

## SYLLABUS

I Year - I Semester

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### 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 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 nondetailed 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 roleplays, 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.

## **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 class are to be learner-centered 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.

### **Assessment Procedure: Theory**

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats— emails, letters and reports-- are to be tested along with appropriate language and expressions.

4. Examinations:  
I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%  
(80% for the best of two and 20% for the other)  
Assignments= 5%  
End semester exams=70%
5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches)and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17 (R-16 Regualtions)

**DETAILED TEXTBOOK:**

**ENGLISH FOR ENGINEERS AND TECHNOLOGISTS**, Published by **Orient Blackswan Pvt Ltd**

**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:**

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:

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 detrimental to biological 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 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.

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.

**MODEL QUESTION PAPER FOR THEORY**

**PART- I**

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

**PART-II**

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

<b>I Year - I Semester</b>	<b>MATHEMATICS-I</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>

(Common to ALL branches of First Year B.Tech.)

**Learning Objectives:**

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

**UNIT-I:**

**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-II:**

**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  $x$ ,  $e^{ax}V(x)$ ,  $xV(x)$ - Method of Variation of parameters.

Applications: LCR circuit, Simple Harmonic motion.

**UNIT-III:**

**Laplace transforms:**Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (without proof).

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

**UNIT-IV:**

**Partial differentiation:**Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

**UNIT-V:**

**First order 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.

## UNIT-VI:

**Higher order Partial differential equations:**Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type  $e^{ax+by}$ ,  $\sin(ax+by)$ ,  $\cos(ax+by)$ ,  $x^m y^n$ . Classification of second order partial differential equations.

### Outcomes:

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

- Solve linear differential equations of first, second and higher order.
- Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
- Calculate total derivative, Jacobian and minima of functions of two variables.

### Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, 43<sup>rd</sup> Edition, Khanna Publishers.
2. Engineering Mathematics, N.P.Bali, Lakshmi Publications.

### Reference Books:

1. Advanced Engineering Mathematics, Erwin Kreyszig, 10<sup>th</sup> Edition, Wiley-India.
2. Advanced Engineering Mathematics, Micheael Greenberg, 9<sup>th</sup> Edition, Pearson edn.
3. Advanced Engineering Mathematics with MATLAB, Dean G. Duffy, CRC Press.
4. Advanced Engineering Mathematics, Peter O'neil, Cengage Learning.
5. Engineering Mathematics, Srimanta Pal, Subodh C.Bhunia, Oxford University Press.
6. Higher Engineering Mathematics, Dass H.K., Rajnish Verma. Er., S. Chand Co. Pvt. Ltd, Delhi.

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**ENGINEERING CHEMISTRY**  
(CE, ME, PCE, PE, Met.E, Mining, Automobile, Aeronautical, Chemical, Bio.tech.)

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.

**Learning Objectives:**

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace and automotive industries.
- 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 they are introduced.
- The basics for the construction of galvanic cells are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- 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.
- Water is a basic material in almost all the industries, more so where steam is generated and also where it is supplied for drinking purposes.
- Materials used in major industries like steel industry, metallurgical industries and construction industries and electrical equipment manufacturing industries are introduced. Also lubrication is introduced.

**UNIT I: HIGH POLYMERS AND PLASTICS**

**Polymerisation:-** Introduction- 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 (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

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

**Composite materials** & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

**UNIT II: FUEL TECHNOLOGY**

**Fuels** – Introduction – Classification – Calorific value - HCV and LCV – Dulong’s formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- 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 apparatus – Numerical problems on combustion.

**Explosives:-** Rocket fuels



### **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 and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air 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 - Galvanic series – Factors which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

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

**Nano materials:-** Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications

**Liquid crystals:-** Introduction – Types – Applications

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

**Green synthesis:-** Principles - 3or 4 methods of synthesis with examples – R<sub>4</sub>M<sub>4</sub> principles

### **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.

### **UNIT VI: CHEMISTRY OF ENGINEERING MATERIALS AND FUEL CELLS**

**Refractories: -** Definition, characteristics, classification, properties, failure of refractories

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

**Cement: -** Constituents, manufacturing, hardening and setting, deterioration of cement

**Insulators: -** Thermal and electrical insulators

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

**Outcome:** The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. The impurities present in raw water, problems associated with them and how to avoid them are understood. The advantages and limitations of plastic materials and their use in design would be understood. The commonly used industrial materials are introduced.

**Standard 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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## 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

### 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 Theorem, 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.**

**Kinematics:** Rectilinear and Curvelinear 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.

## 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.

### TEXT BOOKS :

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4<sup>th</sup> Edn - , Mc Graw Hill publications.

### REFERENCES :

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11<sup>th</sup> Edn – Pearson Publ.
2. Engineering Mechanics, statics – J.L.Meriam, 6<sup>th</sup> 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 – 5<sup>th</sup> Edn Mc Graw Hill Publ.
5. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston – 5<sup>th</sup> Edn Mc Graw Hill Publ.
6. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5<sup>th</sup> 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

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## COMPUTER PROGRAMMING

### 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, The while Statement, The for Statement, Nested Loops, The 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.

## 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, Initialisation 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, BI Juneja Anita Seth, Cengage Learning.
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, Bichkar, Universities Press.
3. Programming in C, Reema Thareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.

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## ENVIRONMENTAL STUDIES

### Learning Objectives:

The objectives of the course is to impart:

- Overall understanding of the natural resources.
- Basic understanding of the ecosystem and its diversity.
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities.
- An understanding of the environmental impact of developmental activities.
- Awareness on the social issues, environmental legislation and global treaties.

### UNIT-I:

**Multidisciplinary nature of Environmental Studies:** Definition, Scope and Importance – Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, 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. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

### UNIT-II:

**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.

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.

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:

**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. 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: conservation of biodiversity.

#### **UNIT-IV:**

**Environmental Pollution:** Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies.

**Solid Waste Management:** Sources, classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products.

#### **UNIT-V:**

**Social Issues and the Environment:** Urban problems related to energy -Water conservation, 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:**

**Environmental Management:** Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism.

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

#### **Outcomes:**

The student should have knowledge on:

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources.
- 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.
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity.
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices.
- 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.
- About environmental assessment and the stages involved in EIA and the environmental audit.



**Text Books:**

1. Environmental Studies, R. Rajagopalan, 2<sup>nd</sup> Edition, 2011, Oxford University Press.
2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi.
3. Environmental Studies, P.N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani, Pearson Education, Chennai.

**Reference Books:**

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.
2. Environmental Studies, K.V.S.G. Murali Krishna, VGS Publishers, Vijayawada.
3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi.
4. Environmental Studies, Piyush Malaviya, Pratibha Singh, Anoop singh: Acme Learning, New Delhi.

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<b>I Year - I Semester</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

### **ENGINEERING /APPLIED CHEMISTRY LABORATORY**

1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
2. Trial experiment - Determination of HCl using standard Na<sub>2</sub>CO<sub>3</sub> solution.
3. Determination of alkalinity of a sample containing Na<sub>2</sub>CO<sub>3</sub> and NaOH.
4. Determination of KMnO<sub>4</sub> using standard Oxalic acid solution.
5. Determination of Ferrous iron using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
6. Determination of Copper using standard K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> solution.
7. Determination of temporary and permanent hardness of water using standard EDTA solution.
8. Determination of Copper using standard EDTA solution.
9. Determination of Iron by a Colorimetric method using thiocyanate as reagent.
10. Determination of pH of the given sample solution using pH meter.
11. Conductometric titration between strong acid and strong base.
12. Conductometric titration between strong acid and weak base.
13. Potentiometric titration between strong acid and strong base.
14. Potentiometric titration between strong acid and weak base.
15. Determination of Zinc using standard EDTA solution.
16. Determination of Vitamin – C.

**Outcomes:** The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

#### **Reference Books**

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) *Laboratory Manual of engineering chemistry-II*, VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) *Practical Engineering Chemistry*, B.S. Publication

<b>I Year - I Semester</b>	<b>ENGLISH - COMMUNICATION SKILLS</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>LAB- I</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**PRESCRIBED LAB MANUAL FOR SEMESTER I:**

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

### Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

### The rubric to assess the learners:

Body language		Fluency & Audibility	Clarity in Speech	Neutralization of accent	Appropriate Language		Total 10 marks	Remarks
Gestures & Postures	Eye Contact				Grammar	Vocabulary & expressions		

- **Lab Assessment: Internal (25 marks)**
  1. Day-to-Day activities: 10 marks
  2. Completing the exercises in the lab manual: 5 marks
  3. Internal test (5 marks written and 5 marks oral)
- **Lab Assessment: External (50 marks)**
  1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
  2. Oral: Reading aloud a text or a dialogue- 10 marks
  3. Viva-Voce by the external examiner: 20 marks

### 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

I Year - I Semester

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**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 and 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**

- What is an OS Command, Familiarization of Editors - vi, Emacs
- Using commands like mkdir, ls, cp, mv, cat, pwd, and man
- C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

**Exercise - 2 Basic Math**

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

**Exercise - 3 Control Flow - I**

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

**Exercise – 4 Control Flow - II**

- Write a C Program to Find Whether the Given Number is
  - Prime Number
  - Armstrong Number
- Write a C program to print Floyd Triangle
- 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**

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 Continued**

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

**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
- Analyzing 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.**

**I Year - II Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>

## **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 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 nondetailed 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 roleplays, 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.

## **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 class are to be learner-centered 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.

## Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats— emails, letters and reports-- are to be tested along with appropriate language and expressions.
4. Examinations:  
I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%  
(80% for the best of two and 20% for the other)  
Assignments= 5%  
End semester exams=70%
5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I.B.Tech II Semester (Common for all branches)and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 (**R-16 Regulations**)

**DETAILED TEXTBOOK: ENGLISH ENCOUNTERS** Published by **Maruthi Publishers**.  
**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.

#### **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:**

### 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 programme as architect.

#### **OUTCOME:**

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

## **UNIT 4:**

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

#### **OBJECTIVE:**

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 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 get 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.

**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.

## **MODEL QUESTION PAPER FOR THEORY**

### **PART- I**

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

### **PART-II**

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

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<b>I Year - II Semester</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>

**MATHEMATICS-II (Mathematical Methods)**  
**(Common to ALL branches of First Year B.Tech.)**

**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. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
2. Compute interpolating polynomial for the given data.
3. Solve ordinary differential equations numerically using Euler's and RK method.
4. Find Fourier series and Fourier transforms for certain functions.
5. Identify/classify and solve the different types of partial differential equations.

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

Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable 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  $1/3^{\text{rd}}$  and  $3/8^{\text{th}}$  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  $f(x)$  -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

**UNIT V: Applications of PDE:**

Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

**UNIT VI: Fourier Transforms:**

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

**Text Books:**

1. **B.S.Grewal**, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

**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. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
4. **David Kincaid, Ward Cheney**, Numerical Analysis-Mathematics of Scientific Computing, 3<sup>rd</sup> Edition, Universities Press.
5. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
6. **Dass H.K., Rajnish Verma. Er.**, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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**I Year - II Semester**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>

**MATHEMATICS-III**  
(Common to ALL branches of First Year B.Tech.)

**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 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. Determine double integral over a region and triple integral over a volume.
4. 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: Linear systems of equations:**

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordan- Gauss Jacobi and Gauss Seidal methods.Applications: Finding the current in electrical circuits.

**UNIT II: Eigen values - Eigen vectors and Quadratic forms:**

Eigen values - Eigen vectors– Properties – Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative and semi definite - Index – Signature.

Applications: Free vibration of a two-mass system.

**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.

Applications: Work done, Force.

#### **Text Books:**

1. **B.S.Grewal**, Higher Engineering Mathematics, 43<sup>rd</sup> Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

#### **Reference Books:**

1. **Greenberg**, Advanced Engineering Mathematics, 2<sup>nd</sup> edition, Pearson edn
2. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10<sup>th</sup> Edition, Wiley-India
3. **Peter O'Neil**, Advanced Engineering Mathematics, 7<sup>th</sup> edition, Cengage Learning.
4. **D.W. Jordan and T.Smith**, Mathematical Techniques, Oxford University Press.
5. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
6. **Dass H.K., Rajnish Verma. Er.**, Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

<b>I Year - II Semester</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>

### ENGINEERING PHYSICS

(ME, CE, PE, PCE, MET.E, MINING, AUTOMOBILE, CHEMICAL, AERONAUTICAL, BIO.TECH)

**OBJECTIVES:** *Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. 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

**INTERFERENCE:** Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton’s rings – construction and basic principle of Interferometers.

#### UNIT-II

**DIFFRACTION:** 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.

#### UNIT-III

**POLARIZATION:** Types of Polarization-production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter)

**LASERS:** Characteristics– Stimulated emission – Einstein’s Transition Probabilities- Pumping schemes - Ruby laser – Helium Neon laser.

#### UNIT-IV

**ACOUSTICS:** Reverberation time - Sabine’s formula – Acoustics of concert-hall.

**ULTRASONICS:** Production - Ultrasonic transducers- Non-Destructive Testing – Applications.

#### UNIT-V

**CRYSTALLOGRAPHY & X-RAY DIFFRACTION:** Basis and lattice – Bravais systems-Symmetry elements- Unit cell- packing fraction – coordination number- Miller indices – Separation between successive (h k l) planes – Bragg’s law.

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

## UNIT-VI

**MAGNETISM:** Classification based on Field, Temperature and order/disorder –atomic origin – Ferromagnetism- Hysteresis- applications of magnetic materials (Para & Ferro)..

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

***Outcome:** Construction and working details of instruments, ie., Interferometer, Diffractometer 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)
3. Engineering Physics by D.K.Bhattacharya and Poonam Tandon , Oxford press (2015)

### Refference books:

1. Applied Physics by P.K.Palanisamy , Scitech publications (2014)
2. Lasers and Non-Linear optics by B.B.Laud , Newage international publishers (2008)

<b>I Year - II Semester</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
	<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>

## **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 fundamental principles of materials, fuels, Steam, I.C. Engines, compressors, hydraulic machines and transmission systems that usually exist in any process plant.

### **UNIT –I:**

Stresses and strains: kinds of – stress-strains, elasticity and plasticity, Hooks law, stress –strain diagrams, modules of elasticity, Poisson’s ratio, linear and volumetric strain, relation between E, N, and K, bars of uniform strength, compound bars and temperature stresses.

### **UNIT– II:**

Types of supports – loads – Shear force and bending moment for cantilever and simply supported beams without overhanging for all types of loads.

Theory of simple bending, simple bending formula, Distribution of Flexural and Shear stress in Beam section – Shear stress formula – Shear stress distribution for some standard sections

### **UNIT-III:**

Thin cylindrical shells: stress in cylindrical shells due to internal pressures, circumferential stress, longitudinal stress, design of thin cylindrical shells, spherical shells, change in dimension of the shell due to internal pressure, change in volume of the shell due to internal pressure.

Thick Cylinders: Lamé’s equation- cylinders subjected to inside and outside pressures columns and Struts.

### **UNIT-IV:**

Steam boilers and Reciprocating air compressors: Classification of boilers, essentialities of boilers, selection of different types of boilers, study of boilers, boiler mountings and accessories.

Reciprocating air compressors: uses of compressed air, work done in single stage and two-stage compression, inter cooling and simple problems.

### **UNIT-V:**

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-VI:**

Transmission systems:Belts –Ropes and chain: 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.

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

### **Outcomes:**

After completing the course, the student shall be able to determine:

- The stress/strain of a mechanical component subjected to loading.
- The performance of components like Boiler, I.C. Engine, Compressor, Steam/Hydraulic turbine, Belt, Rope and Gear.
- The type of mechanical component suitable for the required power transmission.

### **Text Books:**

1. Strength of Materials and Mechanics of Structures, B.C.Punmia, Standard Publications and distributions, 9<sup>th</sup> edition, 1991.
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.

### **Reference Book:**

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

I Year - II Semester

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>4</b>	<b>0</b>	<b>0</b>	<b>3</b>

## ENGINEERING DRAWING

### Learning Objectives:

- 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, Engg. 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 & simple lines.

**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 of the reference planes (HP, VP or PP)

### UNIT-III:

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

Projections of straight 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.

### **Outcomes:**

- 

### **Text Books:**

1. Engineering Drawing, N.D. Butt, Chariot Publications.
2. Engineering Drawing, Agarwal & Agarwal, Tata McGraw Hill Publishers.

### **Reference Books:**

1. Engineering Drawing, K.L.Narayana & P. Kannaiah, Scitech Publishers.
2. Engineering Graphics for Degree, K.C. John, PHI Publishers.
3. Engineering Graphics, PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCAD, K Venugopal, V. Prabhu Raja, New Age.

www.jntuking.com

<b>I Year - II Semester</b>	<b>ENGLISH - COMMUNICATION SKILLS LAB-II</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**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 Discussions  
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 Suvama 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

www.jntuking.com

<b>I Year - II Semester</b>	<b>ENGINEERING/APPLIED PHYSICS LAB</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
		<b>0</b>	<b>0</b>	<b>3</b>	<b>2</b>

**(Any Ten of the following)**

**Objective:** *Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.*

**LIST OF EXPERIMENTS:**

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of vibrations in stretched strings – Sonometer.
8. Determination of velocity of sound – Volume Resonator.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
12. Characteristics of Thermistor – Temperature Coefficients.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p - n junction.
15. Hall Effect in semiconductors.
16. Time constant of CR circuit.
17. Determination of wavelength of laser source using diffraction grating.
18. Determination of Young's modulus by method of single cantilever oscillations.
19. Determination of lattice constant – lattice dimensions kit.
20. Determination of Planck's constant using photocell.
21. Determination of surface tension of liquid by capillary rise method.

**Outcome:** *Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.*

1.

I Year - II Semester	L	T	P	C
	0	0	2	0

## ENGINEERING /APPLIED PHYSICS- VIRTUAL LAB-ASSIGNMENTS

**(Constitutes 5% marks of 30marks of Internal-component)**

**Objective:** *Training Engineering students to prepare a technical document and improving their writing skills.*

### LIST OF EXPERIMENTS

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson's interferometer
13. Black body radiation

**URL:** [www.vlab.co.in](http://www.vlab.co.in)

**Outcome:** *Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.*

I Year - II Semester

L	T	P	C
0	0	3	2

## 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:**

<b>Carpentry</b>	1. T-Lap Joint 2. Cross Lap Joint 3. Dovetail Joint 4. Mortise and Tenon Joint
<b>Fitting</b>	1. Vee Fit 2. Square Fit 3. Half Round Fit 4. Dovetail Fit
<b>Black Smithy</b>	1. Round rod to Square 2. S-Hook 3. Round Rod to Flat Ring 4. Round Rod to Square headed bolt
<b>House Wiring</b>	1. Parallel / Series Connection of three bulbs 2. Stair Case wiring 3. Florescent Lamp Fitting 4. Measurement of Earth Resistance
<b>Tin Smithy</b>	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**

**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:

- Common understanding of concepts, patterns of decentralization implementation in Africa †
- Identified opportunities for coordinated policy responses, capacity building and implementation of best practices †
- Identified instruments for improved decentralization to the local level †
- Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels

### 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.