

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., ACT No.30 of 2008)
ANANTAPUR – 515 002 (A.P) INDIA

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Lr.No.JNTUA/DAPO/A1/I B.Tech I sem syllabus/2015 Date:27/06/2015

Sub:- JNTUA – DAPO – B.Tech (R15) – 1st year I semester course structure
& syllabus-Reg.

Ref:- Note Orders of the Vice-Chancellor, dated:-27-06-2015.

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Vide ref cited above, I am herewith enclosing approved course structure & syllabi of I B.Tech I semester of R15 regulations which is applicable for the students admitted from 2015-16 onwards.

S.No.	Code No	Title of the Subject
1	15A52101	Functional English
2	15A54101	Mathematics – I
3	15A56101	Engineering Physics
4	15A05101	Computer Programming
5	15A03101	Engineering Drawing
6	15A51101	Engineering Chemistry
7	15A01101	Environmental Studies
8	15A52102	English Language Communication Skills Lab
9	15A56102	Engineering Physics Lab
10	15A51102	Engineering Chemistry Lab
11	15A05102	Computer Programming Lab

Yours faithfully,


D.A.P



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Course Structure for B.Tech. - R15 Regulations
Common to CSE/EEE/CE

I B.Tech. - I Semester

S.No	Course code	Subject	Theory	Tu / Drg / Lab	Credits
1.	15A52101	Functional English	3	1 - -	3
2.	15A54101	Mathematics – I	3	1 - -	3
3.	15A05101	Computer Programming	3	1 - -	3
4.	15A56101	Engineering Physics	3	1 - -	3
5.	15A03101	Engineering Drawing	0	- 6 -	3
6.	15A52102	English Language Communication Skills Lab	-	- - 4	2
7.	15A56102	Engineering Physics Lab	-	- - 4	2
8.	15A05102	Computer Programming Lab	-	- - 4	2
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For the subject Engineering Drawing, day-to-day work shall be evaluated for 15 marks by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm examinations in a semester for duration of 2hrs each for 15 marks with weightage of 80% to better mid marks and 20% for the other. The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3 questions shall be condensed to 15 marks, any fraction shall be rounded off to the next higher mark. There shall be no objective paper in internal examination. The sum of day to day evaluation and the internal test marks will be the final sessional marks for the subject.

In the end examination pattern for Engineering Drawing there shall be 5 questions, either-or type, of 14 marks each. There shall be no objective type questions in the end examination.



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Course Structure for B.Tech. - R15 Regulations
Common to ECE/ME/EIE/IT

I B.Tech. - I Semester

S.No	Course code	Subject	Theory	Tu / Lab		Credits
1.	15A52101	Functional English	3	1	-	3
2.	15A54101	Mathematics – I	3	1	-	3
3.	15A05101	Computer Programming	3	1	-	3
4.	15A51101	Engineering Chemistry	3	1	-	3
5.	15A01101	Environmental Studies	3	1	-	3
6.	15A52102	English Language Communication Skills Lab	-	-	-	2
7.	15A51102	Engineering Chemistry Lab	-	-	-	2
8.	15A05102	Computer Programming Lab	-	-	-	2
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I B.Tech. I - Semester

T	Tu	C
3	1	3

**(15A52101) FUNCTIONAL ENGLISH
(Common to All Branches)**

Preamble:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, and advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

Objectives:

- To enable the students to communicate in English for academic and social purpose.
- To enable the students to acquire structure and written expressions required for their profession.
- To develop the listening skills of the students.
- To inculcate the habit of reading and critical thinking skills.
- To enhance the study skills of the students with emphasis on LSRW skills.

UNIT –I

Topics: Paragraph writing, writing letters, role play, reading graphs, prepositions, designing posters, tenses, making recommendations.

Text: ENVIRONMENTAL CONSCIOUSNESS' from *MINDSCAPES*
Climate Change - Green Cover – Pollution

UNIT –II

Topics: Compound nouns, imperatives, writing instructions, interpreting charts and pictures, note making, role play, prefixes, subject-verb agreement.

Text: EMERGING TECHNOLOGIES from *MINDSCAPES*
Solar Thermal Power - Cloud Computing - Nanotechnology

UNIT –III

Topics: Making conversations, homonyms and homophones, SMS and use of emotions, past participle for irregular verbs, group discussion, E - mail communication, antonyms, Preparing projects

Text: GLOBAL ISSUES from *MINDSCAPES*
Child Labour - Food Crisis - Genetic Modification - E-Waste - Assistive Technology

UNIT –IV

Topics: Group discussion, affixes, double consonants, debates, writing a book / film review, predicting and problem-solving-future tense, adverbs

Text: SPACE TREK from *MINDSCAPES*

Hubble Telescope - Chandrayan-2 - Anusat - Living Quarters - Space Tourism

UNIT –V

Topics: Compare and contrast, effective writing, group discussion, writing reports, writing advertisements, tweeting and blogging, types of interviews, framing questions.

Text: MEDIA MATTERS from *MINDSCAPES*

History of Media - Language and Media - Milestone in Media - Manipulation by Media - Entertainment Media - Interviews

Text Books:

1. MINDSCAPES: English for Technologists and Engineers, Orient Blackswan, 2014.

References:

1. A Practical Course in Effective English Speaking Skills by J.K.Gangal, PHI Publishers, New Delhi.2012
2. Technical Communication, Meenakshi Raman, Oxford University Press,2011.
3. Spoken English, R.K. Bansal & JB Harrison, Orient Longman,2013, 4th edition.
4. Murphy's English Grammar with CD, Murphy, Cambridge University Press,3rd edition.
5. An Interactive Grammar of Modern English, Shivendra K. Verma and Hemlatha Nagarajan , Frank Bros & CO,2008.

Outcomes:

- Have improved communication in listening, speaking, reading and writing skills in general.
- Have developed their oral communication and fluency in group discussions and interviews.
- Have improved awareness of English in science and technology context.
- Have achieved familiarity with a variety of technical reports.

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I B.Tech. - I Semester

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3	1	3

(15A54101) MATHEMATICS – I
(Common to All Branches)

Objectives:

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate and modeling the problems, to think creatively and to synthesize information.

UNIT – I

Exact, linear and Bernoulli equations, Applications to first order equations; Orthogonal trajectories, Simple electric circuits.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax} , $\sin ax$, $\cos ax$, polynomials in x , $e^{ax} V(x)$, $xV(x)$.

UNIT – II

Method of variation of parameters, linear equations with variable coefficients: Euler-Cauchy Equations, Legendre's linear equation. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits and Deflection of Beams.

UNIT – III

Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature.

UNIT – IV

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes in Cartesian and polar coordinates using double and triple integral.

UNIT – V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (Without proof). Application of Green's, Stoke's and Gauss's Theorems.

Text Books:

1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

References:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S.Chand publication.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

Outcomes:

- The students become familiar with the application of differential and integral calculus, ordinary differential equations and vector calculus to engineering problems.
- The students attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications.

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I B.Tech. I - Semester

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(15A05101) COMPUTER PROGRAMMING

(Common to All Branches)

Objectives:

- Understand problem solving techniques
- Understand representation of a solution to a problem
- Understand the syntax and semantics of C programming language
- Understand the significance of Control structures
- Learn the features of C language

UNIT - I

Overview of Computers and Programming - Electronic Computers Then and Now - Computer Hardware - Computer Software - Algorithm - Flowcharts - Software Development Method - Applying the Software Development Method.

Types, Operators and Expressions: Variable Names - Data Types and Sizes - Constants - Declarations - Arithmetic Operators - Relational and Logical Operators - Type Conversions - Increment and Decrement Operators - Bitwise Operators - Assignment Operators and Expressions - Conditional Expressions - Precedence and Order of Evaluation.

UNIT - II

Selections Statements – Iteration Statements – Jump Statements- Expression Statements - Block Statements.

Single Dimensional Arrays – Generating a Pointer to an Array – Passing Single Dimension Arrays to Functions – Strings – Two Dimensional Arrays – Indexing Pointers – Array Initialization – Variable Length Arrays

UNIT - III

Pointer Variables – Pointer Operators - Pointer Expressions – Pointers And Arrays – Multiple Indirection – Initializing Pointers – Pointers to Functions – C's Dynamic Allocation Functions – Problems with Pointers.

Understanding the scope of Functions – Scope Rules – Type Qualifiers – Storage Class Specifiers- Functions Arguments –The Return Statement.

UNIT - IV

Command line arguments – Recursion – Function Prototypes – Declaring Variable Length Parameter Lists

Structures – Arrays of Structures – Passing Structures to Functions – Structure Pointers – Arrays and Structures within Structures – Unions – Bit Fields – Enumerations – typedef

UNIT - V

Reading and Writing Characters – Reading and Writing Strings – Formatted Console I/O – Printf - Scanf – Standard C Vs Unix File I/O – Streams and Files – File System Basics – Fread and Fwrite – Fseek and Random Access I/O – Fprintf () and Fscanf() – The Standard Streams – The Preprocessor Directives #define and #include.

Text Books:

1. "The Complete Reference C"- Fourth Edition- Herbert Schildt- McGrawHill Education.
2. "The C Programming Language" Second Edition- Brian W. Kernighan- Dennis M. Ritchie- Prentice Hall-India. (UNIT- I)

References:

1. Programming in C, Second Edition – Pradip Dey, Manas Ghosh, Oxford University Press.
2. "C From Theory to Practice"- George S. Tselikis- Nikolaos D. Tselikas- CRC Press.
3. "Programming with C"- R S Bichkar- University Press.

4. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education. (UNIT-I)
5. Computer Fundamentals and C Programming- Second Edition- P.Chenna Reddy- Available at Pothi.com (<http://pothi.com/pothi/book/dr-p-chenna-reddy-computer-fundamentals-and-c-programming>).

Outcomes:

- Apply problem solving techniques in designing the solutions for a wide-range of problems
- Choose appropriate control structure depending on the problem to be solved
- Modularize the problem and also solution

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I B.Tech. I - Semester

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(15A56101) ENGINEERING PHYSICS
(Common to CSE/EEE/CIVIL)

Objectives:

- To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
- To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and non-destructive evaluation using ultrasonic techniques.
- To get an insight into the microscopic meaning of conductivity, classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.
- To open new avenues of knowledge and understanding semiconductor based electronic devices, basic concepts and applications of semiconductors and magnetic materials have been introduced which find potential in the emerging micro device applications.
- To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.

UNIT - I

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Physical Optics: Interference (Review) – Interference in thin film by reflection – Newton's rings – Diffraction (Review) - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Excitation mechanism and optical resonator – Nd:YAG laser - He-Ne laser – Semiconductor Diode laser - Applications of lasers

Fiber optics: Introduction - construction and working principle of optical fiber – Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in Optical fibers –Block diagram of Optical fiber communication system – Applications of optical fibers

UNIT – II

CRYSTALLOGRAPHY AND ULTRASONICS

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method.

Ultrasonics: Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

UNIT – III

QUANTUM MECHANICS AND ELECTRON THEORY

Quantum Mechanics: Matter waves – de'Broglie hypothesis and properties - Schrodinger's time dependent and independent wave equations – Physical significance of wave function - Particle in one dimensional infinite potential well.

Electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Source of electrical resistance – Kronig-Penny model (qualitative treatment) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT – IV

SEMICONDUCTORS AND MAGNETIC MATERIALS

Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative treatment) – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Formation of p-n junction.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative treatment) – Hysteresis - Soft and hard magnetic materials, applications of magnetic materials.

UNIT – V

SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

Superconductivity: Introduction - Effect of magnetic field - Meissner effect – Type I and Type II superconductors – Flux quantization – Penetration depth - BCS theory (qualitative treatment) — Josephson effects –Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale and types of nanomaterials – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches: ball mill, chemical vapour deposition, and sol gel –Applications of nanomaterials.

Text Books:

1. Engineering Physics – K.Thyagarajan, 5th Edition, MacGraw Hill Publishers, NewDelhi, 2014.
2. Physics for Engineers - N.K Verma, 1st Edition, PHI Learning Private Limited, New Delhi,2014.

References:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10th Edition, S.Chand and Company, New Delhi, 2014.
2. Engineering Physics – D K Pandey, S. Chaturvedi, 2nd Edition, Cengage Learning, New Delhi, 2013.
3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1nd Edition, Oxford University Press, New Delhi, 2015.

Outcomes:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
- The properties and device applications of semiconducting and magnetic materials are illustrated.
- The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

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B.Tech. I - I Sem.

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(15A03101) ENGINEERING DRAWING
(Common to CSE/EEE/CIVIL)

Objectives:

- To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.
- To learn about various projections, to understand complete dimensions and details of object.
- Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance- Conventions in Drawing-Lettering – BIS Conventions. Curves used in Engineering Practice. a) Conic Sections including the Rectangular Hyperbola- General method only, b) Cycloid, Epicycloid and Hypocycloid

UNIT II

Scales: Plain, Diagonal and Vernier;

Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Lines: lines inclined to one or both planes, Problems on projections, Finding True lengths.

Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Regular Solids with axis inclined to both planes.

Developments of Solids: Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books:

1. *Engineering Drawing*, N.D. Bhatt, Charotar Publishers
2. *Engineering Drawing*, K.L. Narayana & P. Kanniah, Scitech Publishers, Chennai

References:

1. *Engineering Drawing*, Johle, Tata McGraw-Hill Publishers
2. *Engineering Drawing*, Shah and Rana, 2/e, Pearson Education
3. *Engineering Drawing and Graphics*, Venugopal/New age Publishers
4. *Engineering Graphics*, K.C. John, PHI, 2013
5. *Engineering Drawing*, B.V.R. Gupta, J.K. Publishers

Outcomes:

- Drawing 2D and 3D diagrams of various objects.
- Learning conventions of Drawing, which is an Universal Language of Engineers.
- Drafting projections of points, planes and solids.

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I B.Tech. I - Semester

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**(15A51101) ENGINEERING CHEMISTRY
(Common to ECE/EIE/ME/IT)**

Objectives:

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand the concepts of chemistry and apply to various materials for engineering applications.

UNIT – I WATER QUALITY AND TREATMENT

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching powder, ozonisation)

Industrial Use of water:

For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

UNIT – II POLYMERS

i) Introduction: Basic concepts of polymerisation, Types of polymerisation (Chain Growth (Addition), Step growth (Condensation)), Mechanism: cationic, anionic, free radical and coordination covalent.

Plastomers: Thermosetting and Thermoplastics, Preparation, properties and Engineering applications of PVC, Teflon, Bakelite and nylons.

Elastomers

Natural Rubber; Processing of natural rubbers, Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, Buna-N, Polyurethane, Polysulfide (Thiokol) rubbers

ii) Conducting polymers: Mechanism, synthesis and applications of polyacetylene, polyaniline.

iii) Inorganic Polymers: Basic Introduction, Silicones, Polyphosphazins $-(R)_2P=N-$ applications

UNIT – III ELECTROCHEMISTRY

i) Galvanic cells, Nernst Equation, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries), Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen, Solid oxide)

ii) Corrosion: Introduction, type of corrosion (Concentration cell corrosion, Galvanic corrosion), Chemical (Dry) and Electrochemical (Wet) Theory of corrosion. Galvanic series, factors affecting the

corrosion (Metal and environment). Prevention: Cathodic protection (Sacrificial anode and impressed current), Inhibitors (Anodic and cathodic), electroplating (Copper, nickel and chromium) and electroless plating (Copper and nickel)

UNIT – IV FUELS AND COMBUSTION

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

Solid Fuels: Coal-Classification and Analysis (proximate and ultimate), Coke :Characteristics of metallurgical coke, Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline- Octane Number, Diesel -Cetane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, Advantages and Disadvantages of Power Alcohol

Gaseous Fuels: Natural gas, Producer gas, Water gas, Coal gas and Biogas. Determination calorific value of Gases fuels by Junker's calorimeter.

Combustion: Basic principles and numerical problems, Flue Gas analysis by Orsat's apparatus.

UNIT – V CHEMISTRY OF ENGINEERING MATERIALS

i) Cement: Composition, Classification, preparation (Dry and Wet processes), Setting and Hardening (Hydration and Hydrolysis)

ii) Refractories: Introduction, Classification , properties and applications

iii) Lubricants: Introduction, classification (Solid, liquid, semi solid, emulsion and synthetic), Theory of lubrication (Thin film, Thick film & Extreme pressure) , properties of lubricants and applications.

iv) Carbon clusters: Fullerenes and Carbon Nano Tubes (CNT)

Text Books:

1. Engineering Chemistry, First Edition, Jayaveera KN, Subba Reddy GV and Ramachandraiah C, McGraw Hill Higher Education, New Delhi, 2013.
2. A Text Book of Engineering Chemistry, 15th Edition, Jain and Jain, Dhanapathi Rai Publications, New Delhi, 2013.

References:

1. A Text book of Engineering Chemistry, 12th Edition, SS Dhara, Uma, S. Chand Publications, New Delhi, 2010.
2. Engineering Chemistry, First edition, K.B. Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Publications India Pvt Limited, 2010.
3. Engineering Chemistry, First edition, Seshamaheswaramma K and Mridula Chugh, Pearson Education, 2013.

Outcomes: The student is expected to:

- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.
- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.

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**(15A01101) ENVIRONMENTAL STUDIES
(Common to ECE/EIE/ME/IT)**

Objectives:

To make the students to get awareness on environment, to understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life to save earth from the inventions by the engineers.

UNIT – I

MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES: – Definition, Scope and Importance – Need for Public Awareness.

NATURAL RESOURCES : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – 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, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II

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 the following ecosystem:

- a. Forest ecosystem.
- b. Grassland ecosystem
- c. Desert ecosystem
- d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

BIODIVERSITY AND ITS CONSERVATION : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-spots of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT – III

ENVIRONMENTAL POLLUTION: Definition, Cause, effects and control measures of :

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

SOLID WASTE MANAGEMENT: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV

SOCIAL ISSUES AND THE ENVIRONMENT: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment 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 – V

HUMAN POPULATION AND THE ENVIRONMENT: Population growth, variation among nations. Population explosion – Family Welfare Programmed. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

FIELD WORK: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Text Books:

1. Text Book of Environmental Studies for Undergraduate Courses, Erach Bharucha, Universities Press Pvt Ltd, Hyderabad. 2nd Edition 2013.
2. Environmental Studies by Kaushik, New Age Publishers.

References:

1. Environmental Studies by Rajagopalan, Oxford Publishers.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications.
3. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited.

Outcomes:

- Students will get the sufficient information that will clarify modern environmental concepts like equitable use of natural resources, more sustainable life styles etc.
- Students will realize the need to change their approach so as to perceive our own environmental issues correctly, using practical approach based on observation and self learning.
- Students become conversant with the fact that there is a need to create a concern for our environment that will trigger pro-environmental action; including simple activities we can do in our daily life to protect it.
- By studying environmental sciences, students are exposed to the environment that enables one to find out solution of various environmental problems encountered on and often.
- At the end of the course, it is expected that students will be able to identify and analyze environmental problems as well as the risks associated with these problems and efforts to be taken to protect the environment from getting polluted. This will enable every human being to live in a more sustainable manner.

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I B.Tech. I - Semester

P C
4 2

(15A52102) ENGLISH LANGUAGE COMMUNICATION SKILLS (ELCS) LAB
(Common to All Branches)

The Language Lab focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Objectives:

- To enable students to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

UNIT - 1

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels and consonants sounds
4. Phonetic Transcription

UNIT - II

5. Word Stress
6. Syllabification
7. Rules of word stress
8. Intonation

UNIT - III

9. Situational Dialogues
10. Role Plays
11. JAM
12. Describing people/objects/places

UNIT - IV

13. Debates
14. Group Discussions
15. Interview skills

UNIT - V

16. Video speech writing
17. Book reviews -oral and written

Minimum Requirements for ELCS Lab:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self-study by learners.
2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

- i) P – IV Processor
 - a) Speed – 2.8 GHZ
 - b) RAM – 512 MB Minimum
 - c) Hard Disk – 80 GB
- ii) Headphones of High quality

Suggested Software:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. Walden InfoTech Software.

References:

1. A Textbook of English Phonetics for Indian Students 2nd Ed T. Balasubramanian. (Macmillan),2012.
2. A Course in Phonetics and Spoken English, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. Speaking English Effectively, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
4. A Hand book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011
5. Spring Board Success, Sharada Kouhik, Bindu Bajwa, Orient Blackswan, Hyderabad, 2010.

Outcomes:

- Become active participants in the learning process and acquire proficiency in spoken English.
- Speak with clarity and confidence thereby enhance employability skills.

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I B.Tech. I - Semester

p C
4 2

**(15A56102) ENGINEERING PHYSICS LABORATORY
(Common to CSE/EEE/CIVIL)**

Objectives:

- Will recognize the important of optical phenomenon like Interference and diffraction.
- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the application of laser in finding the particle size and its role in diffraction studies.
- Will learn to synthesis of the nanomaterials and recognize its importance by knowing its nano particle size and its impact on its properties.

Any 10 of the following experiments has to be performed during the I year I semester

1. Determination of radius of curvature of a Plano-convex lens by forming Newton's rings.
2. Determination of wavelength of given source using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle of an optical fiber.
4. Energy gap of a Semiconductor diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss for a given magnetic material.
7. Determination of Crystallite size using X-ray pattern (powder) using debye-scheerer method.
8. Determination of particle size by using laser source.
9. Determination of dispersive power of a prism.
10. Determination of thickness of the thin wire using wedge Method.
11. Laser : Diffraction due to single slit
12. Laser : Diffraction due to double slit
13. Laser: Determination of wavelength using diffraction grating
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Synthesis of nanomaterial by any suitable method.

References:

1. Engineering Physics Practicals – NU Age Publishing House, Hyderabad.
2. Engineering Practical physics – Cengage Learning, Delhi.

Outcomes:

- Would recognize the important of optical phenomenon like Interference and diffraction.
- Would have acquired the practical application knowledge of optical fiber, semiconductor, dielectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
- Would recognize the significant importance of nanomaterials in various engineering fields.

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I B.Tech. I - Semester

P	C
4	2

**(15A51102) ENGINEERING CHEMISTRY LAB
(Common to ECE/EIE/ME/IT)**

Objectives:

- Will learn practical understanding of the redox reaction
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology.

List of Experiments:

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
5. Determination of Alkalinity of Water
6. Determination of acidity of Water
7. Preparation of Phenol-Formaldehyde (Bakelite)
8. Determination of Viscosity of oils using Redwood Viscometer I
9. Determination of Viscosity of oils using Redwood Viscometer II
10. Determination of calorific value of gaseous fuels by Junker's Calorimeter
11. Conductometric estimation of strong acid using standard sodium hydroxide solution
12. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
13. Potentio metric determination of iron using standard potassium dichromate
14. Colorometric estimation of manganese.
15. pH meter calibration and measurement of pH of water and various other samples.

(Any 10 experiments from the above list)

References:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – Mendham J et al, Pearson Education, 2012.
2. Chemistry Practical– Lab Manual, First edition, Chandra Sekhar KB, Subba Reddy GV and Jayaveera KN, SM Enterprises, Hyderabad, 2014.

Outcomes:

- Would be confident in handling energy storage systems and would be able combat chemical corrosion
- Would have acquired the practical skill to handle the analytical methods with confidence.
- Would feel comfortable to think of design materials with the requisite properties
- Would be in a position to technically address the water related problems.

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I B.Tech. I - Semester

P	C
4	2

**(15A05102) COMPUTER PROGRAMMING LAB
(Common to All branches)**

Objectives:

- Learn C Programming language
- To make the student solve problems, implement algorithms using C language.

List of Experiments/Tasks

1. Practice DOS and LINUX Commands necessary for design of C Programs.
2. Study of the Editors, Integrated development environments, and Compilers in chosen platform.
3. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
4. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, To read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
5. Write a program to find the roots of a Quadratic equation.
6. Write a program to compute the factorial of a given number.
7. Write a program to check whether the number is prime or not.
8. Write a program to find the series of prime numbers in the given range.
9. Write a program to generate Fibonacci numbers in the given range.
10. Write a program to find the maximum of a set of numbers.
11. Write a program to reverse the digits of a number.
12. Write a program to find the sum of the digits of a number.
13. Write a program to find the sum of positive and negative numbers in a given set of numbers.
14. Write a program to check for number palindrome.
15. Write a program to evaluate the sum of the following series up to 'n' terms e

$$x=1+x+\frac{x^2}{2!}+\frac{x^3}{3!}+\frac{x^4}{4!}+-----$$
16. Write a program to generate Pascal Triangle.
17. Write a program to read two matrices and print their sum and product in the matrix form.
18. Write a program to read matrix and perform the following operations.
 - i. Find the sum of Diagonal Elements of a matrix.
 - ii. Print Transpose of a matrix.
 - iii. Print sum of even and odd numbers in a given matrix.
19. Write a program to accept a line of characters and print the number of Vowels, Consonants, blank spaces, digits and special characters.
20. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
21. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.
22. Write a program to split a 'file' in to two files, say file1 and file2. Read lines into the 'file' from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
23. Write a program to merge two files.
24. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.
25. Write a program to read a set of strings and sort them in alphabetical order.

26. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
 - i. String length determination
 - ii. Compare Two Strings
 - iii. Concatenate them, if they are not equal
 - iv. String reversing
27. Write programs using recursion for finding Factorial of a number, GCD, LCM, and solving Towers of Hanoi problem.
28. Write a program to exchange two numbers using pointers.
29. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
30. A file consists of information about employee salary with fields employeeid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeeid, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
31. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
32. Write a program to find the square root of a number without using built-in library function.
33. Write a program to convert from string to number.
34. Write a program to implement pseudo random generator.
35. Write a program to generate multiplication tables from 11 to 20.
36. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.
37. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
38. Write a program to find the execution time of a program.
39. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels

Note:

1. Instructors are advised to conduct the lab in LINUX/UNIX environment also
2. The above list consists of only sample programs. Instructors may choose other programs to illustrate certain concepts, wherever is necessary. Programs should be there on all the concepts studied in Theory. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.

References:

1. "How to Solve it by Computer", R.G. Dromey, Pearson.
2. "The C Programming Language", Brian W. Kernighan, Dennis M. Ritchie, Pearson.
3. "Let us C", Yeswant Kanetkar, BPB publications
4. "Pointers in C", Yeswant Kanetkar, BPB publications.
5. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A.Ananda Rao, Pearson Education.

Outcomes:

- Apply problem solving techniques to find solutions to problems
- Able to use C language features effectively and implement solutions using C language.
- Improve logical skills.



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
(Established by Govt. of A.P., Act. No. 30 of 2008)
ANANTHAPURAMU – 515 002 (A.P) INDIA

Course Structure for B.Tech. - R15 Regulations

MECHANICAL ENGINEERING

I-II Semester

S.No	Course code	Subject	Th	Tu/Drg/Lab.			Credits
1.	15A52201	English for Professional Communication	3	1	-	-	3
2.	15A54201	Mathematics – II	3	1	-	-	3
3.	15A03201	Material Science and Engineering	3	1	-	-	3
4.	15A56101	Engineering Physics	3	1	-	-	3
5.	15A03101	Engineering Drawing	-	-	6	-	3
6.	15A03202	Material Science and Engineering Lab	-	-	-	4	2
7.	15A56102	Engineering Physics Lab	-	-	-	4	2
8.	15A99201	Engineering & IT Workshop	-	-	-	4	2
			12	4	6	12	21

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B.Tech. I - II Sem. (ME)

T	Tu	C
3	1	3

(15A52201) ENGLISH FOR PROFESSIONAL COMMUNICATION

1. INTRODUCTION:

English is a global language and has international appeal and application. It is widely used in a variety of contexts and for varied purposes. The students would find it useful both for social and professional development. There is every need to help the students acquire skills useful to them in their career as well as workplace. They need to write a variety of documents and letters now extending into professional domain that cuts across business and research also. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed book serves the purpose of preparing them for everyday communication and to face the global competitions in future.

The text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. OBJECTIVES:

1. To develop confidence in the students to use English in everyday situations.
2. To enable the students to read different discourses so that they appreciate English for science and technologies.
3. To improve familiarity with a variety of technical writings.
4. To enable the students to acquire structure and written expressions required for their profession.
5. To develop the listening skills of the students.

3. SYLLABUS:

UNIT –I

Topics: Group discussion, cause and effect, events and perspectives, debate, if conditional, essay writing.

Text: LESSONS FROM THE PAST from *MINDSCAPES*

Importance of History - Differing Perspectives - Modern Corporatism - Lessons From The Past

UNIT-II

Topics: Idioms, essay writing, power point presentation, modals, listening and rewriting, preparing summary, debate, group discussion, role play, writing a book review, conversation

Text: 'ENERGY' from *MINDSCAPES*

Renewable and Non-Renewable Sources - Alternative Sources -Conservation -Nuclear Energy

UNIT-III

Topics: Vocabulary, impromptu speech, creative writing, direct and indirect speech, fixed expressions, developing creative writing skills, accents, presentation skills, making posters, report writing

Text: 'ENGINEERING ETHICS' from *MINDSCAPES*

Challenger Disaster - Biotechnology - Genetic Engineering - Protection From Natural Calamities

UNIT-IV

Topics: Vocabulary, Conversation, Collocation, Group discussion, Note-making, Clauses, Interpreting charts and tables, Report writing.

Text: 'TRAVEL AND TOURISM' from *MINDSCAPES*

Advantages and Disadvantages of Travel - Tourism - Atithi Devo Bhava - Tourism in India

UNIT-V

Topics: Vocabulary, phrasal verbs, writing a profile, connectives, discourse markers, problem-solving, telephone skills, application letters, curriculum vitae, interviews (telephone and personal)

Text: 'GETTING JOB-READY' from *MINDSCAPES*

SWOT Analysis - Companies And Ways Of Powering Growth - Preparing For Interviews

Prescribed Text

***MINDSCAPES*:** English for Technologists and Engineers, Orient Blackswan, 2014.

REFERENCES:

1. **Effective Tech Communication**, [Rizvi](#), Tata McGraw-Hill Education, 2007.
2. **Technical Communication**, Meenakshi Raman, Oxford University Press.
3. **English Conversations Practice**, Grant Taylor, Tata Mc GrawHill publications, 2013.
4. **Practical English Grammar**. Thomson and Martinet, OUP, 2010.

Expected Outcomes:

At the end of the course, students would be expected to:

1. Have acquired ability to participate effectively in group discussions.
2. Have developed ability in writing in various contexts.
3. Have acquired a proper level of competence for employability.

MITUVA

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B.Tech. I - II Sem. (ME)

T	Tu	C
3	1	3

**(15A54201) MATHEMATICS – II
(Common to All Branches)**

Objectives: Our emphasis will be more on conceptual understanding and application of Fourier series, Fourier, Z and Laplace transforms and solution of partial differential equations.

UNIT – I

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions- Parseval's formula- Complex form of Fourier series.

UNIT – III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT – V

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.

REFERENCES:

1. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes: The student gains the knowledge to tackle the engineering problems using the concepts of Fourier series, various transforms and partial differential equations.

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ANANTHAPURAMU**

B.Tech. I - II Sem. (ME)

Th	Tu	C
3	1	3

(15A03201) MATERIAL SCIENCE AND ENGINEERING

Course Objective:

To gain and understanding of the relationship between the structure, properties, processing, testing, heat treatment and applications of metallic , non metallic, ceramic and composite materials so as to identify and select suitable materials for various engineering applications.

UNIT I

STRUCTURE OF METALS: Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

CONSTITUTION OF ALLOYS: Necessity of alloying, types of solid solutions, Hume Rotherys rules, intermediate alloy phases, and electron compounds.

Learning outcome & Suggested Student Activities:

Students will get knowledge on bonds of solids and knowing the crystallization of metals. By knowing the grain size and shape through the crystallization, he may understand the effect of grain boundaries on the properties of metals and finally he determines the grain size that is very essential for analyzing the microstructures of metals.

*Students are advised to refer the following websites
www.physics.rutgers.edu/meis/pubs/BB_thesis.pdf
www.ce.berkeley.edu/~paulmont/CE60New/alloys-steel.pdf for better understanding of this topic.*

UNIT II

EQUILIBRIUM OF DIAGRAMS: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction. Transformations in the solid state – allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, and Fe-Fe₃C

Learning outcome & Suggested Student Activities:

Students will be able to construct the equilibrium diagrams by experimental methods and knowing all types of equilibrium diagrams isomorphs alloy systems , electric systems, pertectic systems solid-state transformations etc. while studying all these diagrams he may able to know about lever rule and phase rule.

*Students are advised to visit the following URLs website www.freelance-teacher.com/videos.htm
www.susqu.edu/brake/aux/downloads/papers/foamcomp.pdf for better understanding of this topic.*

UNIT III

CAST IRONS AND STEELS: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

NON-FERROUS METALS AND ALLOYS: Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

Learning Outcome & Suggested Student Activities:

Students will be able to learn the structure and properties of all cast irons, steels and Non-ferrous metal alloys of copper, Al and Titanium. Students are advised to visit any Machine shop in the industries like SAIL, Visakhapatnam steel plant etc., Students are advised to visit the following website. www.buzzle.com, www.mhprofessional.com www.eng.sut.ac for better understanding of this topic.

UNIT IV

HEAT TREATMENT OF ALLOYS: Effect of alloying elements on Iron – Iron carbon system, Annealing, normalizing, Hardening, TTT diagrams, tempering, Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys. Heat treatment of plastics

Learning outcome & Suggested Student Activities:

Students will be able to learn the methods of different heat treatments i.e. annealing, normalizing and hardening. He also learns the different of alloying elements on Iron-Iron carbon system, the importance of TTT diagrams, Hardenability that are very essential for melting science. Finally, he learn about the heat treatment of cryogenic environment as an advance topic.

Students are advised to go through the URLs <http://www.nptel.iitm.ac.in/> and iisc.ernet.in for video lectures, <http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv180-Page1.htm>

UNIT V

CERAMIC MATERIALS: Crystalline ceramics, glasses, cermets.

COMPOSITE MATERIALS: Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, polymer composites, metal ceramic mixtures, metal – matrix composites and Carbon – Carbon composites.

Learning Outcome & Suggested Student Activities:

This unit helps the students to understand the importance of advanced composite materials in application to sophisticated machine and structure of components, These composite materials helps to develop the components with required properties which we cannot attain using the metals & metal alloys.

Examples of products maybe of composite materials are air cooler bodies, fiber reinforced hose pipes, boat bodies some automobile body frames etc. Students may refer the following website for better understanding www.susqu.edu/brake/aux/downloads/papers/foamcomp.pdf; www.asmenternation.org www.princeton.edu/~achaney/tmve/wiki100k/doc/metal_matrix_composite.html

Text Books:

1. *Introduction to Physical Metallurgy*, Sidney H. Avner, US, 2nd Edition, 2007 Tata McGraw-Hill,
2. *Essential of Materials Science and Engineering*, Donald R. Askeland, USA, 3rd Edition, Cengage Publisher, 2013.

Reference Books:

1. *Material Science and Metallurgy*, U.C. Jindal, pearson educations, 2011,
2. *Elements of Materials Science and Engineering*, Lawrance H. Van Vlack, pearson educations, 6th Edition, 2002.
3. *Material Science and Metallurgy*, kodgire V.D, 12th Edition, Everest Publishing House, 2002.
4. *Engineering Mechanics of Composite Materials-* Isaac and M Daniel, Oxford University Press, 1994, 2nd Edition 2013.
5. *Mechanics of Composite Materials*, R. M. Jones, McGraw Hill Company, New York, 1975.
6. *Science of Engineering Materials*, Agarwal, TMH.
7. *Materials Science and Engineering*, William D. Callister, 8th Edition, 2010.
8. *Elements of Material science*, V. Rahghavan, PHI, 5th Editon.
9. *Engineering Materials and Their Applications* – R. A Flinn and P K Trojan, Jaico Books.
10. *Engineering materials and metallurgy*, R.K.Rajput, S.Chand, 1st Editon, 2008.

Web References:

www.asminternational.org
www.henry.wells.edu
www.ce.berkeley.edu
www.sjsu.edu

2015-2016

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B.Tech. I - II Sem. (ME)

T	Tu	C
3	1	3

(15A56101) ENGINEERING PHYSICS

Objectives:

- To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
- To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and non-destructive evaluation using ultrasonic techniques.
- To get an insight into the microscopic meaning of conductivity, classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.
- To open new avenues of knowledge and understanding semiconductor based electronic devices, basic concepts and applications of semiconductors and magnetic materials have been introduced which find potential in the emerging micro device applications.
- To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.

UNIT - I

PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Physical Optics: Interference (Review) – Interference in thin film by reflection – Newton's rings – Diffraction (Review) - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Excitation mechanism and optical resonator – Nd:YAG laser - He-Ne laser – Semiconductor Diode laser - Applications of lasers

Fiber optics: Introduction - construction and working principle of optical fiber – Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in Optical fibers –Block diagram of Optical fiber communication system – Applications of optical fibers

UNIT – II

CRYSTALLOGRAPHY AND ULTRASONICS

Crystallography: Introduction – Space lattice – Unit cell – Lattice parameters – Bravais lattice – Crystal systems – Packing fractions of SC, BCC and FCC – Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction – Bragg's law – Powder method.

Ultrasonics: Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

UNIT – III

QUANTUM MECHANICS AND ELECTRON THEORY

Quantum Mechanics: Matter waves – de Broglie hypothesis and properties – Schrodinger's time dependent and independent wave equations – Physical significance of wave function – Particle in one dimensional infinite potential well.

Electron theory: Classical free electron theory – Equation for electrical conductivity – Quantum free electron theory – Fermi-Dirac distribution – Source of electrical resistance – Kronig-Penny model (qualitative treatment) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT – IV

SEMICONDUCTORS AND MAGNETIC MATERIALS

Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative treatment) – Drift & diffusion currents and Einstein's equation – Hall effect – Direct and indirect band gap semiconductors – Formation of p-n junction.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magneton – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative treatment) – Hysteresis – Soft and hard magnetic materials, applications of magnetic materials.

UNIT – V

SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS

Superconductivity: Introduction – Effect of magnetic field – Meissner effect – Type I and Type II superconductors – Flux quantization – Penetration depth – BCS theory (qualitative treatment) – Josephson effects – Applications of superconductors.

Physics of Nanomaterials: Introduction – Significance of nanoscale and types of nanomaterials – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches: ball mill, chemical vapour deposition, and sol gel – Applications of nanomaterials.

Text Books:

1. Engineering Physics – K.Thyagarajan, 5th Edition, MacGraw Hill Publishers, New Delhi, 2014.
2. Physics for Engineers – N.K Verma, 1st Edition, PHI Learning Private Limited, New Delhi, 2014.

References:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10th Edition, S.Chand and Company, New Delhi, 2014.
2. Engineering Physics – D K Pandey, S. Chaturvedi, 2nd Edition, Cengage Learning, New Delhi, 2013.
3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1st Edition, Oxford University Press, New Delhi, 2015.

Outcomes:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
- The properties and device applications of semiconducting and magnetic materials are illustrated.

The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

2015-2016

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

B.Tech. I - II Sem. (ME)

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(15A03101) ENGINEERING DRAWING

Objectives:

- To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.
- To learn about various projections, to understand complete dimensions and details of object.
- Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance- Conventions in Drawing-Lettering – BIS Conventions. Curves used in Engineering Practice. a) Conic Sections including the Rectangular Hyperbola- General method only, b) Cycloid, Epicycloid and Hypocycloid

UNIT II

Scales: Plain, Diagonal and Vernier;

Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Lines: lines inclined to one or both planes, Problems on projections, Finding True lengths.

Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Regular Solids with axis inclined to both planes.

Developments of Solids: Development of Surfaces of Right Regular Solids- Prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books:

1. *Engineering Drawing*, N.D. Bhatt, Charotar Publishers

2. *Engineering Drawing*, K.L. Narayana & P. Kannaih, Scitech Publishers, Chennai

References:

1. *Engineering Drawing*, Johle, Tata McGraw-Hill Publishers
2. *Engineering Drawing*, Shah and Rana, 2/e, Pearson Education
3. *Engineering Drawing and Graphics*, Venugopal/New age Publishers
4. *Engineering Graphics*, K.C. John, PHI, 2013
5. *Engineering Drawing*, B.V.R. Guptha, J.K. Publishers

Outcomes:

- Drawing 2D and 3D diagrams of various objects.
- Learning conventions of Drawing, which is a Universal Language of Engineers.
- Drafting projections of points, planes and solids.

2015-2016

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

B.Tech. I - II Sem. (ME)

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(15A03202) MATERIAL SCIENCE and ENGINEERING LAB

1. Mounting and preparation of Specimen.
2. Preparation and study of the Micro Structure of Ferrous metal
3. Preparation and study of the Microstructure of Non - Ferrous metals (Cu, Al..... etc)
4. Preparation and study of the Microstructure of Mild Steel, Low carbon Steels, High carbon steels
5. Study of the Micro Structures of Cast Irons.
6. Study of the Micro Structures of Non-Ferrous alloys.
7. Study of the Micro structures of Heat treated steels.
8. Hardeneability of steels by Jominy End Quench Test.
9. To find out the hardness of various treated and untreated steels.
10. Fracture testing of materials.
11. Fatigue testing of meterials.
12. Creep Testing of materials.

2015-2016

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

B.Tech. I - II Sem. (ME)

P	C
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(15A56102) ENGINEERING PHYSICS LABORATORY

Objectives:

- Will recognize the important of optical phenomenon like Interference and diffraction.
- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the application of laser in finding the particle size and its role in diffraction studies.
- Will learn to synthesis of the nanomaterials and recognize its importance by knowing its nano particle size and its impact on its properties.

Any 10 of the following experiments has to be performed during the I year I semester

1. Determination of radius of curvature of a Plano-convex lens by forming Newton's rings.
2. Determination of wavelength of given source using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle of an optical fiber.
4. Energy gap of a Semiconductor diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss for a given magnetic material.
7. Determination of Crystallite size using X-ray pattern (powder) using debye-scheerer method.
8. Determination of particle size by using laser source.
9. Determination of dispersive power of a prism.
10. Determination of thickness of the thin wire using wedge Method.
11. Laser : Diffraction due to single slit
12. Laser : Diffraction due to double slit
13. Laser: Determination of wavelength using diffraction grating
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Synthesis of nanomaterial by any suitable method.

References:

1. Engineering Physics Practicals – NU Age Publishing House, Hyderabad.
2. Engineering Practical physics – Cengage Learning, Delhi.

Outcomes:

- Would recognize the important of optical phenomenon like Interference and diffraction.
- Would have acquired the practical application knowledge of optical fiber, semiconductor, dielectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.

Would recognize the significant importance of nanomaterials in various engineering fields.

2015-2016

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTHAPURAMU**

B.Tech. I - II Sem. (ME)

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(15A99201) ENGINEERING & I.T. WORKSHOP

ENGINEERING WORKSHOP

Course Objective:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labour involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

1. TRADES FOR EXERCISES:

- Carpentry shop– Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock
- Fitting shop– Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock
- Sheet metal shop– Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet
- House-wiring– Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.
- Foundry– Preparation of two moulds (exercises): for a single pattern and a double pattern.
- Welding – Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint.

2. TRADES FOR DEMONSTRATION:

- Plumbing
- Machine Shop
- Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may

not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

References:

1. *Engineering Work shop practice for JNTU*, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009
2. *Work shop Manual* / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. *Engineering Practices Lab Manual*, Jeyapoovan, SaravanaPandian, 4/e Vikas
4. *Dictionary of Mechanical Engineering*, GHF Nayler, Jaico Publishing House.

I.T. WORKSHOP

Course Objective:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching.

Learning Outcome:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

Preparing your Computer (5 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Operating system features: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives,

write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet (4 weeks)

Task 5: Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimping activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6: Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc. If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, and search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools (6 weeks)

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the color, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations : creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with

different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.Tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

References:

1. Introduction to Computers, Peter Norton, Mc Graw Hill
2. MOS study guide for word, Excel, Powerpoint & Outlook Exams”, Joan Lambert, Joyce Cox, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Networking your computers and devices, Rusen, PHI
5. Trouble shooting, Maintaining & Repairing PCs”, Bigelows, TMH



JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
Course Structure for Mechanical Engineering
B. Tech Course
(2015-16)

II B. Tech – I Sem

S.No.	Course Code	Subject	L	Tu	Lab	C
1	15A54301	Mathematics - III	3	1	-	3
2	15A52301	Managerial Economics & Financial Analysis	3	1	-	3
3	15A01308	Mechanics of Solids	3	1	-	3
4	15A03301	Engineering Drawing for Mechanical Engineers	3	1	-	3
5	15A03302	Engineering Mechanics	3	1	-	3
6	15A03303	Thermodynamics	3	1	-	3
7	15A01309	Mechanics of Solids Lab	-	-	4	2
8	15A01304	Computer Aided Drafting Lab	-	-	4	2
		Total	18	06	08	22

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech II - I sem (M.E)

T	Tu	C
3	1	3

(15A54301) MATHEMATICS-III

(Common to All Branches)

Objectives:

- This course aims at providing the student with the concepts of Matrices, Numerical Techniques and Curve fitting.

UNIT – I

Elementary row transformations-Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations. Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonalization of matrix. Calculation of powers of matrix and inverse of a matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT – II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.

UNIT – III

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT – IV

Curve fitting: Fitting of a straight line – Second degree curve – Exponential curve-Power curve by method of least squares. Numerical Differentiation for Newton's interpolation formula. Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods. Numerical solutions of Laplace equation using finite difference approximation.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

REFERENCES:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes: The student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech II - I sem (M.E)

T	Tu	C
3	1	3

(15A52301) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives: The objective of this course is to equip the student with the basic inputs of Managerial Economics and Economic Environment of business and to impart analytical skills in helping them take sound financial decisions for achieving higher organizational productivity.

Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS

Managerial Economics – Definition- Nature- Scope - Contemporary importance of Managerial Economics - Relationship of Managerial Economics with Financial Accounting and Management. **Demand Analysis:** Concept of Demand-Demand Function - Law of Demand - Elasticity of Demand- Significance - Types of Elasticity - Measurement of elasticity of demand - Demand Forecasting- factors governing demand forecasting- methods of demand forecasting.

UNIT II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function- Least cost combination- Short-run and Long- run production function- Isoquants and Isocosts, MRTS - Cobb-Douglas production function - Laws of returns - Internal and External economies of scale - **Cost Analysis:** Cost concepts and cost behavior- Break-Even Analysis (BEA) -Determination of Break Even Point (Simple Problems)- Managerial significance and limitations of Break- Even Point.

UNIT III: INTRODUCTION TO MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly-Monopolistic Competition-Oligopoly-Price-Output Determination - Pricing Methods and Strategies-Forms of Business Organizations- Sole Proprietorship- Partnership – Joint Stock Companies - Public Sector Enterprises – New Economic Environment- Economic Liberalization – Privatization - Globalization.

UNIT IV: INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Financial Accounting – Concept - Emerging need and Importance - Double-Entry Book Keeping- Journal - Ledger – Trial Balance - Financial Statements - Trading Account – Profit & Loss Account – Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

UNIT V: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Over and Undercapitalization – Remedial Measures - Sources of Short term and Long term Capital - Estimating Working Capital Requirements – Capital Budgeting – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcome: After completion of this course, the student will be able to understand various aspects of Managerial Economics and analysis of financial statements and inputs therein will help them to make sound and effective decisions under different economic environment and market situations.

TEXT BOOKS:

1. Managerial Economics 3/e, Ahuja H.L, S.Chand, 2013.
2. Financial Management, I.M.Pandey, Vikas Publications, 2013.

REFERENCES

1. Managerial Economics and Financial Analysis, 1/e, Aryasri, TMH, 2013.
2. Managerial Economics and Financial Analysis, S.A. Siddiqui and A.S. Siddiqui, New Age International, 2013.

Accounting and Financial Management, T.S.Reddy & Y. Hariprasad Reddy, Margham Publishers.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech II - I sem (M.E)

T	Tu	C
3	1	3

(15A01308) MECHANICS OF SOLIDS

Course Objective:

The objective of the subject is to learn the fundamental concepts of stress, strain and deformation of solids with applications to bars and beams. The students shall understand the theory of elasticity including strain/displacement and hooks law relationships. To access stresses and deformations through the mathematical models of beams for bending and bars for twisting or combination of both. The knowledge of this subject will help in the design & Theory of machines courses.

UNIT I

SIMPLE STRESSES & STRAINS: Elasticity and plasticity – Types of stresses & strains – Hooke's law – stress & strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings. Principle stresses and strains-computation of principle stresses and strains on inclined planes-theory of failures- minimum principle stress, strain, shear stress and strain energy theories.

Learning Outcome & Suggested Student Activities:

This unit gives the student how to measure the strength of materials based on calculating stresses, strains and deformations for basic geometries subjected to axial loading and thermal effects. Students are advised to visit the URL http://nptel.iitm.ac.in/courses/IIT-MADRAS/Strength_of_Materials/Pdfs/1_1.pdf.

UNIT II

SHEAR FORCE AND BENDING MOMENT : Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, U.D.L., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

Learning outcome & Suggested Student Activities:

This unit gives awareness for the students how to draw shear force and bending moment diagrams for calculating maximum shear force and maximum bending moment for different types of beams with different lateral loadings conditions. This topic can be downloaded from the URL [http://vedyadhara.ignou.ac.in/wiki/images/a/ad/BME-017_B-1\(Unit_4\).pdf](http://vedyadhara.ignou.ac.in/wiki/images/a/ad/BME-017_B-1(Unit_4).pdf)

UNIT III

FLEXURAL STRESSES: Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ Neutral axis –Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections – Design of simple beam sections, crane hooks.

SHEAR STRESSES: Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I , T angle sections, shear centre.

Learning outcome & Suggested Student Activities:

This unit gives knowledge to the students about the strength of the beams with different sections by bringing the relationship between the bending stress and maximum bending moment, bringing the relationship between the shear stress and maximum shear force which are calculated from previous unit. This topic can be downloaded from the following URL http://web.mit.edu/emech/dontindex-build/full-text/emechbk_7.pdf.

UNIT IV

TORSION OF CIRCULAR SHAFTS- Theory of pure torsion- Derivation of torsion equations; $T/J = q/r = N\theta/L$ – Assumptions made in the theory of pure torsion- torsional moment of resistance- polar section modulus.

DEFLECTION OF BEAMS: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L uniformly varying load. Mohr's theorems – Moment area method – application to simple cases including overhanging beams.

Learning outcome & Suggested Student Activities:

This unit gives awareness to the students how to calculate the shear strength of the solid and hallow shafts which are subjected to torsional loading in power transmitting. This topic related to torsion can be download from the following URLs

http://www.mae.ncsu.edu/zhu/courses/mae314/lecture/Lecture4_Torsion.pdf, and also gives better knowledge for students how to calculate deflections of beam using different methods under different boundary and loading conditions. Notes for this topic can be download from the web site http://nptel.iitm.ac.in/courses/IIT-MADRAS/Strength_of_Materials/Pdfs/5_1.pdf.

UNIT V

THIN CYLINDERS: Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – changes in diameter, and volume of thin cylinders – Riveted boiler shells – Thin spherical shells.

THICK CYLINDERS: Lame's equation – cylinders subjected to inside & outside pressure - compound cylinders.

Learning outcome & Suggested Student Activities:

This unit gives application to mechanics of solids for students in which how to calculate different stresses and strains for the thin and thick cylinders in identifying safe design for boiler shells and thick shells as such in like domestic cylinders, air compressor and high pressure vessels used in thermal plants etc. Notes for this topic can be download from the site

[http://www.ewp.rpi.edu/hartford/users/papers/engr/ernesto/poworp/Project/4.%20Supporting_Material/Books/32658_09 & 10.pdf](http://www.ewp.rpi.edu/hartford/users/papers/engr/ernesto/poworp/Project/4.%20Supporting_Material/Books/32658_09%20&10.pdf).

Text Books:

1. *Strength of Materials* by R.Subramaniam, oxford publishers.
2. *Strength of Materials* by R.K. Bansal, Laxmi Publishers, 5th Edition, 2012.
3. *Mechanics of Materials*, Andrews Pytel, Jaan Kiusallaas & M.M.M.Sarcar (Second Edition), Cengage Learning Publishers.

Reference Books:

1. *Strength of Materials* by S. Ramamrutham, Dhanpat Rai Publishers
2. *Strength of Materials* by R.K. Rajput, S.Chand & Company, 5th Edition, 2012.
3. *Strength of Materials* by Dr. Sadhu Singh, Khanna Publishers, 10th Edition, 2013.
4. *Strength of Materials* by M.Chakraborti, S.K.Kataria & Sons, 2nd Edition, 2011.
5. *Strength of Materials* by S S Rattan, The McGraw-Hill Companies, 2nd Editon, 2011.

Suggestions:

- Students are advised to buy a text book for understanding problems then they may buy *Strength of materials* by R.K.Bansal, Laxmi Publishers & For further more problems *Strength of Materials* by R.K. Rajput, S.Chand & Company
- Students may go around some of the small scale industries and domestic orientated jobs gives better knowledge on to check strength of materials.
- Some basic knowledge regarding Engineering mechanics, Mathematics and Physics are required for understanding this subject.

Web Resources:

<http://nptel.iitm.ac.in/>

www.learnerstv.com/Free-Engineering-video-lecture-courses.htm

http://en.wikibooks.org/wiki/Strength_of_Materials

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

B. Tech II - I sem (M.E)

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(15A03301) ENGINEERING DRAWING FOR MECHANICAL ENGINEERS

Course Objective: To enhance the student's knowledge and skills in engineering drawing of solids with interpenetration of solids and to present isometric and perspective projections.

Unit –I

Sections and Developments of Solids: Section Planes and Sectional View of Right Regular Solids- Prism, cylinder, Pyramid and Cone. True shapes of the sections and their development of Surfaces

Unit –II

Isometric projection: Isometric views of Sectional Planes, and Sectional Solids, Objects.

Unit –III

Conversion of Pictorial views to orthographic views –Conventions.

Unit –IV

Interpenetration of Right Regular Solids: Projections of Curves of intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Square Prism Vs Square Prism.

Unit –V

Perspective Projections: Perspective View of Plane Figures and simple Solids, Visual Ray Method, Vanishing point method.

Text Books:

1. *Engineering Drawing*, N.D. Bhat, Charotar Publishers
2. *Engineering Drawing*, K.L. Narayana & P. Kannaih, Scitech Publishers, Chennai.

References:

1. *Engineering Drawing*, Johle, Tata McGraw-Hill Publishers, 2014
2. *Engineering Drawing*, N.S Patha sarathy, vela murali, Oxford University Press, 2015
3. *Engineering Graphics* D.A.Hindoliya, BSP publications, 2014
4. *Engineering Graphics*, K.C.John, PHI, 2014

Suggestions:

Student is expected to buy a book mentioned under 'Text books' for better understanding.
Student should prepare rough sketches for all the problems given at the end of each chapter to improve his / her imaginations.
Student should also practice Auto CAD or any other drawing software to help understanding better.

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(15A03302) ENGINEERING MECHANICS

OBJECTIVE: *This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.*

UNIT – I

Introduction of Engineering Mechanics – Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II

Friction : Types of friction– laws of Friction – Limiting friction- Cone of limiting friction– static and Dynamic Frictions – Motion of bodies – Wedge and Screw jack

UNIT – III

Centroid and Center of Gravity: Centroids of simple figures – Centroids of Composite figures – Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures.

Mass Moment of Inertia: Moment of Inertia of Simple solids – Moment of Inertia of composite masses.(Simple problems only)

UNIT – IV

Kinematics: Rectilinear and Curvilinear motion – Velocity and Acceleration – Motion of A Rigid Body – Types and their Analysis in Planar Motion.

Kinetics: Analysis as a particle and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies

UNIT – V

Analysis of Perfect Frames: Types of frames – cantilever frames and simply supported frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

Mechanical Vibrations: Definitions, Concepts-Simple Harmonic motion-Free vibrations-Simple, Compound and Torsional pendulum- Numerical problems

Text Books:

- (1) *Engineering Mechanics* by Jayakumar, Kumar, PHI, 2014
- (2) *Singer's Engineering Mechanics Statics and Dynamics*, Vijay Kumar Reddy, Suresh Kumar. BS Publications 2015
- (3) *Engineering Mechanics – B. Bhattacharyya*, Oxford University Publications, 2015

References:

- (1) *Engineering Mechanics* by Seshigiri Rao, Rama Durgaiah, Universities Press, 2005
- (2) *Engineering Mechanics* by Shames & Rao – Pearson Education.
- (3) *Engineering Mechanics* by Ferdinand L. Singer – Harper Collings Publishers.
- (4) *Engineering Mechanics (Statics and Dynamics)* by Pytel, Kiusalaas; Cengage, 2015
- (5) *Engineering Mechanics* by S. Timoshenko, D.H. Young and J.V. Rao, Tata McGraw-Hill Company
- (6) *Engineering Mechanics* by Chandramouli, PHI publications.

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(15A03303) THERMODYNAMICS

Course Objective:

By this subject students will get the awareness on basic thermodynamic principles, skills to perform the analysis and design of thermodynamic systems, First law and second law of thermodynamics and its applications to a wide variety of systems, principles of psychrometry and properties of pure substances. And also understand the concept of various air standard cycles with the help of P-v and T-s Diagrams.

UNIT I

BASIC CONCEPTS: Macroscopic and Microscopic Approaches, Thermodynamic System, State, Property, Process and Cycle, Quasi Static Process, Thermodynamic Equilibrium, Quasi-static Process, Zeroth Law of Thermodynamics,

WORK & HEAT TRANSFER: Work transfer, types of work transfers, Point and Path Functions, Heat transfer, Comparison of Work and Heat transfers.

Learning Outcome & Suggested Student Activities:

Students can able to understand thermodynamic property, cycle, constraints of equilibrium, reversibility and energy transfer in the form of Work and Heat with various applications. Students are advised to collect different types of thermometers, measure the temperature of a given room/substance and compare the values. Following URL is very useful for better understanding <http://www.nptel.iitm.ac.in>. Students may refer text book of Fundamentals of Engineering Thermodynamics By Michael J. Moran, Howard N. Shapiro.

UNIT II

FIRST LAW OF THERMODYNAMICS: First Law applied to a process and a cycle, Energy - a property, Forms and transformation of Energy, Internal Energy and Enthalpy, PMM I.

FLOW SYSTEMS: Control Volume, Steady Flow Process, Mass balance and Energy Balance, Applications of Steady Flow Processes.

Learning Outcome & Suggested Student Activities:

Student will learn how energy transformation occurs from one form into another form in open and closed systems and applying steady flow energy equation and mass balance equation to various applications.

Student is advised to observe the Nozzle, Diffuser, Throttling device, Turbine and compressor in laboratories or local industries and understand their working principles practically. Notes of First law of thermodynamics can be downloaded from the website <http://nptel.iitm.ac.in/courses/103101004/downloads/chapter-3.pdf>.

UNIT III

Second Law of Thermodynamics: Heat Engine, Statements of Second law and their equivalence, Refrigeration and Heat Pump, Reversibility and Irreversibility, Carnot cycle and Carnot's Theorem, Thermodynamic Temperature Scale, Efficiency of Heat Engine, PMM II

Entropy: Clausius' Theorem, Entropy as a property, T-s Plot, Clausius Inequality, Principle of Entropy Increase and its applications. Available Energy, Quality of Energy, definitions of Dead state, Availability.

Learning Outcome & Suggested Student Activities:

Student will identify the major difference in working of a heat engine, refrigerator and heat pump. to calculate the maximum efficiency of a cycle. Also student can learn calculating entropy change for a process, maximum available energy. Student is advised to visit laboratories of Heat Engines, Refrigeration and Air conditioning and observe how they work. Student may refer text book Fundamentals of Classical Thermodynamics - G.J.VanWylen& Sonntag

UNIT IV

Pure Substances: P-v, P-T, T-s diagrams of Pure Substances, Mollier Diagram, Dryness Fraction, Use of Steam Tables for Thermodynamic Properties

Thermodynamic Relations: Maxwell's equations, TDS equations, Joule-Kelvin Effect, Clausius-clapeyron equation.

Learning Outcome & Suggested Student Activities:

After the completion of the unit, student will be able to understand the method drawing phase equilibrium diagrams like P-v, h-s, T-s and P-T of a pure substance. Student can learn the usage of steam tables and mollier diagrams in solving problems. Also, the student will learn the cooling / heating effect of throttling process. Thermodynamic relations.

Student is advised to do the experiment on water (To cool / heat water) from atmospheric conditions and observe freezing / boiling point temperatures, changes in volume etc. Repeat the same experiment under different pressure.

UNIT V

Properties of Gases and Gas Mixtures: Ideal Gas, Equation of State, Avogadro's Law, Internal Energy and Enthalpy of Ideal Gas, Entropy Change of Ideal Gas, Mixture of Gases- Dalton's Law of Partial Pressure, Specific Heats, Internal Energy and Enthalpy of Gas Mixtures

Gas Power Cycles: Carnot Cycle, Sterling Cycle, Ericson Cycle, Otto Cycle, Diesel Cycle, Dual Cycle, their applications, comparison of Otto, Diesel and Dual cycles, Second Law Analysis of Gas Power Cycles

Learning Outcome & Suggested Student Activities:

Student will learn basic laws of ideal gas and gas mixtures. After studying Gas Power Cycles, student will understand the concept of ideal cycles for different engines and their working principle. Student can know drawing P-V and T-S diagrams for various air standard cycles and calculating work output, efficiency, mean effective pressure of each cycle.

Student is advised to conduct experiments in I.C Engines lab to find out the actual thermal efficiencies of Diesel and Petrol Engines and compare them with respect to ideal cycles.

Text Books:

1. *Engineering Thermodynamics*, P.K Nag, TMH Publishers, New Delhi, 5th Edition, 2013.
2. *Engineering Thermodynamics* by P. Chattopadhyaya, Oxford, 1st Revised, 2016

Reference Books:

1. *Thermodynamics for Engineers*, Kenneth A. Kroos, Marle C. Potter, V. Pandurangadu.
2. *Fundamentals of Thermodynamics* – Sonntag, Borgnakke and van Wylen, John Wiley & sons
3. *Thermodynamics – An Engineering Approach* – Yunus Cengel & Boles, TMH, 2011.
4. *Thermodynamics* – J.P. Holman, McGrawHill, 2nd Edition company New York 1975.
5. *An introduction to Thermodynamics*, YVC Rao, Universities press, 2009 Revised Edition,
6. *Engineering Thermodynamics* – J.B. Jones & R.E. Dugan, PHI, 1st Edition, 2009.

NOTE: Steam tables, Mollier Diagrams should be supplied

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(15A01309) MECHANICS OF SOLIDS LABORATORY

MECHANICS OF SOLIDS LAB

1. Direct tension test beam
2. Bending test on
 - a) Simply supported beam
 - b) Cantilever beam
3. Torsion test
4. Hardness test
5. Brinells hardness test
6. Rockwell hardness test
7. Test on springs
8. Compression test on cube
9. Impact test
10. Punch shear test

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(15A03304) COMPUTER AIDED DRAFTING LAB

LIST OF EXPERIMENTS:

- I Introduction to Computer Aided Drafting software packages.
- II. Practice on basic elements of a Computer Aided Drafting packages
- III. Practice on features of a Computer Aided Drafting package
- IV Drafting of Solids, Intersection of Solids
- V Drafting of Perspective views
- VI Drafting of Orthographic views of simple parts

Note: Any of the standard Software Packages like – AUTO CAD, Pro-E, Uni – Graphics, Catia
Etc may be used

References:

- 1. Computer – Aided Engineering Drawing, S. Trymbaka Murthy. University Press.
- 2. Engineering Graphics for Degree, K.C. John. PHI Publications.