JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::ANANTHAPURAMU

DEPARTMENT OF MECHANICAL ENGINEERING

UG SYLLABUS FOR R20 REGULATIONS

Program Outcomes:

1	**Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems
2	**Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
3	**Design/Development Of Solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4	**Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions
5	**Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	**The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice
7	**Environment and Sustain ability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	**Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multi disciplinary settings.
10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11	**Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi disciplinary environments.

12	**Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

PSO 1	Identify, Formulate and Analyze complex Mechanical Engineering problems
PSO 2	Ability to implement the learned principles of Mechanical Engineering to Understand, analyze, evaluate and create more advanced mechanical systems or processes.
PSO 3	Ability to apply Mechanical Engineering Skills and Managerial Skills to Become Entrepreneurs and build the Attitude to innovate.

VISION AND MISSION OF THE DEPARTMENT

VISION :

To be a centre of excellence in the field of Mechanical Engineering for providing its students and faculty with opportunities for excel in education and targeted research themes in emerging areas.

MISSION:

- **M1:** Providing students with sound mechanical engineering knowledge, practices, skills and training
- **M2:** Enriching the quality of life of students through teaching, research, internships, outreach programs and symposiums.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR COLLEGE OF ENGINEERING (Autonomous), ANANTHAPURAMU

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B.Tech (Mechanical Engineering) (R20)
Course Structure

Induction Program – 3 weeks
I- Year B.Tech.

Semester - 1 (Theory - 4, Lab - 5)					
S.No	**Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Linear Algebra & Calculus	BS	3-0-0	3
2.		Fundamental Chemistry	BS	3-0-0	3
3.		C-Programming & Data Structures	ES	3-0-0	3
4.		**Material Science & Engineering**	**ES**	**3-0-0**	**3**
5.		**Engineering Workshop**	**LC**	**0-0-3**	**1.5**
6		IT Workshop	LC	0-0-3	1.5
7.		Fundamental Chemistry Lab	BS	0-0-3	1.5
8.		C-Programming & Data Structures Lab	ES	0-0-3	1.5
9.		**Material Science & Engineering Lab**	**ES**	**0-0-3**	**1.5**
Total					19.5

Semester – 2 (Theory – 5, Lab – 4)					
S.No	**Code**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.		Differential Equations and Vector Calculus	BS	3-0-0	3
2.		Engineering Physics	BS	3-0-0	3
3.		Communicative English	HS	3-0-0	3
4.		Basic Electrical & Electronics Engineering	ES	3-0-0	3
5		**Engineering Drawing**	**LC**	**1-0-2**	**2**
6.		**Engineering Graphics Lab**	**LC**	**0-0-2**	**1**
7.		Communicative English Lab	HS	0-0-3	1.5
8.		Engineering Physics Lab	BS	0-0-3	1.5
9.		Basic Electrical & Electronics Engineering Lab	ES	0-0-3	1.5
10		Universal Human Values	MC	3-0-0	0.0
Total					19.5

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JNTUA COLLEGE OF ENGINEERING (Autonomous)::ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. I-Sem

L	P	T	C
3	0	1	4

Linear Algebra & Calculus

Course Objectives:	
1	This course will illuminate the students in the concepts of calculus and linear algebra.
2	To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

Bridge Course: Limits, continuity, Types of matrices

Unit 1: Matrices

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneousequations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamiltontheorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem,diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction ofquadratic form to canonical forms by orthogonal transformation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors, diagonal form and different factorizations of a matrix;
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics.

Unit 2: Mean Value Theorems

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof)

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders
- Analyze the behaviour of functions by using mean value theorems

Unit 3: Multivariable calculus

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies.
- Acquire the Knowledge maxima and minima of functions of several variable
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables.

Unit 4: Multiple Integrals

Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates.

Learning Outcomes:

- At the end of this unit, the student will be able to
- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates
- Apply double integration techniques in evaluating areas bounded by region
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries

Unit 5: Special Functions

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- understand beta and gamma functions and its relations
- Conclude the use of special function in evaluating definite integrals

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1													2	2	
CO2	2			3										2	1
CO3	2	3											2	2	
CO4		3												2	1
CO5			3										2	2	1

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. I-Sem

L	T	P	C
2	1	0	3

Engineering Chemistry

COURSE OBJECTIVES	
1	To familiarize engineering chemistry and its applications
2	To impart the concept of soft and hard waters, softening methods of hard water
3	To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

Unit 1: Water Technology **(8 hrs)**

Introduction –Soft Water and hardness of water, Estimation of hardness of water by EDTA Method - Boiler troubles - scale and sludge, Industrial water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

Unit 2: Electrochemistry and Applications: **(10 hrs)**

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zn-MnO_2 (Leclanche cell), Li Battery

Secondary cells – lead acid and lithium ion batteries- working of the batteries including cell reactions.

Fuel cells- Basic Principles and Working Principles of hydrogen-oxygen, methanol fuel cells

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry electrochemical corrosion, Pilling Bedworth ratios and uses, Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Unit 3: Polymers and Fuel Chemistry: (12 hrs)

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization,

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of PVC and Bakelite

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol

Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal,

Liquid Fuels refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and

Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio fuels.

UNIT-4 Advanced Engineering Materials (8 hrs)

(i)Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

(ii) Refractories - Classification, Properties, Factors affecting the refractory materials and Applications

(iii)Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils and Applications

(iv)Building materials- Portland Cement, constituents, phases and reactivity of clinker, Setting and Hardening of cement.

Unit 5: Surface Chemistry and Applications: (10 hrs)

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, solid-gas interface, solid-liquid interface, adsorption isotherm, applications of colloids and nanomaterials – catalysis, medicine, sensors.

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	**List** the differences between temporary and permanent hardness of water, **explain** the principles of reverse osmosis and electrodialysis. **Compare** quality of drinking water with BIS and WHO standards. **Illustrate** problems associated with hard water - scale and sludge**. explain** the working principles of different Industrial water treatment processes
CO2	**Apply** Nernst equation for calculating electrode and cell potentials, **apply** Pilling Bedworth rule for corrosion and corrosion prevention, **demonstrate** the corrosion prevention methods and factors affecting corrosion, **compare** different batteries and their applications
CO3	**Explain** different types of polymers and their applications, **Solve the numerical problems based on Calorific value, select** suitable fuels for IC engines, **explain** calorific values, octane number, refining of petroleum and cracking of oils
CO4	Explain the constituents of Composites and its classification Identify the factors affecting the refractory material, Illustrate the functions and properties of lubricants, demonstrate the phases and reactivity of concrete formation, identify the constituents of Portland cement, enumerate the reactions at setting and hardening of the cement
CO5	**summarize** the applications of SEM, TEM and X-ray diffraction in surface characterization, **explain** the synthesis of colloids with examples, **outline** the preparation of nanomaterials and metal oxides **identify** the application of colloids and nanomaterials in medicine, sensors and catalysis

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi

References:

1.A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi

2. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
3. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi

4. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1				1		3									
CO2		2	3										1	2	3
CO3				1	2										
CO4		2				3	3						1	2	3
CO5			3												

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU

DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. I-Sem **L T P C**

3 1 0 4

Problem Solving & Programming

COURSE OBJECTIVES	
1	Introduce the internal parts of a computer, and peripherals.
2	Introduce the Concept of Algorithm and use it to solve computational problems
3	Identify the computational and non-computational problems
4	Teach the syntax and semantics of a C Programming language
5	Demonstrate the use of Control structures of C Programming language
6	Illustrate the methodology for solving Computational problems

Unit 1:

Computer Fundamentals: What is a Computer, Evolution of Computers, Generations of Computers, Classification of Computers, Anatomy of a Computer, Memory revisited, Introduction to Operating systems, Operational overview of a CPU.

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Fourth generation languages, Fifth generation languages, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Introduction to computer problem solving: Introduction, the problem-solving aspect, top-down design, implementation of algorithms, the efficiency of algorithms, the analysis of algorithms.

Unit Outcomes:

Student should be able to

1. Identify the different peripherals, ports and connecting cables in a PC (L2)
2. Illustrate the working of a Computer (L3)
3. Select the components of a Computer in the market and assemble a computer (L4)
4. Solve complex problems using language independent notations (L3)

Unit 2:

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.

Input and output: standard input and output, formatted output-Printf, formatted input-Scanf.

Control Flow: Statements and blocks, if-else, else-if, switch, Loops-while and for, Loops-Do-while, break and continue, Goto and labels.

Learning Outcomes: Student should be able to

1. Solve Computational problems (L3)
2. Apply Algorithmic approach to solving problems (L3)
3. Analyze the algorithms (L4)

Unit 3:

Fundamental algorithms: Exchanging the values of two variables, counting, summation of a set of numbers, factorial computation, sine function computation, generation of the Fibonacci sequence, reversing the digits of an integer.

Functions and Program Structure: Basics of functions, functions returning non-integers, external variables, scope variables, header variables, register variables, block structure, initialization, recursion, the C processor.

Learning Outcomes: Student should be able to

1. Recognize the programming elements of C Programming language (L1)
2. Select the control structure for solving the problem (L4)
3. Apply modular approach for solving the problem (L3)

Unit 4:

Factoring methods: Finding the square root of a number, the smallest divisor of a number, the greatest common divisor of two integers, generating prime numbers.

Pointers and arrays: Pointers and addresses, pointers and function arguments, pointers and arrays, address arithmetic, character pointers and functions, pointer array; pointers to pointers, Multi-dimensional arrays, initialization of arrays, pointer vs. multi-dimensional arrays, command line arguments, pointers to functions, complicated declarations.

Array Techniques: Array order reversal, finding the maximum number in a set, removal of duplicates from an order array, finding the k^{th} smallest element

Learning Outcomes: Student should be able to

1. Solve mathematical problems using C Programming language (L3)
2. Structure the individual data elements to simplify the solutions (L6)
3. Facilitate efficient memory utilization (L6)

Unit 5:

Sorting and Searching: Sorting by selection, sorting by exchange, sorting by insertion, sorting by partitioning, binary search.

Structures: Basics of structures, structures and functions, arrays of structures, pointers to structures, self-referential structures, table lookup, typedef, unions, bit-fields.

Some other Features: Variable-length argument lists, formatted input-Scanf, file access, Error handling- stderr and exit, Line Input and Output, Miscellaneous Functions.

Learning Outcomes: Student should be able to

1. Select sorting algorithm based on the type of the data (L4)
2. Organize heterogeneous data (L6)
3. Design a sorting algorithm (L6)

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Construct his own computer using parts (L6).
CO2	Recognize the importance of programming language independent constructs (L2)
CO3	Solve computational problems (L3)
CO4	Select the features of C language appropriate for solving a problem (L4)
CO5	Design computer programs for real world problems (L6)
CO6	Organize the data which is more appropriated for solving a problem (L6)

Text Books:

1. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, Pearson.

Reference Books:

1. P.Chenna Reddy, " Computer Fundamentals and C Programming" 2018, BS Publications
2. RS Bichkar " Programming with C", 2012, Universities Press.
3. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage Learning.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2			1		1		3			3			
CO2			3			2		1		1	2		2	1	
CO3			3	3				1							3
CO4		2					3		3	1	2		2		
CO5	1				1					1					
CO6	1	3	3		1		1	1			2		2	1	

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I-Year B.Tech. I-Sem

L	T	P	C
3	0	0	3

Material Science & Engineering

Course Objectives	
1	To teach the principles of physical metallurgy, i.e. crystallography of metals, constitution of alloys, phase diagrams.
2	Expose commercially important metals and alloys (both ferrous and non ferrous) with engineering constraints.
3	Explain the methods to change the properties of materials through heat treatment processes
4	Familiarize properties and applications of ceramics, polymers, composite materials and nano-materials.

UNIT I

Structure of Metals: Crystal Structures: Unit cells, Metallic crystal structures, Imperfection in solids: Point, Line, interstitial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress.

Constitution of Alloys: Necessity of Alloying, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. Iron-Iron-carbide diagram and microstructural aspects of ferrite, cementite, austenite, ledeburite, and cast iron.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the importance of material science in engineering.(L2)
- Recall the definitions and terminology of crystallography. (L1)
- Distinguish metals and alloys. (L4)
- Make use of the principles of construction of binary phase diagrams. (L3)
- Identify various invariant reactions in binary phase diagrams. (L3)
- Know the concept of metallography in studying the microstructures of metals and alloys. (L2)

UNIT II

Steels: Plain carbon steels, use and limitations of plain carbon steels. AISI & BIS classification of steels. Classification of alloys steels. Microstructure, properties and applications of alloy steels-stainless steels and tool steels.

Cast irons: Microstructure, properties and applications of white cast iron, malleable cast iron, grey cast iron, nodular cast iron and alloy cast irons.

Learning Outcomes:

At the end of this unit the student will be able to

- Classify various types of steels, their properties and applications. (L2)
- Identify various types of cast irons, their properties and applications. (L3)
- Compare steels and cast irons and their limitations in applications. (L3)

UNIT III

Heat Treatment of Steels: Annealing, tempering, normalizing and hardening, isothermal transformation diagrams for Fe-Fe_3C alloys and microstructure development. Continuous cooling curves and interpretation of final microstructures and properties- austempering, martempering, case hardening - carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, and vacuum and plasma hardening.

Learning Outcomes:

At the end of this unit the student will be able to

- Know the influence of heat treatment in modification of properties of steels. (L2)
- Develop a heat treatment cycle based on properties required. (L3)
- Comprehend the principles of surface hardening methods. (L2)

UNIT IV

Non-ferrous Metals and Alloys: Microstructure, properties and applications of copper, aluminium, titanium, nickel and their alloys. Study of Al-Cu phase diagram.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the importance of non-ferrous metals and alloys in engineering applications. (L2)
- Demonstrate various properties and applications of non-ferrous alloys. (L4)
- Demonstrate Al-Cu phase diagram. (L4)

UNIT V

Ceramics, Polymers and Composites: Structure, properties and applications of ceramics, polymers and composites. Introduction to super alloys and nano-materials.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the properties of ceramics and their applications. (L2)
- Summarize the properties of polymers and composites and their use. (L2)

Interpret the properties of super alloys, nano - materials and their applications. (L2)

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Understand the crystal structures and principles of binary phase diagrams. (L2)
CO2	Select steels and cast irons for a given application. (L3)
CO3	Apply heat treatment to different applications. (L3)
CO4	Utilize nonferrous metals and alloys in engineering. (L3)
CO5	Assess the properties of ceramics, polymers and composites nano-scale materials and their applications. (L2)

Text Book(s)

1. V.Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2004.
2. S.H.Avner, Introduction to Physical Metallurgy, 2/e, Tata McGraw- Hill, 1997R.

References

1. Y. Lakhtin, Engineering Physical Metallurgy, University Press of the Pacific, 2000.
2. Balasubramaniam, Callister's Material Science and Engineering, 2/e, Wiley India, 2014.
3. L.H.Van Vlack, Elements of Material Science and Engineering, 6/e, Pearson Education, 2008.
4. George E.Dieter, Mechanical Metallurgy, 3/e, McGraw-Hill, 2013.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		3		2		2						2		3	
CO2	3			2		2	1			2	2				1
CO3	3	3			2		1								1
CO4			3		2		1		3	2	2			3	
CO5		3	3		2		1		3			2	3		

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU

DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. I-Sem

L	T	P	C
0	0	3	1.5

Engineering Workshop

(Common to all branches)

Course Objective:	
1	To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

Wood Working:

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint

Sheet Metal Working:

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel
c) Elbow pipe d) Brazing

Fitting:

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b) Dovetail fit c) Semi-circular fit
d) Bicycle tyre puncture and change of two wheeler tyre

Electrical Wiring:

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting
d) Tube light e) Three phase motor f) Soldering of wires

Power tools:

Demonstration of a) Circular Saw b) Power Planer
c) Zig Saw d) Buffing Machine

After completion of this lab the student will be able to

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Apply wood working skills in real world applications. (L3)
CO2	Build different objects with metal sheets in real world applications. (L3)
CO3	Apply fitting operations in various applications. (L3)
CO4	Apply different types of basic electric circuit connections. (L3)
CO5	Understand the operation of power tools. (L2)

Note: In each section a minimum of three exercises are to be carried out.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					2			3			2		3	
CO2			2												
CO3		3			3		1				2	2			
CO4				2			1				2		2	3	2
CO5	3		2						3			2			2

JNTUACEA **R20**

2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU

Department of Computer Science and Engineering

I- Year B.Tech. I-Sem

L	T	P	C
0	0	3	1.5

IT Workshop
(Common to CE, ME, EEE, ECE, CHEM)

Note: Use open source tools for implementation of the following exercises.

Course Objectives	
1	To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system
2	To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations and LAteX
3	To learn about Networking of computers and use Internet facility for Browsing and Searching.
4	To learn about Google Forms and Google Sites

Preparing your Computer

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

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

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. Crimpling 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

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 colour, 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, Image Manipulation tools.

Task 9: Presentations: creating, opening, saving and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, 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.

Task 10: 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

Task 11: LateX: Introduction to Latex and its installation and different IDEs. Creating first document using Latex, using content into sections using article and book class of LaTeX. Styling Pages: reviewing and customizing different paper sizes and formats. Formatting text (styles, size, alignment, colors and adding bullets and numbered items, inserting mathematical symbols, and images, etc.). Creating basic tables, adding simple and dashed borders, merging rows and columns. Referencing and Indexing: cross-referencing (refer to sections, table, images), bibliography (references).

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Disassemble and Assemble a Personal Computer and prepare the computer ready to use.
CO2	Prepare the Documents using Word processors and Prepare spread sheets for calculations .using excel and also the documents using LAteX
CO3	Prepare Slide presentations using the presentation tool
CO4	Interconnect two or more computers for information sharing.
CO5	Access the Internet and Browse it to obtain the required information

References:

1. Introduction to Computers, Peter Norton, McGraw 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
6. Lamport L. LATEX: a document preparation system: user's guide and reference manual. Addison-wesley; 1994.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3					2			3			2		3	
CO2			2												
CO3		3			3		1				2	2			
CO4				2			1				2		2	3	2
CO5	3		2						3			2			2

JNTUACEA **R20**

2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous):: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. I-Sem

L	T	P	C
0	0	3	1.5

Engineering Chemistry Lab

Subject Code	Title of the Lab	L	T	P	C
19A53103	Engineering Chemistry lab	-	-	4	2

COURSE OBJECTIVES	
1	Verify the fundamental concepts with experiments

LIST OF EXPERIMENTS

1. Determination of Hardness of a groundwater sample.
2. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer
7. Determination of percentage of Iron in Cement sample by colorimetry
8. Estimation of Calcium in port land Cement
9. Adsorption of acetic acid by charcoal
10. Determination of percentage Moisture content in a coal sample
11. Determination of Viscosity of lubricating oil by Red Viscometer 1
12. Determination of Flash and Fire points of fuels
13. Determination of Calorific value of gases by Junker's gas Calorimeter

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	**Determine** the cell constant and conductance of solutions (L3)
CO2	**Prepare** advanced polymer materials (L2)
CO3	**Determine** the physical properties like surface tension, adsorption and viscosity (L3)
CO4	**Estimate** the Iron and Calcium in cement (L3)
CO5	**Calculate** the hardness of water (L4)

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1				3									2		
CO2	2					2								2	1
CO3				3	1									2	
CO4	2		3		1	2							2	2	1
CO5			3	3											

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2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous)::ANANTAPURAMU
DEPARTMENT OF COPUTER SCIENCE ENGINEERING

I- Year B.Tech. I-Sem

L	T	P	C
0	0	3	1.5

Problem Solving & Programming Lab

Laboratory Experiments

1. Basic DOS Commands/Unix Commands
2. Familiarize with windows/Linux Environment.
3. Familiarize with development environment of C Language
4. Design a C program which reverses the number
5. Design a C program which finds the second maximum number among the given list of numbers.
6. Construct a program which finds the kth smallest number among the given list of numbers.
7. Design an algorithm and implement using C language the following exchanges

   a ← b ← c ← d

1. Develop a C Program which counts the number of positive and negative numbers separately and also compute the sum of them.

7. Implement the C program which computes the sum of the first n terms of the series
   Sum = 1 – 3 + 5 -7 + 9
8. Design a C program which determines the numbers whose factorial values are between 5000 and 32565.

9. Design an algorithm and implement using a C program which finds the sum of the infinite series $1 – x^2/2! + x^4/4! – x^6/6! + ...$
10. Design a C program to print the sequence of numbers in which each number is the sum of the three most recent predecessors. Assume first three numbers as 0, 1, and 1.
11. Implement a C program which converts a hexadecimal, octal and binary number to decimal number and vice versa.
12. Develop an algorithm which computes the all the factors between 1 to 100 for a given number and implement it using C.
13. Construct an algorithm which computes the sum of the factorials of numbers between m and n.
14. Design a C program which reverses the elements of the array.
15. Given a list of n numbers, Design an algorithm which prints the number of stars equivalent to the value of the number. The starts for each number should be printed horizontally.

16. Implement the sorting algorithms a. Insertion sort b. Exchange sort c. Selection sort d. Partitioning sort.
17. Illustrate the use of auto, static, register and external variables.
18. Design algorithm and implement the operations creation, insertion, deletion, traversing on a singly linked list.
19. Develop a C program which takes two numbers as command line arguments and finds all the common factors of those two numbers.
20. Design a C program which sorts the strings using array of pointers.

The above list is not exhaustive. Instructors may add some experiments to the above list. Moreover, 50% of the experiments are to be changed every academic year. Instructors can choose the experiments, provided those experiments are not repetitions.

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Construct a Computer given its parts (L6)
CO2	Select the right control structure for solving the problem (L6)
CO3	Analyze different sorting algorithms (L4)
CO4	Design solutions for computational problems (L6)
CO5	Develop C programs which utilize the memory efficiently using programming constructs like pointers.

References:

1.B. Govindarajulu, "IBM PC and Clones Hardware Trouble shooting and Maintenance", ta McGraw-Hill, 2nd edition, 2002.
2.R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3.P.Chenna Reddy, "Computer Fundamentals and C Programming" 2018, BS Publications.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		2		3	2			3	2					
CO2			2				1			2		3		3	1
CO3	3			3		2		3							
CO4				3		2		3	3		3		1		
CO5		3	2		3		1			2					1

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU

DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. I-Sem

L	T	P	C
0	0	3	1.5

Material Science & Engineering Lab

Course Objectives	
1	To understand the microstructure and hardness of engineering materials
2	To explain grain boundaries and grain sizes of different engineering materials.

List of Experiments:

1. Metallography sample preparation
2. Microstructure of pure metals – Iron, copper and aluminum as per ASTM standards
3. Microstructure of low carbon steel, mild steel and high carbon microstructure of cast irons.
4. Microstructure of non-ferrous alloys – aluminum, copper, titanium, nickel and their alloys.
5. Hardenability of steels by Jominy End Quench Test.
6. Microstructure of heat treated steels.
7. Hardness of various untreated and treated steels.
8. Microstructure of ceramics, polymeric materials.
9. Microstructure of super alloy and nano-materials.
10. Hardness of ceramics, super alloys, nano-materials and polymeric materials (one sample on each)

Course Outcomes	
At the end of this course the student will be able to	
CO1	Differentiate various microstructures of ferrous and non-ferrous metals and alloys. (L4)
CO2	Visualize grains and grain boundaries. (L3)
CO3	Importance of hardening of steels. (L2)
CO4	Evaluate hardness of treated and untreated steels. (L4)
CO5	Differentiate hardness of super alloys, ceramics and polymeric materials.(L4)

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3		3		2	2			3			3			1
CO2		3		2			3			2	3			3	
CO3	3		3		2				3		3	3			
CO4		3				2	3			2					
CO5				2											

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. I-Sem

L	T	P	C
1	0	2	2

Engineering Drawing
(Common to All Branches of Engineering)
(Manual)

Course Objectives	
1	Bring awareness that Engineering Drawing is the Language of Engineers
2	Familiarize how industry communicates technical information
3	Teach the practices for accuracy and clarity in presenting the technical information.
4	Develop the engineering imagination essential for successful design

Unit:I

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance-Conventions in drawing-lettering - BIS conventions.
a)Conic sections including the rectangular hyperbola- general method only,
b) Cycloid, epicycloids and hypocycloid c) Involutes

Learning Outcomes:

At the end of this unit the student will be able to

1. Understand the Printing of Letters and dimensioning.(L1)
2. Draw the geometric constructions; drawing parallel and perpendicular lines, and to construct circles, arcs, tangencies, and irregular curves (L6)
3. Construct the Conic sections and cycloidal curves.(L6)

Unit: II

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

At the end of this unit the student will be able to

1. Understand the Orthographic Projection in four quadrants (L2)
2. Project the points, lines and planes (L6)

Unit: III

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

Learning Outcomes:

At the end of this unit the student will be able to

1. Project the solids inclined to one or both planes. (L6)
2. draw the solids by auxiliary method. (L6)

Unit: IV

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes:

At the end of this unit the student will be able to

1. Project the sectional view of regular solids.(L6)
2. Draw the true shapes of the sections.(L2)

Unit:V

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

At the end of this unit the student will be able to

1. Draw the development of surfaces of the solids.(L6)
2. Develop the sectional parts of the solids.(L2)

Course Outcomes	
At the end of this course the student will be able to	
CO1	Draw various curves applied in engineering. (L2)
CO2	Plot the projection of points, Lines and planes.(L2)
CO3	Draw the projections of solids inclined to one or both planes. (L2
CO4	Draw the sectional view and true shape of the regular solids.(L2)
CO5	Draw the development of surfaces of solids. (L3)

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dr K.Prahlada Rao, Dr. S. Krishnaiah, Prof.A.V.S. Prasad, Engineering Graphics, Amaravati publications.
2. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
4. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
5. K.C.John, Engineering Graphics, 2/e, PHI, 2013
6. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Additional Sources

1. Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2			2	1	1			1		2	
CO2		3					2	1					3		3
CO3	2		3	2				1	1	2		1		2	3
CO4		3		2			2	1					3		3
CO5	2	3	3	2			2	1	1			1		2	

JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

L	T	P	C
0	0	2	1

I- Year B.Tech. I-Sem
Engineering Graphics Lab
(Common to All Branches of Engineering)

Course Objectives	
1	Instruct the utility of drafting & modelling packages in orthographic and isometric drawings
2	Instruct graphical representation of machine components

Computer Aided Drafting:

Introduction to Geometric Modeling: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.

Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Text Books:

1. K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

Reference Books:

1. T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
2. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3. Linkan Sagar, BPB Publications, Auto Cad 2018 Training Guide.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes	
At the end of this course the student will be able to	
CO1	Use computers as a drafting tool. (L2)
CO2	Draw isometric and orthographic drawings using CAD packages. (L3)

Additional Sources:

1. Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	3	3	2			2	1	1			1		2	
CO2		3					2	1					3		3

JNTUA COLLEGE OF ENGINEERING (Autonomous):: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem

L	**P**	**T**	**C**
3	**0**	**0**	**3**

Differential Equations and Vector Calculus

Course Objectives:	
1	To enlighten the learners in the concept of differential equations and multivariable calculus
2	To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT 1: Linear differential equations of higher order
Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

Learning Outcomes:
At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant Coefficients
- Solve the linear differential equations with constant coefficients by appropriate method

UNIT 2: Equations reducible to Linear Differential Equations
Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications to L-C-R Circuit problems and Mass spring system.

Learning Outcomes:
At the end of this unit, the student will be able to

- Classify and interpret the solutions of linear differential equations
- Formulate and solve the higher order differential equation by analyzing physical situations

UNIT 3: Partial Differential Equations First order partial differential equations, solutions of first order linear and non-linear PDEs.
Solutions to homogenous and non-homogenous higher order linear partial differential equations.

Learning Outcomes:
At the end of this unit, the student will be able to

- apply a range of techniques to find solutions of standard PDEs
- outline the basic properties of standard PDEs

UNIT4: Vector differentiation
Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply del to Scalar and vector point functions
- illustrate the physical interpretation of Gradient, Divergence and Curl

UNIT 5: Vector integration

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field
- evaluate the rates of fluid flow along and across curves
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple
- integrals

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	solve the differential equations related to various engineering fields
CO2	Identify solution methods for partial differential equations that model physical processes
CO3	interpret the physical meaning of different operators such as gradient, curl and divergence
CO4	estimate the work done against a field, circulation and flux using vector calculus

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
2. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
3. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
6. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
7. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
8. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
9. R.L. Garg Nishu Gupta, Engineering Mathematics Volumes-I &II, Pearson Education
10. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.

11. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.
12. N. Bali, M. Goyal, C. Watkins, Advanced Engineering Mathematics, Infinity Science Press.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem

L	T	P	C
2	1	0	3

Engineering Physics

Subject Code	Title of the Subject	L	T	P	C
	ENGINEERING PHYSICS	2	1		3

COURSE OBJECTIVES	
1	To make a bridge between the physics in school and engineering courses.
2	To understand the concepts of mechanics and employ the applications of oscillations to engineering fields.
3	To familiarize the basic ideas of acoustics and ultrasonics with their Engineering applications.
4	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.
5	To evoke interest on applications of superposition effects like interference, diffraction and polarization in engineering.
6.	To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano materials, their properties and applications in modern emerging technologies are elicited.

Unit-1: Introduction to Mechanics and Oscillations

Introduction to Mechanics and Oscillations-Basic laws of vectors and scalars-Rotational frames-Conservative forces – F = - grad V, torque and angular momentum – Simple harmonic oscillators-Damped harmonic oscillator-Heavy, critical and under damping- Energy decay in damped harmonic oscillator- Forced oscillations – Resonance.

Unit-II: Acoustics and Ultrasonic's

Acoustics: Introduction to acoustics – Reverberation – Reverberation time– Sabine's formula-Derivation using growth and decay method – Absorption coefficient and its determination –Factors affecting acoustics of buildings and their remedies.

Ultrasonics: Introduction, Properties and Production by magnetostriction & piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications

Unit-III: Lasers and Fiber optics

Lasers: Introduction – Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients – Population inversion – Pumping mechanisms – Nd:YAG laser – He-Ne laser – Applications of lasers.

Fiber optics- Introduction to Optical Fibers-Total Internal Reflection-Critical angle of propagation-Acceptance Angle-Numerical Aperture-Classification of fibers based on refractive index profile – Propagation of electromagnetic wave through optical fibers – Modes -Importance of V-number-Fiber optic sensors (Pressure/temperature/chemical change)

Unit-IV: Wave Optics

Interference-Principle of superposition –Interference of light – Conditions for sustained interference-interference in thin films- Colors in thin films-Newton's Rings-Determination of wavelength and refractive index.

Diffraction-Introduction-Fresnel and Fraunhofer diffraction-Fraunhofer diffraction due to single slit and double slit – Diffraction grating- Grating spectra.

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plates-Engineering applications of Polarization.

UNIT V: Engineering Materials

Dielectric Materials: Introduction-Dielectric polarization- Dielectric constant- Types of polarizations: Electronic and Ionic, Orientation Polarizations (Qualitative) - Lorentz (Internal) field – Clausius - Mossotti equation - Applications of Dielectrics: Ferro electricity and Piezoelectricity.

Magnetic Materials: Introduction-Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials- Hysteresis - Soft and hard magnetic materials-Applications.

Nanomaterials: Introduction – Surface area and quantum confinement –Physical properties: electrical and magnetic properties- Synthesis of nanomaterials: Top-down: Ball Milling, Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

COURSE OUTCOMES At the end of this course the student will be able to	
CO1	Understand the basics of mechanics and types of oscillations.
CO2	Explain sound propagation in buildings, acoustic properties of typically used materials in buildings and the use of ultrasonics.
CO3	Apply the different realms of physics in both scientific and technological systems through the study of lasers and fiber optics.
CO4	Analyze different physical phenomena of optics like interference, diffraction and polarization.
CO5	Compare the properties of dielectric, magnetic and nano materials along with their engineering applications.

Prescribed Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company

2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

1. Introduction to modern optics – Grant R Fowles
2. A text book on Optics – Brijlal & Subramanyam
3. Laser Fundamentals – William T. Silfvast, Cambridge University Press
4. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
5. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley
6. Hand Book of Non-destructive evaluation, C.J.Hellier, McGraw-Hill
7. Engineering Physics – K.Thyagarajan, MacGraw Hill Publishers
8. Engineering Physics – M.R.Srinivasan, New Age Publications
9. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
10. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
11. Engineering Physics – M. Arumugam, Anuradha Publications

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem	**L**	**T**	**P**	**C**
	2	**0**	**0**	**2**

Communicative English 1

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

COURSE OBJECTIVES	
1	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
2	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
3	Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
4	Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
5	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit 1

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing :**Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learners will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information

- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3

Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit4

Lesson: Innovation: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Learning Outcomes

At the end of the module, the learners will be able to

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Unit 5

Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes

At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO2	Apply grammatical structures to formulate sentences and correct word forms
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO5	Create a coherent paragraph interpreting a figure/graph/chart/table

Prescribed Text:

Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- Oxford Learners Dictionary, 12th Edition, 2011

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

JNTUACEA **R20**

2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU

DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. I-Sem **L T P C**

3 0 0 3

Basic Electrical & Electronics Engineering for Mechanical Engineering

PART- A

To make the students learn about:

Course Objectives	
1	The basics of AC & DC Circuits, DC generators & motors.
2	The construction and operation of Transformers, Induction motors and their performance aspects will be studied.

Syllabus:

UNIT – I

Introduction to DC & AC Circuits

Ohm's Law, Basic Circuit Components, Kirchhoff's Laws, Resistive Networks, Series Parallel Circuits, Star-Delta and Delta-Star Transformation. Principle of AC Voltages, Waveforms and Basic Definitions, Root Mean Square and Average Values of Alternating Currents and Voltage, Form Factor and Peak Factor, Phasor Representation of Alternating Quantities, The 'j' Operator and Phasor Algebra, Basic concepts of AC series circuits.

Outcomes : After the completion of the unit the students will be able to

1. Perceive and analyse the basic laws of electrical circuits
2. Apply to basic laws to solve real life problems

UNIT-II

DC Machines

Constructional details of DC Machines

DC Generators: Principle of Operation, EMF equation, Types, O.C.C. of a DC Shunt Generator

DC Motors: Principle of Operation, Types, Torque Equation, Losses and Efficiency Calculation, Swinburne's Test, concepts of speed control.

Outcomes: After the completion of the unit the students will be able to

1. Apprehend and interpret basic principles of DC machines
2. Evaluate the performance of DC machines

UNIT-III

AC Machines

Transformers: Principles of Operation, Constructional Details, Losses and Efficiency, Regulation of Transformer, Testing: OC & SC Tests.

Three Phase Induction Motors: Principle of Operation, Slip and Rotor Frequency, Torque (Simple Problems).

Alternators: Principle of Operation, Constructional Details, EMF Equation, Voltage Regulation by Synchronous Impedance Method.

Outcomes : After the completion of the unit the students will be able to

1. Identify different types of AC machines
2. Analyse the performance of various AC machines

Course Outcomes	
At the end of this course the student will be able to	
CO1	Understand the basics of AC & DC circuits and AC & DC machines
CO2	Analyse the circuit elements, various AC and DC machines

TEXT BOOKS:

1. Basic Electrical Engineering - By M.S.Naidu and S. Kamakshiah – TMH.
2. Basic Electrical Engineering –By T.K.Nagasarkar and M.S. Sukhija Oxford University Press.
3. Electrical and Electronic Technology-By Hughes – Pearson Education.

REFERENCES:

1. Theory and Problems of Basic Electrical Engineering by D.P.Kothari & I.J. Nagrath PHI.
2. Principles of Electrical Engineering by V.K Mehta, S.Chand Publications.
3. Fundamentals of Electrical Electronics Engineering by T.Thyagarajan, SCITECH Publications 5th Edition-2007

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												

JNTUACEA **R20**
2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous):: ANANTHAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I –Year B.Tech.I -Semester **L T P C**
3 0 0 3

BASIC ELECTRICAL & ELECTRONICS ENGINEERING

ELECTRONICS ENGINEERING
PART- B

COURSE OBJECTIVES	
The students will be able to	
1	Understand principle and terminology of electronics.
2	Analyse the characteristics of electronic devices and understand the working of basic circuits such as rectifiers, amplifiers, filters, oscillators.
3	Understand the concept of Digital Logic
4	Understand the Concept & Principles of Digital Logic

UNIT I
Diodes and Transistors: Semiconductor Diode, Zener Diode, Rectifier Circuits, Wave Shaping Circuits,Bipolar Junction Transistors(operating modes modes,Configurations and Charecteristics), Introduction to Transistor Biasing and Transistor as an amplifier, Introduction to Field-Effect Transistors (Configurations and characteristics).

UNIT II
Operational Amplifiers: Op-amp Equivalent Circuit, Ideal and practical Op-amp characteristics, Op-Amp Applications (Inverting amplifier, Non -inverting amplifier, Summing, scaling & averaging amplifiers, integrator, differentiator, Active filters, oscillators and comparators).

UNIT III
Digital Electronics: Number Systems and Codes, Logic Gates, Boolean Theorems, DeMogan's Theorems, Algebraic Simplification, Karnaugh Map Method. Binary Addition, 2's Complement System, Full Adder, BCD Adder. NAND and NOR gate Latches, S-R Flip-Flop, JK Flip-Flop, D Flip-Flop, Introduction to Shift registers and Counters.

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Able to apply the knowledge of diodes, Zener diodes, BJT's and FET's for applications of different circuits.
CO2	Analyse the applications of operational amplifiers.
CO3	Solve problems of various digital logic gates and circuits.
CO4	Correlate the fundamental concepts to various Real life applications of today.

Text Books:
1. Boylested, R. L. and Nashelsky, L., Electronic Devices and Circuit Theory, Pearson Education
2. Ramakant A.Gayakwad, Op-Amps and Linear Integrated Circuits, Eastern Economy Edition
3.M.Morris Mano and Michael D.Ciletti, Digital Design, Pearson Education,4th Edition

References:

1. R. Muthusubramanian, S. Salivahanan, "Basic Electrical and Electronics Engineering", Tata McGraw-Hill Education.
2. Bell, D. A., Electronic Devices and Circuits, Oxford University Press
3. 3.R.J. Tocci: Digital Systems; PHI, 6e, 2001.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem

L	T	P	C
1	0	2	2

Engineering Drawing
(Common to All Branches of Engineering)
(Manual)

	Course Objectives
1	Bring awareness that Engineering Drawing is the Language of Engineers.
2	To know how to represent letters and numbers in drawing sheets..
3	To know about the different types of the projections, projection of points, straight lines, planes and regular solids
4	To know sectional views and development of different types of surfaces.
5	To know about the projection of orthographic views, isometric views and isometric projections.

Unit:I

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance-Conventions in drawing-lettering - BIS conventions.
a)Conic sections including the rectangular hyperbola- general method only,
b) Cycloid, epicycloids and hypocycloid c) Involutes

Learning Outcomes:

At the end of this unit the student will be able to

4. Lettering and dimensioning by freehand (L1)
5. Create geometric constructions; drawing parallel and perpendicular lines, and to construct circles, arcs, tangencies, and irregular curves (L6)
6. Create Conic sections and cycloidal curves.(L6)

Unit: II

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

At the end of this unit the student will be able to

3. Understand the Projection of the objectives in four quadrants (L2)
4. Project the points, lines and planes (L6)

Unit: III

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

Learning Outcomes:

At the end of this unit the student will be able to

1.Project the solids in both planes. (L6)
2. To draw the solids by auxiliary method. (L6)

Unit: IV

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes:

At the end of this unit the student will be able to

1.Project the sectional view of regular solids.(L6)

2. Understand how to draw the true shapes of the sections.(L2)

Unit:V

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

At the end of this unit the student will be able to

3. Draw the development of surfaces of the solids.(L6)
4. Understand to develop the sectional parts of the solids.(L2)

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Draw various curves applied in engineering. (L2)
CO2	Plot the projection of points, Lines and planes.(L2)
CO3	Draw the projections of solids inclined to one or both planes. (L2)
CO4	Draw the sectional views and development of surfaces.(L2)

Text Books:

3. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
4. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

7. Dr K.Prahlada Rao, Dr. S. Krishnaiah, Prof.A.V.S. Prasad, Engineering Graphics, Amaravati publications.
8. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
9. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
10. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
11. K.C.John, Engineering Graphics, 2/e, PHI, 2013
12. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Additional Sources

1. Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												

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2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem

L	T	P	C
0	0	2	1

Engineering Graphics Lab
(Common to All Branches of Engineering)

COURSE OBJECTIVES	
1	Instruct the utility of drafting & modelling packages in orthographic and isometric drawings
2	Instruct graphical representation of machine components

Computer Aided Drafting:

Introduction to Geometric Modeling: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.

Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

Text Books:

3. K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
4. Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

Reference Books:

6. T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
7. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
8. Linkan Sagar, BPB Publications, Auto Cad 2018 Training Guide.
9. K.C.John, Engineering Graphics, 2/e, PHI, 2013
10. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Use computers as a drafting tool. (L2)
CO2	Draw isometric and orthographic drawings using CAD packages. (L3

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		3							3			
CO2	1				2		1				2	

Additional Sources: 1. Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu.

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JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU

DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem

L	T	P	C
0	0	2	1

COMMUNICATIVE ENGLISH LABORATORY-1

COURSE OBJECTIVES	
1	Students will be exposed to a variety of self instructional, learner friendly modes of language learning
2	Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc
3	Students will learn better pronunciation through stress, intonation and rhythm
4	Students will be trained to use language effectively to face interviews, group discussions, public speaking
5	Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Unit 1

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes

At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software

- Young India Films
- Walden Infotech
- Orell

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO2	Apply communication skills through various language learning activities
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.

- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Mapping between Course Outcomes and Programme Outcomes

1.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

JNTUACEA **R20**

2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem	**L**	**T**	**P**	**C**
	0	**0**	**3**	**1.5**

ENGINEERING PHYSICS LAB

COURSE OBJECTIVES	
1	The Objective of this course is to make the students gain practical knowledge to co-relate with the theoretical studies.
2	To develop practical applications of engineering materials and use of principle in the right way to implement the modern technology.
3	To train engineering students on basis of measurements and the instruments
4	To equip the students with practical knowledge in electronic and optics experiments

LIST OF EXPERIMENTS

Any TEN of the following experiments has to be performed during the SEMESTER

1. Laser: Determination of wavelength using diffraction grating.
2. Laser: Determination of Particle size.
3. Determination of spring constant of springs using Coupled Oscillator
4. Determination of ultrasonic velocity in liquid (Acoustic grating)
5. Determination of dielectric constant and Curie temperature of a ferroelectric material.
6. B-H curve
7. Stewart-Gee's Method
8. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
9. Determination of numerical aperture of an optical fiber.
10. Determination of thickness of thin object by wedge method.
11. Determination of radius of curvature of lens by Newton's rings.
12. Determination of wavelengths of various colours of mercury spectrum using diffraction grating in normal incidence method.
13. Determination of dispersive power of the prism
14. Sonometer: Verification of the three laws of stretched strings
15. Meldes experiment: Determination of the frequency of tuning fork

Note: Out of 10 experiments, two experiments will be performed using virtual laboratory.

Data Books Required: Nil

COURSE OUTCOMES
At the end of this course the student will be able to

CO1	On Completion of this course, students are able to – Develop skills to impart practical knowledge in real time solution.
CO2	Understand principle, concept, working and application of new technology and comparison of results with theoretical calculations.
CO3	Understand measurement technology, usage of new instruments and real time applications in engineering studies.
CO4	The student will be able to analyze the physical principle involved in the various instruments, also relate the principle to new application.
CO5	The various experiments in the areas of optics, mechanics and thermal physics will nurture the students in all branches of Engineering.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

JNTUACEA **R20**

2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem	**L**	**T**	**P**	**C**
	0	**0**	**1.5**	**0.75**

BASIC ELECTRICAL ENGINEERING LAB

(PART-A - ½ LAB)

Course Objectives: To make the student learn about:

1	The DC motors, DC Generators and know various characteristics, performance analysis of DC machines and speed control techniques of DC machines.
2	Various test conditions of single phase transformers.

Syllabus:

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne's Test on DC Shunt Machine (Predetermination of Efficiency of a Given DC Shunt Machine Working as Motor and Generator).
2. OC & SC Tests on Single-Phase Transformer (Predetermination of Efficiency and Regulation at Given Power Factors and Determination of Equivalent Circuit).
3. Brake Test on 3-Phase Induction Motor (Determination of Performance Characteristics)
4. Regulation of Alternator by Synchronous Impedance Methods.
5. Speed Control of D.C.Shunt Motor by
   a) Armature Voltage Control B) Field Flux Control Method
6. Brake Test on D.C Shunt Motor

Course Outcomes	
At the end of this course the student will be able to	
CO1	Learn about DC motors, DC Generators and know various characteristics, performance analysis of DC machines and speed control techniques of DC machines.
CO2	Various test conditions of single phase transformers.

Mapping of Course outcomes with Program outcomes:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												

JNTUACEA **R20**

2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU
DEPARTMENT OF MECHANICAL ENGINEERING

I- Year B.Tech. II-Sem	**L**	**T**	**P**	**C**
	0	**0**	**1.5**	**0.75**

BASIC ELECTRONICS ENGINEERING LAB

(PART-B - ½ LAB)

(Common to ME & CHEM)

COURSE OBJECTIVES	
The students will be able to	
1	Understand the characteristics of PN junction diode and zener diode.
2	Understand the characteristics of BJT in CE and CB configurations
3	Learn the frequency response of CE Amplifier
4	Exposed to linear and digital integrated circuits

LIST OF EXPERIMENTS:

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator
3. Full Wave Rectifier with & without filter
4. Wave Shaping Circuits (Clippers & Clampers)
5. Input & Output characteristics of Transistor in CB / CE configuration
6. Frequency response of CE amplifier.
7. Inverting and Non-inverting Amplifiers using Op Amps
8. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs
9. Verification of Truth Tables of RS, JK, T & D flip flops using respective ICs

LAB REQUIREMENTS:

Cathode Ray Oscilloscopes (30MHz)

Signal Generator /Function Generators (3 MHz)

Dual Regulated Power Supplies (0 – 30V)

IC Trainer Kit

Bread Boards

Electronic Components

COURSE OUTCOMES	
At the end of this course the student will be able to,	
CO1	Learn the characteristics of basic electronic devices like PN junction diode, Zener diode & BJT.
CO2	Analyze the application of diode as rectifiers, clippers and clampers.
CO3	Learn the fundamental principles of amplifier circuits and need of Bias in Amplifier circuits.
CO4	Learn the basics of linear integrated circuits and understand characteristics of operational amplifier.
CO5	Learn about available digital ICs and verify truth tables of logic gates and flip flops.

2. **Mapping between Course Outcomes and Programme Outcomes**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

JNTUACEA **R20**

2020-21

JNTUA COLLEGE OF ENGINEERING (Autonomous) :: ANANTAPURAMU

(Common to All Branches of Engineering)

UNIVERSAL HUMAN VALUES

I - Year B.Tech. II-Sem **L T P C**

3 0 0 0

1. Introduction:

This course discusses the role of human values in one's family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course names as"H-102 Universal Human Values 2 : "Understanding Harmony" is designed which may be covered in their III or IV Semester.
In the Induction Program, students would get an initial exposure to human values through Universal HumanValues–I.This exposure is to be augmented by this compulsory full semester foundation course.

2. Learning Objectives:

1. Exposure to the value of life, society and harmony
2. Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
3. Bringing transition from the present state to Universal Human Order
4. Instill commitment and courage to act.
5. Know about appropriate technologies and management patterns

3. COURSE TOPICS:

Unit 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Universal Human Values-I - Self-Exploration - content and process; 'Natural Acceptance' and Experiential Validation - self-exploration - Continuous Happiness and Prosperity - Human Aspirations - current scenario - Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Unit 2: Understanding Harmony in the Human Being - Harmony in Myself!

human being as a co-existence of the sentient 'I' and the material'Body' - the needs - happiness and physical facility -the Body as an instrument of 'I' - the characteristics and activities of 'I' and harmony in 'I' - the harmony of I with the Body

Unit 3: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

Values in human relationship; meaning of Justice; Trust and Respect; Difference between intention and competence; the other salient values in relationship - the harmony in the society:

Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals - Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Unit 4: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

the harmony in the Nature - Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature - Understanding Existence as Co-existence of mutually interacting units in all- pervasive space - Holistic perception of harmony at all levels of existence.

Unit 5: Implications of the above Holistic Understanding of Harmony on Professional Ethics

Humanistic Education - Competence in professional ethics: professional competence - people friendly and eco-friendly production systems - appropriate technologies and management patterns for above production systems. Individuals as socially and ecologically responsible engineers, technologists and managers

COURSE OUTCOMES	
At the end of this course the student will be able to	
CO1	Define terms like Natural Acceptance, Happiness and Prosperity
CO2	Understand awareness of oneself, and ones surroundings (family, society, nature)
CO3	Apply what they have learnt to their own self in different day-to-day settings in real life
CO4	Relate human values with human relationship and human society
CO5	Justify the need for universal human values and harmonious existence
CO6	Develop as socially and ecologically responsible engineers

Prescribed Text Book

A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

ReferenceBooks

.**JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999**

1. HumanValues,A.N.Tripathi,NewAgeIntl.Publishers,NewDelhi,2004.
2. The Story of Stuff (Book).
3. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj - PanditSunderlal 9. Rediscovering

India - byDharampal

4. Hind Swaraj or Indian Home Rule - by Mohandas K.Gandhi
5. India Wins Freedom - Maulana Abdul Kalam Azad 12. Vivekananda - Romain Rolland(English)

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												
CO6												

JNTUCEA **R20**

2020-21

Program Educational Objectives (PEOs):

PEO 1	**SUCCESSFUL CAREER**: Graduates of the program will have successful technical or professional career.
PEO 2	**LIFELONG LEARNING:** Graduates of the program will continue to learn and to adopt in a world of constantly evolving technology
PEO 3	**SERVICE TO SOCIETY:** Graduates of the program will have the capability to work with multi -disciplinary teams to implement innovative ideas ethically for uplifting the society.