECTIVES:**

- Understand the basic components and peripherals of a computer.
- To become familiar in configuring a system.
- Learn the usage of productivity tools.
- Acquire knowledge about the netiquette and cyber hygiene.
- Get hands on experience in trouble shooting a system?

**1. System Assembling, Disassembling and identification of Parts / Peripherals**



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2. **Operating System Installation**-Install Operating Systems like Windows, Linux along with necessary Device Drivers.
3. **MS-Office / Open Office**
  - a. **Word** - Formatting, Page Borders, Reviewing, Equations, symbols.
  - b. **Spread Sheet** - organize data, usage of formula, graphs, charts.
  - c. **Power point** - features of power point, guidelines for preparing an effective presentation.
  - d. **Access**- creation of database, validate data.
4. **Network Configuration & Software Installation**-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.
5. **Internet and World Wide Web**-Search Engines, Types of search engines, netiquette, cyber hygiene.
6. **Trouble Shooting**-Hardware trouble shooting, Software trouble shooting.
7. **MATLAB**- basic commands, subroutines, graph plotting.
8. **LATEX**-basic formatting, handling equations and images.

**Outcomes:**

- PC Hardware introduces the students to a personal computer and its basic peripherals, the process of assembling a personal computer, installation of system software like MS Windows, Linux and the required device drivers.
- Internet & World Wide Web introduces the different ways of hooking the PC on to the internet from home and workplace and effectively usage of the internet.
- Usage of web browsers, email, newsgroups and discussion forums, awareness of cyber hygiene, i.e., protecting the personal computer from getting infected with the viruses, worms and other cyber attacks will be introduced.
- Productivity tools will enable the students in crafting professional word documents, excel spread sheets and power point presentations using the Microsoft suite of office tools and LaTeX.
- Basic usage of MATLAB toolboxes will be introduced.

**Text Books:**

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).
3. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.
4. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudraprathap, Oxford University Press, 2002.
5. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
6. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
8. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.



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**I year - II semester**

**Subject Code: 16BH2L02**

**ENGLISH - COMMUNICATION SKILLS LAB- II**

PRESCRIBED LAB MANUAL FOR SEMESTER II:

*'INTERACT: English Lab Manual for Undergraduate Students'* Published by Orient Blackswan Pvt Ltd.

OBJECTIVES: To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME: A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

**UNIT-1:**

1. Debating- Practice work

**UNIT-2:**

1. Group Discussion- Practice work

**UNIT-3:**

1. Presentation Skills- Practice work

**UNIT-4:**

1. Interview Skills- Practice work

**UNIT-5:**

1. Email

2. Curriculum Vitae- Practice work

**UNIT-6:**

1. Idiomatic Expressions

2. Common Errors in English- Practice work

**Reference Books:**

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education





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**I year - II semester**

**Subject Code: 16BH2L03**

**ENGINEERING/APPLIED PHYSICS LAB**

**(only 10 out of 14 Experiments prescribed)**

1. To verify the Laws of Transverse vibrations of a stretched string using sonometer
2. To determine the Rigidity Modulus of a given wire using Torsional Pendulum
3. To determine the velocity of sound in air using Volume Resonator Method
4. To determine the acceleration due to gravity using Compound Pendulum
5. To determine the frequency of an electric tuning fork using Melde's Apparatus
6. To Study the V-I Characteristics and determine the breakdown voltage of a Zener Diode
7. To determine the wavelength of a given source using diffraction Grating in Normal Incidence Method
8. To determine the energy Band Gap of a Semiconductor using P-N Junction diode
9. To Study the variation of the Magnetic field along the axis of a current carrying circular coil using Stewart and Gee's Apparatus
10. To study the R-I Characteristics of a Thermistor
11. To determine the refractive index of the medium of the film using the formation of Newton's Rings.
12. To determine the thickness of a paper using the formation of parallel fringes
13. To Determine Planck's constant using photoconductor
14. To determine the refractive index of the Prism using spectrometer

**Reference :**

1. Engineering Physics Lab Manual by Dr.Y.Aparna & Dr.K.Venkatesswara Rao.(V.G.S. Book Links)
2. Physics Manual cum Observation book (College Designed Manual).

**Reference Books:**

1. Hydraulic Machines by Jagadhishlal; Metropolitan Company, Delhi.
2. Fluid Mechanics & Hydraulic Machines by Dr. R. K. Bansal; Laxmi Publications, New Delhi.
3. Rajput R.K., Fluid Mechanics and Hydraulic Machines, S.Chand and Company Ltd., 2005.
4. Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria& Sons.
5. K.Subramanya, Open Channel Flow, Tata McGraw Hill Publishing Company,2002.

**Web Reference:**

**[www.nptel.ac.in/courses/105101082/](http://www.nptel.ac.in/courses/105101082/)**

**[www.nptel.ac.in/courses/105103095/xc](http://www.nptel.ac.in/courses/105103095/xc)**

