



**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)**

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**(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.

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**(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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**(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](http://www.physics.rutgers.edu/meis/pubs/BB_thesis.pdf)*

*[www.ce.berkeley.edu/~paulmont/CE60New/alloys-steel.pdf](http://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-Fe<sub>3</sub>C

**Learning outcome & Suggested Student Activities:**

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

*Students are advised to visit the following URL's website [www.freelance-teacher.com/videos.htm](http://www.freelance-teacher.com/videos.htm)*

*[www.susqu.edu/brake/aux/downloads/papers/foamcomp.pdf](http://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](http://www.buzzle.com), [www.mhprofessional.com](http://www.mhprofessional.com) [www.eng.sut.ac](http://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, Harden ability 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](http://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](http://www.susqu.edu/brake/aux/downloads/papers/foamcomp.pdf); [Asmenternation.org](http://Asmenternation.org) [www.princeton.edu/~achaney/tmve/wiki100k/doc/metal\\_matrix\\_comp osite.html](http://www.princeton.edu/~achaney/tmve/wiki100k/doc/metal_matrix_comp osite.html)*



**Text Books:**

1. *Introduction to Physical Metallurgy*, Sidney H. Avner, US, 2<sup>nd</sup> Edition, 2007 Tata McGraw-Hill,
2. *Essential of Materials Science and Engineering*, Donald R. Askeland, USA, 3<sup>rd</sup> 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, 6<sup>th</sup> Edition, 2002.
3. *Material Science and Metallurgy*, kodgire V.D, 12<sup>th</sup> Edition, Everest Publishing House, 2002.
4. *Engineering Mechanics of Composite Materials*- Isaac and M Daniel, Oxford University Press, 1994, 2<sup>nd</sup> 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, 8<sup>th</sup> Edition, 2010.
8. *Elements of Material science*, V. Rahghavan, PHI, 5<sup>th</sup> 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, 1<sup>st</sup> Editon, 2008.

**Web References:**

[www.asminternational.org](http://www.asminternational.org)  
[www.henry.wells.edu](http://www.henry.wells.edu)  
[www.ce.berkeley.edu](http://www.ce.berkeley.edu)  
[www.sjsu.edu](http://www.sjsu.edu)

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**(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, 5<sup>th</sup> Edition, MacGraw Hill Publishers, New Delhi, 2014.
2. Physics for Engineers – N.K Verma, 1<sup>st</sup> Edition, PHI Learning Private Limited, New Delhi, 2014.

**References:**

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10<sup>th</sup> Edition, S.Chand and Company, New Delhi, 2014.
2. Engineering Physics – D K Pandey, S. Chaturvedi, 2<sup>nd</sup> Edition, Cengage Learning, New Delhi, 2013.
3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1<sup>nd</sup> 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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**(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 an Universal Language of Engineers.
- Drafting projections of points, planes and solids.

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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 materials.
12. Creep Testing of materials.

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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.

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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 gauge 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

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