MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)

**Course Structure for B.Tech. Mechanical Engineering**

**MR22 Regulations - Effective from the Academic Year 2022 – 23 onwards**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER-I** | | | | | | | |
| **Sl.**  **No.** | **Category** | **Course**  **Code** | **Name of the Subject** | **L** | **T** | **P** | **Credits** |
| 1. | HSMC | C0H01 | English | 3 | 0 | 0 | 3 |
| 2. | BSC | C0B05 | Linear Algebra and Differential  Equations | 3 | 1 | 0 | 4 |
| 3. | BSC | C0201 | Basic Electrical and Electronics  Engineering | 3 | 1 | 0 | 3 |
| 4. | ESC | C0501 | Programming for Problem Solving | 3 | 0 | 0 | 3 |
| 5 | ESC | C0202 | Basic Electrical and Electronics  Engineering Lab | 0 | 0 | 2 | 1 |
| 7. | ESC | C0502 | Programming for Problem Solving  Lab | 0 | 0 | 2 | 1 |
| 8. | HSMC | C0H02 | English Language and Communication skills Lab | 0 | 0 | 2 | 1 |
| 9. | ESC | C0302 | Engineering Workshop | 0 | 0 | 2 | 1 |
| **Total** | | | | **12** | **2** | **8** | **17** |
| **Total Contact Hours** | | | | **22** | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER-II** | | | | | | | |
| **Sl.**  **No.** | **Category** | **Course**  **Code** | **Name of the Subject** | **L** | **T** | **P** | **Credits** |
| 1. | BSC | C0B06 | Vector Calculus and Numerical  Techniques | 3 | 1 | 0 | 4 |
| 2. | ESC | C0303 | Engineering Mechanics | 3 | 0 | 0 | 3 |
| 3. | BSC | C0B17 | Engineering Chemistry | 3 | 1 | 0 | 4 |
| 4. | ESC | C0B12 | Engineering Physics | 3 | 0 | 0 | 4 |
| 5 | ESC | C0301 | Engineering Graphics | 2 | 0 | 2 | 3 |
| 6. | ESC | C0527 | Basic Python Programming Lab | 0 | 1 | 2 | 2 |
| 7. | ESC | C0304 | Engineering Mechanics Lab | 0 | 0 | 2 | 1 |
| 8. | BSC | C0B18 | Engineering Chemistry Lab | 0 | 0 | 2 | 1 |
| 9. | ESC | C0B13 | Engineering Physics Lab | 0 | 0 | 2 | 1 |
| **Total** | | | | **14** | **3** | **10** | **23** |
| **Total Contact Hours** | | | | **27** | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER-III** | | | | | | | |
| **Sl. No.** | **Category** | **Course Code** | **Name of the Subject** | **L** | **T** | **P** | **Credits** |
| 1. | BSC | C0B02 | Probability and Statistics | 3 | 0 | 0 | 3 |
| 2. | ESC | C0306 | Mechanics of Solids | 3 | 0 | 0 | 3 |
| 3. | ESC | C0307 | Metallurgy and Material Science | 3 | 0 | 0 | 3 |
| 4. | PCC | C0308 | Kinematics of Machines | 3 | 0 | 0 | 3 |
| 5. | PCC | C0309 | Thermodynamics | 3 | 0 | 0 | 3 |
| 6. | PCC | C0310 | Production Technology | 3 | 0 | 0 | 3 |
| 7. | PCC | C0311 | Metallurgy and Mechanics of Solids Lab | 0 | 0 | 2 | 1 |
| 8. | PCC | C0312 | Production Technology Lab | 0 | 0 | 2 | 1 |
| 9. | MC | C00M2 | Environmental Sciences | 2 | 0 | 0 | - |
| **Total** | | | | **20** | **0** | **4** | **20** |
| **Total Contact Hours** | | | | **24** | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SEMESTER-IV** | | | | | | | |
| **Sl.**  **No.** | **Category** | **Course**  **Code** | **Name of the Subject** | **L** | **T** | **P** | **Credits** |
| 1. | PCC | C0313 | Dynamics of Machines | 3 | 0 | 0 | 3 |
| 2. | PCC | C0314 | Fluid Mechanics and Hydraulic Machines | 3 | 0 | 0 | 3 |
| 3. | PCC | C0315 | Machine Tools | 3 | 0 | 0 | 3 |
| 4. | PCC | C0316 | Thermal Engineering - I | 3 | 0 | 0 | 3 |
| 5. | PCC | C0317 | Operations Research | 3 | 0 | 0 | 3 |
| 6. | PCC | C0318 | Fluid Mechanics and Hydraulic  Machines Lab | 0 | 0 | 2 | 1 |
| 7. | PCC | C0319 | Machine Tools Lab | 0 | 0 | 2 | 1 |
| 8. | ESC | C0554 | Fundamentals of Data Structures Lab | 0 | 0 | 4 | 2 |
| 9. | MC | C00M1 | Gender Sensitization | 0 | 0 | 2 | - |
| 10. | PCC | C00P1 | Real-time Research Project/ Field Based Project | 0 | 0 | 2 | 1 |
| **Total** | | | | **15** | **0** | **12** | **20** |
| **Total Contact Hours** | | | | **27** | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **I Semester** | | |
| **Code: C0H01** | **ENGLISH**  **(Common for CE,EEE,ME,ECE,CSE,CSE(AIML) CSE(DS), CSE (CS), CSE(IOT),IT and Min.E)** | **L** | **T** | **P** |
| **Credits: 3** | **3** | **-** | **-** |

**Course Objectives:**

The objective of this course is to improve the English Language and Literary competence of the students. The course provides requisite insights into grammar, vocabulary, prose, and short stories. Further, it also helps in developing the skills of Reading and Writing. The course also equips students to study their academic subjects more effectively using the theoretical and practical components of the English language and literature.

# MODULE – I

**Speech :** “Go Kiss the World” by Subroto Bagchi

**Poem : “**Leisure” by W. H. Davies

**Vocabulary:** Formation of Words, Prefixes, Suffixes, and Root Words

**Grammar :** Articles and Prepositions

**Reading :** Skimming and Scanning

**Writing :** Introduction to Writing Skills, Characteristics of Effective Writing

# MODULE – II

**Short story :** “Gift of Magi” by O’ Henry

**Poem : “**No Man is an Island” by John Donne

**Vocabulary:** One Word Substitutions; Synonyms and Antonyms **Grammar :** Degrees of Comparison, Voice – Exercises

**Reading :** Intensive Reading and Extensive Reading

**Writing :** Paragraph Writing- Cohesive devices; Jumbled Sentences; Punctuation

# Module – III

**Essay :** “Lucidity, Simplicity, Euphony” by W. Somerset Maugham

**Poem : “**The Mask” by Maya Angelou

**Grammar :** Tense and Aspect

**Vocabulary:** Homonyms, Homophones, Homographs

**Reading :** Reading for Topic and Theme **Writing :** Letter Writing

# MODULE – IV

**Short story :** “The Night Train at Deoli” by Ruskin Bond

**Poem : “**Gift of India” by Sarojini Naidu **Grammar :** Question Tags; Concord

**Vocabulary:** Idiomatic Expressions; Phrasal Verbs

**Reading :** Reading for Interpretation

**Writing :** Essay Writing, Describing, Defining and Classifying

# MODULE – V

**Essay :** “Toasted English” by R. K. Narayan

**Poem :** “If” by Rudyard Kipling

**Grammar :** Direct and Indirect Speech, Misplaced Modifiers

**Vocabulary:** Redundancies and Clichés

**Reading :** Reading for Specific Purposes, Reading Comprehension practice

**Writing :** Paraphrasing & Summarizing,

* Exercises from the texts not prescribed shall also be used for classroom tasks.

# Prescribed Textbook:

**Reference Books:**

* 1. Azar, Betty and Stacy A, Hagen***.*** *Understanding and Using English Grammar*. 4th edition, Foundation Books, 2009.
  2. Chaudhuri, Santanu S. *Learn English: A Fun Book of Functional Language****,*** *Grammar andVocabulary.* Tata McGraw Hill Education, New Delhi, 2013.
  3. Eastwod, John. *Oxford Guide to English Grammar.* 4th edition, Oxford University Press, 1994.
  4. Field, Marion**.** *Improve Your Written English*. 5th Edition. How to Books, UK, 2009.
  5. Leech, Geoffrey and Svartvik, J. *A Communicative Grammar of English*. 3rd edition,

Routledge, 2013.

# Related Websites:

1. <http://www.slideshare.net/aszardini/word-formationroot-words-prefixes-and-suffixes>
2. [http://www.scribd.com/doc/37085980/Circulars-Circular-Letters-Notices-Memo#scribd.](http://www.scribd.com/doc/37085980/Circulars-Circular-Letters-Notices-Memo#scribd)
3. <http://www.zsme.tarnow.pl/jezykiobce/wp>‐content/uploads/2013/11/writing‐letters1.pdf.

# Course Outcomes:

After completion of the course, students will be able to:

1. Use Written And Spoken English Considerably Well For Academic Purposes.
2. Communicate In Enrich Accurately And Fluently.
3. Employ Extensive And Intensive Reading Skills.
4. Gain Confidence In Writing For Academic And Real Life Situations.
5. Use Standard Grammar, Punctuation, And Spelling In Technical Documents.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO, PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | |
| **COS** | **Programme Outcomes(POs)** | | | | | | | | | | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | **3** | **2** | **2** |  |  |  |  |  |  |  |  |  |
| **CO2** | **3** | **2** |  |  |  |  |  |  |  |  |  |  |
| **CO3** | **3** | **2** |  | **2** |  |  |  |  |  |  |  |  |
| **CO4** | **3** | **2** | **2** |  |  |  |  |  |  |  |  |  |
| **CO5** | **2** | **2** | **1** |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomos)** | **B.Tech.**  **I Semester** | | |
| **Code:C0B05** | **Linear Algebra and Differential Equations (Common For CE, ME&MINING)** | **L** | **T** | **P** |
| **Credits: 4** | **3** | **1** | **-** |

**Prerequisites:** Matrices, Differentiation, and Integration

# Course Objectives:

1. To learn rank of the matrix and its application to consistency of system of linear equations
2. To learn Eigen Values, Eigen Vectors and nature of Quadratic forms.
3. To learn the concept of the mean value theorems, partial differentiation and maxima and minima.
4. To learn methods of solving differential equations and its applications to basic engineering problems.
5. To learn basics of partial differential equations and the standard forms of partial differential equations.

# Module -I: Matrix algebra

Vector Space, basis, linear dependence and independence (Only Definitions)

Matrices: Types of Matrices, Symmetric; Hermitian; Skew-symmetric; Skew- Hermitian; orthogonal matrices; Unitary Matrices; rank of a matrix by Echelon form and Normal form, Inverse of Non-singular matrices by Gauss-Jordan method; solving system of Homogeneous and Non-Homogeneous linear equations. LU - Decomposition Method

# Module- II: Eigen Values and Eigen Vectors

Eigen values , Eigen vectors and their properties; Diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); Finding inverse and power of a matrix by Cayley-Hamilton Theorem; Singular Value Decomposition.

**Quadratic forms**: Nature, rank, index and signature of the Quadratic Form, Linear Transformation and Orthogonal Transformation, Reduction of Quadratic form to canonical forms by Orthogonal Transformation Method.

# Module - III: Differential Calculus

Mean value theorems: Rolle’s theorem and Lagrange’s Mean value theorem with their Geometrical Interpretation and its applications, Cauchy’s Mean value Theorem. Taylor’s Series. Limits, Continuity, Partial differentiation, partial derivatives of first and second order, Jacobian, Taylor’s theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange’s method of undetermined Multipliers.

# Module –IV: Ordinary Differential Equations

**First Order and First Degree ODE:** Orthogonal trajectories, Newton’s law of cooling, Law of naturalgrowth and decay.

**Second and Higher Order ODE with Constant Coefficients:** Introduction-Rules for finding complementary function and particular integral. Solution of Homogenous, non-homogeneous differentialequations, Non-Homogeneous terms of the type eax , sin(ax), cos (ax), polynomials in x, eax V(x), x V(x),Method of variation of parameters.

# Module – V: Partial Differential Equations

Formation of partial differential equations by eliminating arbitrary constants or arbitrary function, solutions of first order linear (Lagrange) equations, solutions of non linear first order equations (four standard types). Equations reducible to linear, Charpit’s Method.

# Text Books:

* 1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
  2. R K Jain SRK Iyengar , Advanced engineering mathematics, Narosa publications.
  3. Erwin Kreyszig, Advanced Engineering Mathematics, Wiley publications.

# Reference Books:

* + 1. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint,2002.
    2. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, LaxmiPublications,Reprint, 2008.
    3. V. Krishnamurthy, V.P. Mainra and J.L. Arora, An introduction to Linear Algebra,AffiliatedEast–West press, Reprint 2005.
    4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11thReprint,2010.

# E – RESOURCES:

1. https:/[/www.mathplanet.com/education/algebra-2/matrices/how-to-operate-with-](http://www.mathplanet.com/education/algebra-2/matrices/how-to-operate-with-matrices) [matrices](http://www.mathplanet.com/education/algebra-2/matrices/how-to-operate-with-matrices)(Systems of linear equations, matrices)
2. <http://math.mit.edu/~gs/linearalgebra/ila0601.pdf(Eigen>values, Eigen vectors)
3. <http://www.math.cmu.edu/~wn0g/noll/2ch6a.pdf(Differential> Calculus)
4. https:/[/www.intmath.com/differential-equations/1-solving-des.php(Differential](http://www.intmath.com/differential-equations/1-solving-des.php(Differential) Equations)
5. https:/[/www.math.uni-leipzig.de/~miersemann/pdebook.pdf(Partial](http://www.math.uni-leipzig.de/~miersemann/pdebook.pdf(Partial) differential Equations)

# NPTEL:

1. https[://w](http://www.youtube.com/watch?v=NEpvTe3pFIk&list=PLLy_2iUCG87BLKl8eISe4fHKdE2_j2)ww[.youtube.com/watch?v=NEpvTe3pFIk&list=PLLy\_2iUCG87BLKl8eISe4fH](http://www.youtube.com/watch?v=NEpvTe3pFIk&list=PLLy_2iUCG87BLKl8eISe4fHKdE2_j2) [KdE2\_j2](http://www.youtube.com/watch?v=NEpvTe3pFIk&list=PLLy_2iUCG87BLKl8eISe4fHKdE2_j2) B\_T&index=5 (Matrices – System of linear Equations)
2. https:/[/www.youtube.com/watch?v=wrSJ5re0TAw](http://www.youtube.com/watch?v=wrSJ5re0TAw) (Eigen values and Eigen vectors)
3. https:/[/www.youtube.com/watch?v=yuE86XeGhEA](http://www.youtube.com/watch?v=yuE86XeGhEA) (Quadratic forms)

# Course Outcomes:

1. The student will be able to find rank of a matrix and analyze solutions of system of linear equations.
2. The student will be able to find Eigen values and Eigen vectors of a matrix, diagonalization a matrix, verification of Cayley Hamilton theorem and reduce a quadratic form into a canonical form through a linear transformation.
3. The student will be able to verify mean value theorems and maxima and minima of function of two variables.
4. Formulate and solve the problems of first and higher order differential equations
5. Apply knowledge of Partial differential equations in real world problems.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO, PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | |
| **COS** | **Programme Outcomes(POs)** | | | | | | | | | | | |
| **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** | **PO 8** | **PO 9** | **PO 10** | **PO 11** | **PO 12** |
| **CO1** | **3** | **2** | **2** | **3** | **3** |  |  |  | **2** |  |  | **3** |
| **CO2** | **3** | **2** | **2** | **3** | **2** |  |  |  | **2** |  |  | **3** |
| **CO3** | **3** | **2** | **2** | **3** | **2** |  |  |  | **2** |  |  | **2** |
| **CO4** | **3** | **2** | **2** | **3** | **3** |  |  |  | **2** |  |  | **2** |
| **CO5** | **3** | **2** | **2** | **3** | **3** |  |  |  | **2** |  |  | **2** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. II Semester** | | |
| **Code: C0201** | **BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**  **(Common for ALL )** | **L** | **T** | **P** |
| **Credits: 3** | **3** | **-** | **-** |

# Prerequisites: NIL Course Objectives:

To introduce the concept of electrical circuits and its components. To introduce the characteristics of various electronic devices. To impart the knowledge of various configurations, characteristics and applications of electrical & electronic components.

# MODULE I: DC Circuits

Electrical circuit elements (R, L and C), voltage and current sources, Kirchhoff’s current and voltage laws- Series, parallel, series-parallel, star-to-delta and delta-to-star transformation- analysis of simple circuits with dc excitation. Superposition, Thevenin's and Maximum Power Transfer Theorems with DC excitation.

# MODULE II: AC Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC,RLC combinations (series and parallel).

# MODULE III: Introduction to Electrical Machines

**A: DC Machines:** Construction & Principle of Operation of DC Generators – E.M.F Equation. Principle of operation DC Motors – Back E.M.F. - Torque equation – Brake Test - Characteristics.

**B: AC Machines:** Construction and Principle of operation of Transformer- EMF Equation. Construction and Principle of Operation of 3 Phase Induction Motors - Brake test on 3-Phase Induction Motor – Applications.

# MODULE IV: P-N Junction Diode

**P-N Junction Diode:** Diode equation, Energy Band diagram, Volt-Ampere characteristics, Temperature dependence, Ideal versus practical, Static and dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances. Zener diode operation, Zener diode as voltage regulator.

**Rectifiers:** P-N junction as a rectifier - Half Wave Rectifier, Ripple Factor - Full Wave Rectifier, BridgeRectifier.

**Filters**: Filters – Inductor Filters, Capacitor Filters, L- section Filters, π- section Filters.

# MODULE V: BJT and Junction Field Effect Transistor (JFET)

**Bipolar Junction Transistor (BJT):** Construction, Principle of Operation, Symbol, Amplifying Action, Common Emitter, Common Base and Common Collector configurations and Input-Output Characteristics, Comparison of CE, CB and CC configurations

**Junction Field Effect Transistor and MOSFET:** Construction, Principle of Operation, Symbol, Pinch-Off Voltage, Volt-Ampere Characteristic, Comparison of BJT and FET.

# TEXT BOOKS

1. M.Surya Kalavathi, Ramana Pilla, Ch. Srinivasa Rao, Gulinindala Suresh, “Basic Electrical and Electronics Engineering”, S.Chand and Company Limited, New Delhi, 1st Edition, 2017.
2. R.L.Boylestad and Louis Nashlesky, “Electronic Devices & Circuit Theory”, Pearson Education, 2007.

# REFERENCES

1. V.K. Mehtha and Rohit Mehta, “Principles of Electrical Engineering and Electronics”, S.Chand&Co., 2009.
2. Jacob Milliman, Christos C. Halkias, Satyabrata Jit (2011), “Electronic Devices and Circuits”, 3rd edition, Tata McGraw Hill, New Delhi.
3. Thomas L. Floyd and R. P. Jain, “Digital Fundamentals”, Pearson Education, 2009.
4. David A. Bell, “Electronic Devices and Circuits”, Oxford University Press, 2008.
5. Nagrath I.J. and D. P. Kothari, “Basic Electrical Engineering”, Tata McGraw Hill, 2001.
6. Mittle N., “Basic Electrical Engineering”, Tata McGraw Hill Education, New Delhi, 2nd Edition,2005.

# E - RESOURCES

1. https://[www.electrical4u.com/ohms-law-equation-formula-and-limitation-of-ohms-law/](http://www.electrical4u.com/ohms-law-equation-formula-and-limitation-of-ohms-law/)
2. https://[www.eeweb.com/passives](http://www.eeweb.com/passives)
3. <http://nptel.ac.in/courses/108108076/>
4. <http://nptel.ac.in/downloads/108105053/>

# Course Outcomes:

At the end of the course, students will be able to:

* 1. Apply basic laws in electrical circuit.
  2. Analyze the single phase circuits
  3. Comprehend the construction and Operation of DC and AC machines
  4. Know the practical importance of Diode and its characteristics
  5. Recognize the construction and operation of BJT and JFET

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO, PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO1 2** | **PSO 1** | **PSO 2** | **PSO 3** |
| **CO1** | **3** | **3** | **3** |  |  |  |  |  |  |  |  | **3** | **3** | **3** | **3** |
| **CO2** | **3** | **3** | **3** |  |  |  |  |  |  |  |  | **3** | **3** | **3** | **3** |
| **CO3** | **3** | **3** | **3** |  |  |  |  |  |  |  |  | **3** | **3** | **3** | **3** |
| **CO4** | **3** | **3** | **3** |  |  |  |  |  |  |  |  | **3** | **3** | **3** | **3** |
| **CO5** | **3** | **3** | **3** |  |  |  |  |  |  |  |  | **3** | **3** | **3** | **3** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. I Semester** | | |
| **Code: C0501** | **Programming for Problem Solving (Common for ALL )** | **L** | **T** | **P** |
| **Credits: 3** | **3** | **-** | **-** |

# Prerequisites: NIL

**Course Objectives:**

1. Understand the basic terminology, write, compile and debug programs in computer programming
2. Implement different control statements for solving problems.
3. Understand the concept of structured program and arrays.
4. Implement the idea of strings and pointers.
5. Analyse the usage of structures and different file operations.

# MODULE I: Fundamentals and Introduction to ‘C’ Language

**Introduction Fundamentals**– Computer Systems, Computing Environments, Computer Languages, Creating and running programs, Software Development Method, Algorithms, Pseudo code, flow charts, applying the software development method.

**Introduction to ‘C’ Language:** – Background, C-tokens- Keywords, Identifiers, Basic data types, Variables, Constants, Preprocessor directives-include, define, Managing Input / Output functions - formatted input / output functions, Operators. Expressions, Precedence and Associatively, Expression Evaluation, Type conversions, Simple C Programming examples.

# MODULE II: Conditional Statements and Repetition Statements

**Control Statements:** if and switch statements, Repetition statements – while, for, do-while statements, Loop examples, other statements related to looping – break, continue, go to, Simple C Programming examples.

**Repetition statements** – while, for, do-while statements, nested looping, other statements related to looping – break, continue, goto, Simple C Programming examples.

# MODULE III: Designing Structured Programs and Arrays

**Designing Structured Programs**-Introduction to function, Advantages, user defined functions, inter function communication-call by value, Storage classes-auto, register, static, extern, scope rules, type qualifiers, recursion – recursive functions-Towers of Hanoi problem.

**Arrays:** Basic Concepts, Types of arrays, applications- Selection sort, Bubble sort, Insertion sort, Linear search and Binary search methods, arrays and functions.

# MODULE IV: Strings and Pointers

**Strings:** Concepts, String Input / Output functions, arrays of strings, string manipulation functions, string conversion, C program examples.

**Pointers** – Basic Concepts, Pointers for inter function communication-call by reference, pointers to pointers, Pointer arithmetic, array of pointers, pointers to array, applications, pointers to void, pointers to functions, Dynamic memory allocation functions.

# MODULE V Structures and File Handling

**Structures** – Declaration, definition and initialization of structures, accessing structure elements, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, unions, difference between structures and union, typedef, bit fields, enumerated types, C programming examples.

**Files** – Basic Concept of a file, file input / output operations, text files and binary files, file status functions (error handling), Random file access functions, command –line arguments.C program examples.

# TEXTBOOKS

* 1. Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition, Oxford University Press.
  2. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
  3. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

# REFERENCES

* + 1. C Programming & Data Structures, B.A.Forouzan and R.F. Gilberg, Third Edition, Cengage Learning
    2. C for Engineers and Scientists, H.Cheng, Mc.Graw-Hill International Edition
    3. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

# E–RESOURCES

1. [http://oxford](http://oxford/) university press.ac.in/eBooks/ Programming in C.
2. https[://www.journals.](http://www.journals.elsevier.com/science-of-computer-programming)e[lsevi](http://www.journals.elsevier.com/science-of-computer-programming)e[r.c](http://www.journals.elsevier.com/science-of-computer-programming)o[m/science-of-computer-programming](http://www.journals.elsevier.com/science-of-computer-programming)
3. [http://www.ejournalofsciences.org](http://www.ejournalofsciences.org/)
4. <http://onlinecourses.nptel.ac.in/iiitk_cs-101>
5. <http://onlinevideolecture.com/ebooks/?subject=C-Programming>

# Outcomes:

At the end of the course, students will be able to

* 1. Translate the algorithms/flowcharts to programs (in C language).
  2. Decompose a problem into functions and to develop modular reusable code.
  3. Apply different types of control structures and arrays in a computer programming.
  4. Develop programs that make use of concepts such as strings, pointers and structures.
  5. Analyze file operations and command line arguments.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO,PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COS** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **2** | **2** | **2** |  |  |  | **2** | **1** | **1** | **3** | **3** | **2** | **2** |
| **CO2** | **3** | **3** | **2** | **2** | **2** |  |  |  | **2** | **1** | **1** | **3** | **3** | **2** | **1** |
| **CO3** | **3** | **3** | **3** | **2** | **2** |  |  |  | **1** |  |  | **3** | **3** | **2** | **1** |
| **CO4** | **3** | **2** | **3** | **2** | **2** |  |  |  | **1** |  | **1** | **2** | **3** | **2** | **1** |
| **CO5** | **3** | **3** | **3** | **2** | **2** |  |  |  | **1** | **1** | **1** | **2** | **3** | **2** | **1** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. II Semester** | | |
| **Code: C0202** | **Basic Electrical and Electronics Engineering Lab**  **(Common for ALL)** | **L** | **T** | **P** |
| **Credits: 1** | **-** | **-** | **2** |

# Prerequisites: Nil Course Objective:

To get practical knowledge about basic electrical circuits, electronic devices like Diodes, BJT, JFET and also analyse the performance of DC Motors, AC Motors and Transformers.

# List of Experiments:

1. Verification of Kirchhoff’s Laws.
2. Verification of Maximum Power Transfer Theorem.
3. Determination of Phase Angle for RC series circuit.
4. Brake Test on DC-Shunt Motor. Determination of Performance curves
5. Load Tests on Single Phase Transformer
6. Brake Test on Three Phase Induction Motors. Determination of Performance curves
7. V-I Characteristics of PN junction Diode
8. V-I Characteristics of Zener Diode
9. Half Wave Rectifier and Full Wave rectifier.
10. Input and Output characteristics of BJT with CE configuration
11. Input and Output characteristics of BJT with CB configuration
12. Input and Output Characteristics of JFET.

# Course Outcomes:

At the end of the course, students will be able to

1. Analyze electrical circuits by applying basic laws
2. Analyze the performance of DC Motor, three phase Induction motor and transformer
3. Understand V-I Characteristics of various diodes
4. Design Different Rectifier Circuits
5. Differentiate the Transistors and their Operations

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **3** | **3** |  |  |  |  | **3** |  |  | **3** |  |  |  |
| **CO2** | **3** | **3** | **3** | **3** |  |  |  |  | **3** |  |  | **3** |  |  |  |
| **CO3** | **3** | **3** | **3** | **3** |  |  |  |  | **3** |  |  | **3** |  |  |  |
| **CO4** | **3** | **3** | **3** | **3** |  |  |  |  | **3** |  |  | **3** |  |  |  |
| **CO5** | **3** | **3** | **3** | **3** |  |  |  |  | **3** |  |  | **3** |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. I Semester** | | |
| **Code: C0502** | **Programming for Problem Solving Lab (Common for ALL)** | **L** | **T** | **P** |
| **Credits: 1** | **-** | **-** | **2** |

# Prerequisites: NIL Course Objectives:

1. Understand the various steps in Program development
2. Identify syntax and semantics of C Programming Language
3. Illustrate the usage of structured programming approach in solving problems.
4. Develop programs that make use of arrays, strings, pointers and structures in C language
5. Analyse different file operations

# Software Requirements: C

**List of Programs:**

* 1. a. Practice various Internal and External DOS Commands.
     1. Write sample examples of C programs to implement basic operations.
  2. a. Write a C program to find smallest and largest of given three numbers.
     1. Write a C program to find the roots of a quadratic equation.
     2. Write a C program to check whether given character is alphabet, digit or special symbol
  3. a. Write a C program to find the sum of individual digits of a positive integer.
     1. Write a C program to generate the first ‘n’ terms of the sequence.

[A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence.]

* 1. a. Write a C program to find whether the given number is palindrome, perfect, Armstrong or strong.
     1. Write a C program to generate all the prime numbers between n1 and n2, wheren1 and n2 are values supplied by the user.
  2. Write C programs that use both recursive and non-recursive functions

1. To find the factorial of a given integer.
2. To find the GCD (greatest common divisor) of two given integers.
   1. a. Write a C program to find both the largest and smallest number in a list of integers.

b. Write a C program that uses non-recursive function to search for a Key value in agiven list of integers using linear search.

c. Write a C program that uses recursive and non -function to search for a Key value in a given sorted list of integers using Binary search.

* 1. a. Write a C program that implements the Bubble sort method to sort a given array of integers in ascending order.

b. Write a C program that implements the Selection sort method to sort a given list of names in ascending order.

* 1. Write a C program to perform the following:

1. Addition of Two Matrices
2. Multiplication of Two Matrices.
   1. Write a C program that uses functions to perform the following operations:
3. To insert a sub-string into given main string from a given position.
4. To delete n characters from a given position in a given string.
5. To find substring in a given string
   1. a. Write a C program to determine if the given string is a palindrome or not

b. Write a C program to count the lines, words and characters in a given text.

* 1. a. Write a C program to swap two numbers, which implement call by value and call by reference.

b. Write a C program to display the below student details using structures

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Roll Number | Name | Gender | Branch | Attendance e  percentage |
| 501 | John | male | CSE | 77.3 |
| 502 | Alice | male | ECE | 80.5 |
| 503 | Sam | female | IT | 90.7 |

c. Write a C program to find grade of a student using structures.

* 1. a. Write a C program which copies one file to another

b. Write a C program to find sum of two numbers using command line arguments

* 1. a. Develop a mini project which implement the Library Management System

b. Develop a mini project which implements the Student Record System

.

.

# TEXT BOOKS:

1. Computer Fundamentals and Programming in C, P. Dey, M Ghosh, Second edition,

Oxford University Press

1. Problem Solving and Program Design in C, J.R. Hanly and E.B. Koffman, Eighth Edition, Pearson Education.
2. The C Programming Language, B.W. Kernighan and Dennis M.Ritchie, PHI/Pearson Education

# REFERENCES:

1. C Programming & Data Structures, B.A. Forouzan and R.F. Gilberg, Third Edition,

Cengage Learning

1. C for Engineers and Scientists, H. Cheng, Mc. Graw-Hill International Edition
2. C Programming & Data Structures, P. Dey, M Ghosh R Thereja, Oxford University Press

# Course Outcomes:

At the end of the course, students will be able to

* 1. Analyse concepts in problem solving and write diversified solutions for a given problem.
  2. Identify situations where computational methods and computers would be useful.
  3. Understand the programming tasks using techniques learned and write pseudo-code.
  4. Compare the program on a computer, edit, compile, debug, correct, recompile and execute it.
  5. Identify tasks in which the numerical techniques learned are applicable and apply them to write programs, and hence use computers effectively to solve the task

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO, PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO 1** | **PO 2** | **PO 3** | **PO4** | **PO 5** | **PO6** | **PO7** | **PO 8** | **P09** | **PO1 0** | **PO1 1** | **PO1 2** | **PSO 1** | **PSO 2** | **PSO 3** |
| **CO1** | **3** | **2** | **3** |  |  |  |  |  |  |  |  |  | **2** | **2** |  |
| **CO2** | **3** | **3** | **3** |  |  |  |  |  |  |  |  |  | **2** | **2** |  |
| **CO3** | **2** | **2** | **2** |  |  |  |  |  |  |  |  |  | **2** | **2** |  |
| **CO4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERINGCOLLEGE**  **(Autonomous)** | **B.Tech. I Semester** | | |
| **Code: C0H02** | **English Language and communication skills Lab (Common for CE,EEE,ME,ECE,CSE,CSE(AIML)**  **CSE(DS), CSE (CS), CSE(IOT),IT and Min.E)** | **L** | **T** | **P** |
| **Credits: 1** | **-** | **-** | **2** |

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

# Course Objectives:

The course aims to develop students’ intelligibility in their pronunciation of English - speech sounds, word accent, intonation and rhythm. It also helps to improve the fluency in spoken English and make them aware of nuances of major skills, namely*,* listening and speaking skills. It also trains students to understand nuances of both verbal and non-verbal communication during all activities. The course enables the learners to develop their confidence levels so as to participate in discussions, debates and public speaking.

# Listening Skills:

**Objectives:**

1. To enable students to develop their listening skill so that they may appreciate its role in the LSRW skills approach to language and improve their pronunciation
2. To equip students with necessary training in listening so that they can comprehend the speech of people of different backgrounds and regions

\*Students should be given practice in listening to the sounds of the language to be able to recognize them, awareness regarding stress and recognize and use the right intonation in sentences.

* + Listening for general content
  + Listening to fill up information
  + Intensive listening
  + Listening for specific information

# Speaking Skills:

**Objectives:**

1. To make students aware of the role of speaking in English and its contribution to their success.
2. To enable students to express themselves fluently and appropriately in social and professional contexts.

* Oral practice
* Describing objects/situations/people
* Just A Minute (JAM) Sessions.

# Syllabus: English Language Communication Skills Lab shall have two parts:

1. **Computer Assisted Language Learning (CALL) Lab**

# Interactive Communication Skills (ICS) Lab

The following course content is prescribed for the English Language Communication Skills Lab

# Module - I:

**CALL Lab:** Introduction to Phonetics – Speech Sounds – Vowels and Consonants

**ICS Lab :** Ice-Breaking activity and JAM session; Listening: listening for sounds in context, for ideas; Speaking: ideation and translation of ideas into sentences.

# Module - II:

**CALL Lab:** Structure of Syllables - Past Tense Marker and Plural Marker – Weak Forms and Strong Forms - Consonant Clusters.

**ICS Lab :** Situational Dialogues – Role-Play- Expressions in Various Situations –

Self-introduction and Introducing others – Greetings – Apologies – Requests – Social and Professional Etiquette - Telephone Etiquette; Listening: listening for specific purposes, for details; Speaking: speaking in the above situations with clarity, connectivity, maintaining voice characters.

# Module - III:

**CALL Lab:** Word accent and Listening Comprehension-reading(aloud) meaningfully.

**ICS Lab :** Descriptions- Narrations- Giving Directions and guidelines; Listening: listening for intelligible English; Speaking: formal and informal conversations, register.

# Module - IV:

**CALL Lab:** Intonation and Common errors in Pronunciation- reading aloud (evaluating through recording).

**ICS Lab:** Extempore- Public Speaking, Oral Presentation Skills; Listening: note taking and listening for speaker’s tone/attitude; Speaking: organizing, connecting ideas and sentences, short forms in spoken English, errors in spoken English

# Module - V:

**CALL Lab:** Neutralization of Mother Tongue Influence and Conversation Practice

**ICS Lab :** Information Transfer, Debate

Minimum Requirement of infra structural facilities for EL Lab:

1. Computer Assisted Language Learning (CALL) Lab:

The Computer aided Language Lab for 40 students with 40 systems, one master console, LAN facility and English language software for self- study by learners.

# System Requirement (Hardware component):

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

a) P – IV Processor b) Speed – 2.8 GHZ c) RAM – 512 MB Minimum

d) Hard Disk – 80 GB e) Headphones of High quality

1. **Interactive Communication Skills (ICS) Lab:** The Interactive Communication Skills Lab: A Spacious room with movable chairs and audio-visual aids with a Public Address System, a T. V., a digital stereo –audio & video system and camcorder etc.

Books Suggested for English Language Lab Library (to be located within the lab in addition to the CDs of the text book which are loaded on the systems):

# Prescribed Lab Manual:

Rani, Sudha. *English Language Communication Skills Laboratory*. 5th edition, Pearson Publication, 2014.

# Reference Books:

* 1. Gairns, Ruth and Redman, Stuart. *Oxford Word Skills: Learn and Practice English Vocabulary.*

2nd edition, Oxford University Press, 2008.

* 1. Hughes, John and Mallett, Andrew. *Successful Presentations DVD and Student's Book Pack*.Oxford University Press, 2013.
  2. Hancock, Mark. *English Pronunciation in Use* (Intermediate). 2nd edition, Cambridge UniversityPress, 2009.
  3. Karia, Akash. *Public Speaking Mastery: Speak Like a Winner*. Kindle edition, 2013.
  4. Lucas, Stephen. *The Art of Public Speaking****.*** 11th edition, Tata McGraw Hill, 2011.

# Websites:

1. <http://www.mindtools.com/CommSkll/ActiveListening.htm>
2. <http://www.slideshare.net/alisonkis/dialogue-and-roleplay-activity> 3.

[http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/A](http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An) [n%20](http://www.hse.ru/pubs/lib/data/access/ram/ticket/2/14309868938d576a532b71360b7354268380727a22/An)article%20for%20Monika%20(2010).pdf

# Course Outcomes:

After completion of the course, students will be able to:

* 1. Understand the nuances of language through audio- visual experience and group activities.
  2. Neutralize the accent for intelligibility
  3. realize the importance of listening skills and speaking skills and their application in real life situations.
  4. Recognize significance of non-verbal communication and develop confidence to face audience and shed inhibitions.
  5. Speak with clarity and confidence; thereby enhance employability skills of the students.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO,PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COS** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** |  | **1** |  |  |  | **1** |  | **1** | **2** | **2** |  | **1** |  |  |  |
| **CO2** |  |  |  |  |  |  |  |  |  | **1** |  | **1** |  |  |  |
| **CO3** |  |  |  |  |  |  | **1** |  | **1** | **2** |  | **2** |  |  |  |
| **CO4** |  |  |  |  |  |  |  | **1** | **1** | **2** |  | **2** |  |  |  |
| **CO5** |  |  |  |  |  |  |  |  |  | **2** |  | **2** |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. I Semester** | | |
| **Code:C0302** | **ENGINEERING WORKSHOP**  **(Common for CE, ME and Min.E)** | **L** | **T** | **P** |
| **Credits: 1** | **-** | **-** | **2** |

# COURSE OBJECTIVES:

To understand the usage of hand tools, acquire the skills in model / pattern making and familiarize with various work materials and tools.

1. TRADES FOR EXERCISES:

# At least two exercises from each trade:

|  |  |  |
| --- | --- | --- |
| 1. Carpentry | 2.Fitting | 3. Tin-Smithy |
| 4. House-wiring | 5.Foundry | 6.Arc welding |

1. TRADES FOR DEMONSTRATION & EXPOSURE
   1. Machine shop
   2. Plumbing
   3. Wood working lathe
   4. Identification of Electronic Components
   5. Black smithy
   6. Computer Peripherals

# COURSE OUTCOMES

At the end of the course, students will be able to

1. Knowledge of carpentry process and methods used in the design and fabrication, installation, maintenance and repair of structures and fixtures (e.g., furniture, cabinets) to accomplish work assignments.
2. Assembling together of part and removing metals to secure the necessary joint by using fitting and welding.
3. Understand the hardware components of house wiring.
4. Understand the manufacturing process using machine shop.
5. Analyze the different types of computer Peripherals

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** |  |  |  | **2** | **2** | **1** |  | **3** |  |  | **3** |  | **2** |  |
| **CO2** | **3** |  |  |  | **2** | **2** | **1** |  | **3** |  |  | **3** |  | **2** |  |
| **CO3** | **3** |  |  |  | **2** | **2** | **1** |  | **3** |  |  | **3** |  | **2** |  |
| **CO4** | **3** |  |  |  | **2** | **2** | **1** |  | **3** |  |  | **3** |  | **2** |  |
| **CO5** | **3** |  |  |  | **2** | **2** | **1** |  | **3** |  |  | **3** |  | **2** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. II Semester** | | |
| **Code:C0B06** | **Vector Calculus and Numerical Techniques (Common For CE,ME&MINING)** | **L** | **T** | **P** |
| **Credits: 4** | **3** | **1** | **-** |

**Pre- requisite:** Basics of vectors, Differentiation and Integration.

# Course Objectives: To learn

1. The physical quantities involved in engineering field related to vector valued functions.
2. The basic properties of vector valued functions and their applications to line, surface and volume integrals.
3. The various numerical techniques which are indispensable tools to solve many algebraic and transcendental equations.
4. Numerical methods of solving the ordinary differential equations.
5. Evaluation of PDE and their applications by using numerical techniques.

# MODULE – I: Vector Differentiation

Vector point functions and scalar point functions. Gradient, Divergence and Curl. Directional derivatives,. Scalar potential functions. Solenoid and Irrotational vectors. Vector Identities.

# MODULE – II: Vector Integration

Line, Surface and Volume Integrals. Green Theorem, Gauss Divergence Theorem and Stokes Theorem (without proofs) and their applications.

# MODULE III: : Algebraic and Transcendental equations and Interpolation

1. Solution of Algebraic and Transcendental Equations: Introduction-Errors, types of errors. Bisection Method, Method of False Position. The Iteration Method – Newton-Raphson Method
2. **Interpolation:** Introduction- Errors in Polynomial Interpolation – Finite differences- Forward Differences-Backward differences – Symbolic relations and separation of symbols, Differences of a polynomial-Newton’s formulae for interpolation, Central difference interpolation Formulae – Gauss Central Difference Formulae –Interpolation with unevenly spaced points-Lagrange’s Interpolation formula.

# MODULE – IV: Numerical solution of Ordinary Differential Equations and Numerical Integration

**Numerical solution of Ordinary Differential Equations** Introduction-Solution by Taylor’s series method - Picard’s Method of successive Approximations, Euler’s Method, Modified Euler’s Method – Runge-Kutta Methods.

**Numerical Integration**: Trapezoidal Rule, Simpson’s 1/3rd Rule, Simpson’s 3/8 Rule.

# MODULE – V: Numerical solution of PDE

Classification of second order equations , Finite difference approximations to derivatives ,- standard 5- point formula ,diagonal 5-point formula , solution of Laplace equation, Solution of Poisson’s equation. Solution of one-dimensional heat, wave equations (by Crank-Nicolson explicit/implicit formula only).

# Text Books:

* 1. B.S. Grewal, **Higher Engineering Mathematics**, Khanna Publishers, 36th Edition, 2010.
  2. R K Jain S R KIyengar, **Advanced engineering mathematics**, Narosa publications.
  3. Erwin Kreyszig, **Advanced Engineering Mathematics**, Wiley publications.
  4. M. K Jain, S R K Iyengar, R.K Jain, **Numerical Methods for Scientific and Engineering Computation**, New age International publishers.
  5. S.S.Sastry, **Introductory Methods of Numerical Analysis**,5th Edition,PHI Learning Private Limited

# Reference Books:

1. Kanti B. Datta**“Mathematical Methods of Science and Engineering”,** Cengage Learning.
2. Alan Jeffrey **“Mathematics for Engineers and Scientists”**, Chapman & Hall/ CRC, 6th Edition2013
3. Michael Greenberg **“Advanced Engineering Mathematics”**, Pearson Education Second Edition.
4. G.B. Thomas and R.L. Finney, **Calculus and Analytic geometry**, 9th Edition, Pearson,Reprint, 2002

# E Resources:

1. **Concerned Website links**
   1. <http://www.mecmath.net/calc3book.pdf(VectorCalculus)>
   2. [http://www.simumath.com/library/book.html?code=Alg\_Equations\_Examples](http://www.simumath.com/library/book.html?code=Alg_Equations_Examples(Algebraic) [(Algebraic](http://www.simumath.com/library/book.html?code=Alg_Equations_Examples(Algebraic) and transcendental equation text book by YURG BERENGARD)
   3. <http://jupiter.math.nctu.edu.tw/~smchang/9602/NA_lecture_note.pdf> (Interpolation)
   4. [http://nptel.ac.in/courses/104101002/downloads/lecturenotes/module1/chapte](http://nptel.ac.in/courses/104101002/downloads/lecturenotes/module1/chapter6.pdf) [r6.pdf](http://nptel.ac.in/courses/104101002/downloads/lecturenotes/module1/chapter6.pdf) (Numerical Differentiation and Integration)
   5. <http://www.sam.math.ethz.ch/~hiptmair/tmp/NPDE10.pdf>(Numerical Solution of Partial Differential Equations)

# Concerned Journals/Magazines links

1. https:/[/www.jstor.org/stable/27953736?seq=1#page\_scan\_tab\_contents(Alg](http://www.jstor.org/stable/27953736?seq=1&page_scan_tab_contents(Algebraic) [ebraic](http://www.jstor.org/stable/27953736?seq=1&page_scan_tab_contents(Algebraic) and transcendental equation by William L. Schaaf)
2. <http://www.ijcsi.org/papers/IJCSI-9-6-2-413-419.pdf(Algebraicandtranscendental> equation by Md.Golam Moazzam)
3. <http://www.iosrjournals.org/iosr-jm/papers/Vol6-issue6/J0665862.pdf> (Interpolation)

# NPTEL Videos

1. <http://nptel.ac.in/courses/122102009> (Algebraic and transcendental equation)
2. [http://nptel.ac.in/courses/112104035/14 (Mathematical](http://nptel.ac.in/courses/112104035/14(Mathematical) methods in engineering and science by Prof.Bhaskar Dasgupta)
3. <http://nptel.ac.in/courses/111107063> (Numerical solution of Ordinary Differential Equations)
4. <http://nptel.ac.in/courses/111105038> (Numerical Solution of Partial Differential Equations)

# Course Outcomes:

After completion of this course, students will be able to:

1. Apply the concept of Gradient, Divergence and Curl of a vector valued functions and scalar valued functions in engineering and physical problems.
2. Apply vector integral theorems in engineering and physical problems.
3. Apply numerical methods to solve some algebraic and transcendental equations to the desired level of accuracy and by applying interpolation concept to evaluate missed data in data analysis.
4. Apply differential equations in engineering-oriented problems and to observe patterns by using numerical techniques.
5. To find out the Numerical solution of partial differential equations.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **2** | **2** |  |  |  |  |  |  |  | **1** | **3** | **3** | **2** |
| **CO2** | **3** | **3** | **2** | **3** |  |  |  |  |  |  |  |  | **3** | **3** | **2** |
| **CO3** | **3** | **3** | **3** | **3** |  |  |  |  |  |  |  | **1** | **3** | **3** | **3** |
| **CO4** | **3** | **3** | **3** | **3** |  |  |  |  |  |  |  |  | **3** | **3** | **3** |
| **CO5** | **3** | **3** | **3** | **3** |  |  |  |  |  |  |  |  | **3** | **3** | **3** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. II Semester** | | |
| **Code: C0303** | **ENGINEERING MECHANICS**  **(Common for CE, ME and Min.E)** | **L** | **T** | **P** |
| **Credits: 3** | **3** | **-** | **-** |

# Prerequisites: Nil

**COURSE OBJECTIVES:**

The objective of this subject is to provide the basic concepts and effect of system forces on rigid bodies, Geometrical Properties of Planes and Solids, problem solving in kinematics and kinetics using different methods and to analyze the types of friction for moving bodies and problems related to friction.

# MODULE I: Introduction to Mechanics & System of Forces

Introduction: Basic Concepts, Laws of Motion, Force - types, characteristics - Principle of transmissibility - Types of Forces - Concurrent and non-concurrent Forces - Composition of force – Resultant - Triangle, Polygon and Parallelogram Law of Forces - Moment of Force and its Application -Varignon‘s theorem, Couples - Free Body Diagrams, Types of Supports and their reactions, Internal and External Forces - Types of Equilibrium, Equations of Equilibrium, Conditions of Equilibrium - Lami‘s Theorem.

# MODULE II: Friction, Centroid and Center of Gravity

Friction: Types of friction, Limiting friction, Laws of friction, static and dynamic friction, application of laws of friction. Motion of bodies - wedge, screw, screw jack.

Centroid and Center of Gravity: Introduction, Centroids of Lines and Areas - simple figures - Centroid of composite figures. Pappus theorem - Centre of gravity of simple solids, composite solids - Centroids of volumes.

# MODULE III: Moment of Inertia

A: Area Moment of Inertia: Definition - Moment of Inertia of plane areas, Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures.

B: Mass Moment of Inertia: Introduction-moment of inertia of masses - Radius of gyration- Transfer formula for mass moment of inertia- by integration - Moment of Inertia of composite bodies.

# MODULE IV: Kinematics& Kinetic

Kinematics: Rectilinear motion - Motion of Rigid Body under uniform and variable accelerations -motion under gravity- curvilinear motion – Projectiles - rotary motion.

Kinetics: Analysis as a Particle and Analysis as a Rigid Body in Translation - D’Alemberts Principle - Connected bodies- Kinetics of rotating bodies.

# MODULE V: Work, Power, Energy & Mechanical Vibrations

Work, Power and Energy: Introduction, work-energy equation - motion of connected bodies - work done by a spring - general plane motion. Mechanical Vibrations: Definitions, concepts - simple harmonic motion - free vibrations - Simple and compound pendulums.

# TEXT BOOKS

* 1. S. Timoshenko, D.H. Young, J.V. Rao and Sukumar Pati**, “EngineeringMechanics”**, Tata McGraw-Hill Education, 5th Edition, 2013.
  2. K.Vijaya Kumar Reddy, J. Suresh Kumar**, “Engineering Mechanics”**, B SPublications, 3rd Edition, 2013

# REFERENCES

1. Beer, F.P and Johnston Jr. E.R. “**Vector Mechanics for Engineers**”, Tata McGraw-Hill Education 10th Edition (India) Pvt Ltd.. 2013.
2. Fedinand. L. Singer, **“Engineering Mechanics”**, Harper & Row Publishers, 3rdEdition, 1975.
3. R.S. Khurmi, “**A Text Book of Engineering Mechanics”**, S.Chand Publications, 21st Edition, 2007.
4. K L Kumar, “**Engineering Mechanics”**, Tata McGraw Hill Education, 4th Edition, 2011.
5. D.S.Kumar Patil, “**Engineering Mechanics"**, SK Kataria & Sons Publishers, 2ndEdition, 2009.

# E - RESOURCES

1. <http://www.mathalino.com/reviewer/engineering-mechanics/equilibrium-force-system>
2. <http://nptel.ac.in/courses/112103109/>
3. <http://ascelibrary.org/journal/jenmdt>
4. https://tll.mit.edu/sites/default/files/SUTDVideoThumb/freebodydiagrams.pdf
5. <http://nptel.ac.in/courses/112106180/>

# COURSE OUTCOMES

At the end of the course students will be able to:

* 1. Determine the resultant of a system of forces and draw free body diagrams and can frame appropriate equilibrium equations from the free body diagram.
  2. Understand and solve the fundamental static problems and able to find centroid and centre of gravity.
  3. Determine area and mass moment of inertia for various sections.
  4. Apply fundamental concepts of kinetics and kinematics of particles to the analysis of simple practical problems.
  5. Understand and solve fundamental work, power and energy related problems and know the concepts of mechanical vibrations.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **1** | **3** |  |  |  |  |  |  |  | **3** | **2** |  |  |
| **CO2** | **3** | **3** | **1** | **3** |  |  |  |  |  |  |  | **3** | **2** |  |  |
| **CO3** | **3** | **3** | **1** | **3** |  |  |  |  |  |  |  | **3** | **2** |  |  |
| **CO4** | **3** | **3** | **1** | **3** |  |  |  |  |  |  |  | **3** | **2** |  |  |
| **CO5** | **3** | **3** | **1** | **3** |  |  |  |  |  |  |  | **3** | **2** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech II Semester** | | |
| **Code: C0B17** | **Engineering Chemistry**  **(Common for CSE, IT, ECE, EEE, CE, ME and Min.E)** | **L** | **T** | **P** |
| **Credits: 4** | **3** | **1** | **-** |

# Course objectives:

The purpose of this course is to emphasize the relevance of fundamentals of chemical sciences in the field of engineering and to provide basic knowledge on atomic- molecular orbital’s, electrochemistry, batteries, corrosion and the role of water as an engineering material in domestic-industrial use. They will also impart the knowledge of stereochemistry, understanding the chemical reaction path way mechanisms and synthesis of drugs. Listing out various types of fuels and understanding the concept of calorific value and combustion.

# Module I: Water and its treatment

Introduction to water, hardness of water, causes of hardness, expression of hardness, units and types of hardness-Numerical Problems. Alkalinity of water, specifications of potable water (BIS); Estimation of temporary & permanent hardness of water by EDTA method. Boiler troubles - Scale & Sludge, Priming and foaming, caustic embrittlement and boiler corrosion; Treatment of boiler feed water - Internal treatment (colloidal, phosphate, carbonate and calgon conditioning). External treatment - Lime Soda process (cold & hot) and ion exchange process, Numerical Problems. Disinfection of water by chlorination and ozonization. Desalination by Reverse osmosis and its significance.

# Module II: Molecular structure and Theories of Bonding:

Introduction to Molecular orbital Theory. Linear Combination of Atomic Orbital’s (LCAO), significance of bonding and anti-bonding molecular orbital, Conditions for the formation of molecular orbital’s. Molecular orbital energy level diagrams of diatomic molecules -, N2 ,O2 and F2. Introduction to coordination compounds-ligand-coordination number (CN) - spectrochemical series. Salient features of crystal field theory, Crystal field splitting of transition metal complexes in octahedral ( [CoF6]3- and [Co(CN)6]3- ) and tetrahedral ([NiCl4]2- and [Ni (CO)4] ) fields - magnetic properties of complexes. Bandstructure of solids and effect of doping on conductance.

# Module III: Electrochemistry and Corrosion

1. **Electrochemistry:**

Introduction to Electrochemistry-Conductance (Specific and Equivalent) and units. Types of cells- electrolytic & electrochemical cells (Galvanic Cells)-Electrode potential- cell potential (EMF).Electrochemical series and its applications, Nernst equation its applications and numerical problems. Reference electrodes - Calomel Electrode and Glass electrode- determination of pH using glass electrode. Batteries: Primary (dry cells) and secondary (Lead- Acid cell, Ni-Cd cell) - applications of batteries. Fuel cells: Hydrogen - Oxygen fuel cell and its applications.

# Corrosion:

Causes and effects of corrosion: Theories of corrosion - Chemical & Electrochemical corrosion, Pilling- Bedworth rule, Types of corrosion: Galvanic and Water-line corrosion. Factors affecting rate of corrosion-Nature of metal and Nature of Environment, Corrosion control methods - Cathodic protection (Sacrificial anodic and impressed current cathodic methods). Surface coatings: Methods of metallic

coatings - hot dipping (Galvanization), Electroplating (Copper) and Electroless plating (Nickel).

# Module IV: Stereochemistry, Reaction mechanism & synthesis of drug molecules and NMR spectroscopy:

Introduction to Isomers - classification of isomers - structural (chain, positional & functional) and stereoisomerism-geometrical (cis-trans & E-Z system) - characteristics of geometrical isomerism, optical isomerism (chirality - optical activity, specific rotation, enantiomers and diastereomers) of tartaric acid and lactic acid. Conformational isomerism of n-Butane. Introduction to bond cleavage (homo & hetero cleavage) - reaction intermediates and their stability. Types of organic reactions - Mechanism of substitution (SN1 & SN2) and (E1&E2) reactions with suitable example. Ring opening (Beckmann rearrangement), oxidation and reduction (Cannizaro reaction), cyclization (Components of Diels-Alder reaction-Mechanism of Diels-Alder reaction with suitable example) reactions. Synthesis of Paracetamol,Aspirin and their applications.

Introduction to Spectroscopy, Basic concepts of nuclear magnetic resonance spectroscopy, chemical shiftand spin-spin splitting.

# Module-V Fuels and Combustion

**Fuels:** Classification- solid fuels: coal – analysis of coal – proximate and ultimate analysis and their significance. Liquid fuels – petroleum and its refining, cracking – types – moving bed catalytic cracking. Knocking – octane and cetane rating, synthetic petrol - Fischer- Tropsch’s process; Gaseous fuels – composition and uses of natural gas, LPG and CNG. **Combustion:** Definition, Calorific value of fuel – HCV, LCV; Calculation of air quantity required for combustion of a fuel. Determination of calorific value by Junkers gas calorimeter-Numerical problems on combustion.

# Text Books:

* 1. P.C.Jain and Monica Jain, “**A Text Book of Engineering Chemistry”**, DhanpatRai Publications, New Delhi, 16th Edition 2014.
  2. S.S. Dara and S.S. Umare, “**A Text Book of Engineering Chemistry”**, S Chand Publications,New Delhi, 12th Edition 2010.
  3. A.Jaya Shree, “Text book of Engineering Chemistry”, Wiley, New Delhi, 2018.

# Reference Books:

1. B.Rama Devi, Ch.VenkataRamana Reddy and PrasanthaRath, **“Text Book of Engineering chemistry”**, Cengage Learning India Pvt.Ltd,2016.
2. M.G. Fontana and N. D. Greene, “**Corrosion Engineering”**, McGraw Hill Publications, NewYork, 3rd Edition, 1996.
3. K. P. C. Volhardt and N. E. Schore, **“Organic Chemistry: Structure and**

**Function”**, 5thEdition, 2006.

# e-Resources:

1. **Concerned Website links:**
2. https://books.google.co.in/books?isbn=0070669325 (Engineering chemistry by Sivasankar).
3. https:[//ww](http://www.youtube.com/watch?v=yQUD2vzfgh8)w.[youtube.com/watch?v=yQUD2vzfgh8](http://www.youtube.com/watch?v=yQUD2vzfgh8) (Hot dipping Galvanization). 3)https://archive.org/stream/VollhardtOrganicChemistryStructureFunction6th/Vollhardt\_Organic\_Ch emistry

\_Structure\_Function\_6th\_djvu.txt.

# Concerned Journals/Magazines links:

1. <http://americanhistory.si.edu/fuelcells/sources.htm>(Fuel Cell Information Sources)
2. https[://www.abctlc.](http://www.abctlc.com/downloads/courses/WaterChemistry.pdf)co[m/downloads/courses/WaterChemistry.pdf](http://www.abctlc.com/downloads/courses/WaterChemistry.pdf) (Water Chemistry)

# NPTEL Videos:

1. nptel.ac.in/courses/113108051/ (corrosion & electrochemistry web course)
2. https[://ww](http://www.youtube.com/watch?v=V7-8EOfZKeE)w.[youtube.com/watch?v=V7-8EOfZKeE](http://www.youtube.com/watch?v=V7-8EOfZKeE) (Stereochemistry)

# Course Outcomes:

After completion of the course students will be able to:

* 1. Understand water treatment, specifically hardness of water and purification of water by

various methods.

* 1. Analyze microscopic chemistry in terms of atomic and molecular orbital’s splitting and band theory related to conductivity.
  2. Acquire knowledge on electrochemical cells, fuel cells, batteries and their applications.
  3. Acquire basic knowledge on the concepts of stereochemistry, reaction mechanisms and interpretation of NMR in organic molecules.
  4. Acquire the knowledge of various fuels and identify a better fuel source of less pollution.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **1** | **2** | **2** |  |  |  |  |  |  |  |  |  |  |
| **CO2** | **2** | **1** |  | **2** | **1** |  |  |  |  |  |  |  |  |  |  |
| **CO3** | **3** | **3** | **2** | **2** | **1** |  | **2** |  |  |  |  |  |  |  |  |
| **CO4** | **3** | **1** | **1** | **1** | **2** | **1** | **3** |  |  |  |  |  |  |  |  |
| **CO5** | **3** | **3** | **3** | **1** |  |  | **3** |  |  |  |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **II Semester** | | |
| **Code:C0B12** | **Engineering Physics (Common For CE, ME&MINING)** | **L** | **T** | **P** |
| **Credits: 4** | **3** | **1** | **-** |

**Prerequisites:** Fundamentals of Physics

# Course Objectives:

* The main objective of this course is to provide the basic physics principles, would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.
* This would create awareness about the vital role played by science and engineering in the development of new technologies.

# Module – I: Waves and Oscillations

Simple harmonic Oscillator; damped harmonic oscillator; types of damping – heavy, critical and light damping; energy decay in a damped harmonic oscillator; relaxation time, quality factor; Forced harmonic Oscillator; electrical and mechanical analogy for a simple oscillator.

# Module – II

**Acoustics**: Introduction, Reverberation and Reverberation time; Basic requirements of acoustically good hall; Absorption coefficient, Jaeger’s method for derivation of Sabine’s formula; factors affecting the architectural acoustics and their remedies.

**Ultrasonics**: Introduction, Production of Ultrasonic Waves - Piezo Electric Effect, Inverse piezo electric effect, Piezo-Electric crystal Method, Magnetostriction effect, Magnetostriction Method; Detection ofUltrasonic waves - Piezo Electric detector, Kundt’s tube method, Sensitive Flame method and ThermalDetection Method; Applications of Ultrasonics - Medical, SONAR, Ultrasonic drilling and welding, **Module – III: LASERs and Optical Fibers**

**LASER:** Introduction, Characteristics of LASER; Absorption, spontaneous and Stimulated emission; Einstein’s coefficients Derivation; population inversion; pumping mechanisms; Basic components of a laser system; three and four level laser systems; Ruby LASER; He-Ne LASER; Semiconductor diode LASER (Homo junction); Applications of LASER - Computers, Medical, Military.

**Optical Fibers:** Introduction to Optical fibers, total internal reflection; Acceptance angle, and acceptance cone; numerical aperture; types of optical fibers; Losses in optical fibers - absorption losses, scattering losses and bending losses; Applications of optical fibers - Communications, Level Sensor, LASER angioplasty.

# Module – IV

**Non-destructive Testing:** Introduction; Objectives of Non-destructive testing; Types of defects – Cracking, Spalling, Staining, Construction and Design defects, Honey combing, Dusting, Blistering, Rain damage; Methods of Non-destructive testing – Liquid penetrant testing, Magnetic particle testing, Ultrasonic inspection method and Radiography testing.

# Module – V

**Dielectric Properties:** Electric dipole, Dipole moment, Dielectric constant, Polarizability, Electric Susceptibility, Displacement Vector; Determination of dielectric constant by resonance method; Electronic, Ionic and Orientation Polarizations and Calculation of Polarizabilities - Electronic and ionic; Internal field (qualitative treatment); Clausius-mossotti equation; Applications of Dielectric materials.

**Nanomaterials:** Introduction to nanomaterials, Types of nano materials; factors affecting the properties of nano materials - surface area to volume ratio and Quantum confinement effect; Properties of nano materials; Synthesis of nanomaterials - Sol-gel and Chemical vapour deposition method; Applications ofNanomaterials.

# Text Books:

1. M N Avadhanulu, P G Kshirsagar, “A Textbookof Engineering Physics”, Revised Edition2014.
2. K Vijaya Kumar, S Chandralingam, “Modern Engineering Physics’’ Volume I & II, S. Chand, 1st Edition,2017.
3. B KPandeyand S. Chaturvedi, “Engineering Physics” Cengage Learning India Revised Edition, 2014.

**References:**

* 1. P K Palanisamy, "**Engineering Physics"**, 4th Edition, SciTech Publications, 2014.
  2. G Prasad and Bhimashankaram, "**Engineering Physics"**, B S Publications, 3rd Edition, 2008.
  3. M.K.Verma, “Introduction to Mechanics”, Universities Press.
  4. Ajoy Ghatak, “Optics”, McGraw-Hill Education, 2012

**e-Resources**

1. <http://www.gistrayagada.ac.in/gist_diploma/PHYSICS>‐StudyMaterial.pdf
2. <http://www.faadooengineers.com/threads/3300>‐Applied‐Physics‐Ebooks‐pdf‐f ree‐ download?s=1b6cb6b1de4e7152298bd9d60156cd11

**Journals:**

1. <http://aip.scitation.org/journal/jap>
2. <http://www.springer.com/physics/journal/340>

**NPTEL Videos:**

1. <http://nptel.ac.in/courses/115106061/13>

2. https://nptel.ac.in/courses/115/106/115106119/

# Course Outcomes:

At the end of the course, student will be able to

1. Distinguish free, damped and forced vibrations.
2. Using the knowledge of acoustics in designing acoustically important buildings and ultrasonicsfor designing materials.
3. Understand the concepts and applications of LASER and Optical fibers.
4. Apply the knowledge of Ultrasonic to understand non-destructive testing.
5. Understand the importance of dielectric and nanomaterials and their properties.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO,PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **CO S** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOS** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **2** | **1** |  |  |  |  |  |  |  |  |  | **3** | **2** |  |
| **CO2** | **2** | **2** | **1** |  |  |  |  |  |  |  |  |  | **3** |  |  |
| **CO3** | **3** | **2** | **2** |  |  |  |  |  |  |  |  |  | **3** | **2** |  |
| **CO4** | **3** | **1** | **2** |  |  |  |  |  |  |  |  |  | **3** |  |  |
| **CO5** | **3** | **2** | **2** |  |  |  |  |  |  |  |  |  | **3** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **II Semester** | | |
| **Code: C0301** | **ENGINEERING GRAPHICS**  **(Common for CE, ME and Min.E)** | **L** | **T** | **P** |
| **Credits: 3** | **2** | **-** | **2** |

# Prerequisites: Nil

**Course Objectives:** To develop in students, graphic skills for communication of concepts and ideas of engineering products.

**MODULE I: Introduction to Engineering Drawing, Scales and Curves Introduction to Engineering Drawing:** Principles of Engineering Graphics and their significance. Lettering and dimensioning. Geometrical Constructions: Regular polygons only.

**Scales:** Plane Scale, Comparative Scale, Diagonal Scale, Vernier Scale

**Curves:** Conic Sections, Cycloidal Curves and Involutes.

# MODULE II: Projection of Points, Lines and Planes

**Projection of Points:** Principles of Orthographic Projections – Conventions – First and Third Angle projections. Projection of points including all four quadrants.

**Projection of Lines:** Projection of Lines - parallel, perpendicular, inclined to one reference plane and inclined to both reference planes. True length and true angle of a line.

**Projection of Planes**: Projection of Planes - Axis inclined to one reference plane.

# MODULE III: Projection of Solids, Section of Solids and

**Development of Surfaces**

1. **Projection of Solids**: Projections of regular solids like cube, prism, pyramid, cylinder and cone by rotating object method. Axis inclined to one reference plane.
2. **Section of Solids**: Sectioning of single solid with the cutting plane inclined to one plane and perpendicular to the other - true shape of section.
3. **Development of Surfaces:** Development of lateral surfaces of simple Solids.

# MODULE IV: Isometric Projections and Transformation of Projections

**Isometric Projections**: Principles of Isometric Projection – Isometric Views– Conventions

–Plane Figures, Simple Solids.

**Transformation of Projections**: Conversion of Isometric Views to Orthographic Views and vice versa– simple objects.

# MODULE V: Introduction to Computer Aided Drafting

CAD workstation, Advantages of CAD, CAD Software, AutoCAD – Opening and Creating Drawings-Exploring the AutoCAD interface-Zooming and Panning, AutoCAD Commands and Toolbars-Basic Drawing and Editing Commands.

# TEXT BOOKS

1. K.L.Narayana, S.Bheemanjaneyulu “**Engineering Drawing with Auto CAD- 2016**” NewAge International Publishers, 1st Edition, 2018.
2. N.D. Bhat, “**Engineering Drawing**”, Charotar Publishing House, 53rd Edition, 2014.

# REFERENCES

1. K.L.Narayana, P.Kannaiah, “**Engineering Drawing**”, SciTech Publishers. 2nd Edition, 2017
2. K.Venugopal,“**Engineering Drawing**”,NewAge International Publishers, 3rd Edition, 2014.
3. K. V. Natarajan, “**A text book of Engineering Graphics**”, Dhanalakshmi Publishers, 2015.
4. M.S. Kumar, “**Engineering Graphics**”, D.D. Publications, 2011.
5. Trymbaka Murthy, “**Computer Aided Engineering Drawing**", I.K. internationalPublishing House, 3rd Edition, 2011.

# E - RESOURCES

1. https://[www.slideshare.net/search/slideshow?searchfrom=header&q=engineering+drawing](http://www.slideshare.net/search/slideshow?searchfrom=header&q=engineering%2Bdrawing)
2. https://[www.wiziq.com/tutorials/engineering-drawing](http://www.wiziq.com/tutorials/engineering-drawing)
3. <http://freevideolectures.com/Course/3420/Engineering-Drawing>
4. <http://www.worldcat.org/title/journal-of-engineering-graphics/oclc/1781711>
5. <http://road.issn.org/issn/2344-4681-journal-of-industrial-design-and-engineering-graphics>
6. <http://nptel.ac.in/courses/112103019/>

# Course Outcomes:

At the end of the course students will be able to

* 1. Understand the basics of drawings and importance of curves.
  2. Draw the projection of lines and planes.
  3. Draw the projection of solids and section of solids.
  4. Produce development of surface and isometric projections.
  5. Convert orthographic views to isometric views and vice‐versa.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO,PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COS** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** |  | **1** |  | **1** |  |  |  |  | **3** |  | **3** | **2** |  |  |
| **CO2** | **3** |  | **1** |  | **1** |  |  |  |  | **3** |  | **3** | **2** |  |  |
| **CO3** | **3** |  | **1** |  | **1** |  |  |  |  | **3** |  | **3** | **2** |  |  |
| **CO4** | **3** |  | **1** |  | **1** |  |  |  |  | **3** |  | **3** | **2** |  |  |
| **CO5** | **3** |  | **1** |  |  |  |  |  |  | **1** |  | **1** |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **II Semester** | | |
| **Code: C0527** | **Basic Python Programming Lab (Common for CE, EEE, ME, ECE, MiE)** | **L** | **T** | **P** |
| **Credits: 2** | **-** | **1** | **2** |

# Prerequisites: NIL

**Course Objectives:** To be able to introduce core programming basics and program design with functions using Python programming language, understand a range of Object-Oriented Programming, as well as in-depth data and information processing techniques.

# Software Requirements:

**Python List of Programs:**

1. a) Write a program to demonstrate different number data types in Python.

b) Write a program to perform different Arithmetic Operations on numbers in Python.

1. a) Write a program to create, concatenate and print a string and accessing sub-string from a given string.

b) Write a python script to print the current date in the following format “Sun May 29 02:26:23IST 2017”

1. Write a program to create, append, and remove lists in python.
2. Write a program to demonstrate working with tuples in python.
3. Write a program to demonstrate working with dictionaries in python.
4. a) Write a python program to find largest of three numbers.

b) Write a Python program to convert temperatures to and from Celsius, Fahrenheit. [

Formula : c/5 = f-32/9 ]

1. a) Write a Python script that prints prime numbers less than 20.

b) Write a python program to find factorial of a number using Recursion.

1. a) Write a python program to define a module to find Fibonacci Numbers and import the module to another program.

b) Write a python program to define a module and import a specific function in that module to another program.

1. a) Write a program that defines and print a matrix.
2. Write a program to perform addition of two square matrices.
3. Write a program to perform multiplication of two square matrices.
4. a) Write a function dups to find all duplicates in the list.

b) Write a function unique to find all the unique elements of a list.

1. a) Write a program to print each line of a file in reverse order.

b) Write a program to compute the number of characters, words and lines in a file.

1. Write a script named copyfile.py. This script should prompt the user for the names of two text files. The contents of the first file should be input and written to the second file.

# TEXT BOOKS:

1. Vamsi Kurama, “Python Programming: A Modern Approach”, Pearson Publications.
2. Mark Lutz,” Learning Python”, Orielly Publishers

# REFERENCES:

1. Allen Downey, “Think Python”, Green Tea Press
2. W. Chun, “Core Python Programming”, Pearson.
3. Kenneth A. Lambert, “Introduction to Python”, Cengage

# Course Outcomes:

At the end of the course, students will be able to

* 1. Examine Python syntax and semantics and be fluent in the use of Python flow control and functions..
  2. Demonstrate proficiency in handling modules, strings and file systems
  3. Create, run and manipulate Python Programs using regular expressions and multithreaded programming environments
  4. Interpret the concepts of object‐oriented programming in Python.
  5. Implement exemplary GUI applications related to Web Programming in Python

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO, PSO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes (POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **2** |  | **3** |  | **3** |  |  |  | **1** |  | **1** | **2** | **2** | **1** |  |
| **CO2** |  |  | **2** |  | **3** |  |  |  |  |  |  | **1** | **1** |  |  |
| **CO3** |  |  | **2** |  | **2** |  |  |  |  |  |  | **2** |  |  | **2** |
| **CO4** | **1** | **2** | **3** | **2** | **3** |  | **1** |  | **3** |  | **1** | **2** |  |  | **3** |
| **CO5** |  |  |  |  | **3** |  |  |  |  |  | **1** | **2** |  |  | **2** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. II Semester** | | |
| **Code: C0304** | **ENGINEERING MECHANICS LAB**  **(Common for CE, ME and Min.E)** | **L** | **T** | **P** |
| **Credits: 1** | **-** | **-** | **2** |

# COURSE OBJECTIVES:

The objective of this subject is to provide the basic concept of force, moment of inertia, reaction and moments by practically.

**List of Experiments**

1. Verify the triangle law and polygon law of forces.
2. To find the equilibrium of coplanar concurrent force system-forces in the jib crane.
3. To determine the support reaction for a beam.
4. To determine the moment of inertia of a flywheel.
5. To verify the law of moments by disc apparatus.
6. To determine the coefficient of friction.
7. To verify the equilibrium of Non Concurrent forces.
8. To verify the equilibrium of forces using force table.
9. To determine the efficiency of a simple screw jack apparatus.
10. To estimate the value of acceleration due to gravity by using compound pendulum.
11. To determine the efficiency of Worm and Worm Wheel apparatus.
12. To determine the efficiency of a Differential Wheel and Axle apparatus.

# COURSE OUTCOMES

At completion of the course, students will be able to

* 1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures.
  2. Apply basic knowledge of mathematics and physics to solve real-world problems.
  3. Determine the coefficient of friction.
  4. Determine the efficiency of a simple screw jack apparatus, Worm and Worm Wheel apparatus and Differential Wheel and Axle.
  5. Estimate the value of acceleration due to gravity.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO 1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO1 2** | **PSO 1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **1** | **1** | **3** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |
| **CO2** | **3** | **1** | **1** | **3** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |
| **CO3** | **3** | **1** | **1** | **3** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |
| **CO4** | **3** | **1** | **1** | **3** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |
| **CO5** | **3** | **1** | **1** | **3** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. II Semester** | | |
| **Code: C0B18** | **Engineering Chemistry Lab (Common for CE, EEE, ME,ECE,CSE,CSE(AIML),**  **CSE(DS), CSE (CS), CSE(IOT),IT and Min.E))** | **L** | **T** | **P** |
| **Credits: 1** | **-** | **-** | **2** |

# Course Objectives:

To provide the students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence.

# List of Experiments:

1. Calibration of Volumetric apparatus.
2. Estimation of Total Hardness of water by EDTA Method.
3. Estimation of an acid by PH metry.
4. Estimation of alkalinity of water.
5. Estimation of strength of an acid by Conductometry.
6. Estimation of strength of an acid by Potentiometry.
7. Estimation of Mn+2 ion in KMnO4 by Colorimetry.
8. Determination of viscosity of given liquids by Ostwald’s viscometer.
9. Determination of surface tension of given sample using stalagmometer.
10. Estimation of iron (II) by dichrometry.
11. Determination of rate constant of hydrolysis of methyl acetate.
12. Preparation of Aspirin.

**Course outcomes:** After completion of the course, students will be able to:

1. Estimate the hardness of given water samples.
2. Select lubricants for various purposes.
3. Prepare advanced polymers & drug materials.
4. Know the strength of an acid present in batteries.
5. Calculate the amount of Mn+2 present in unknown substances/ores using instrumental methods.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1- Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **2** | **1** | **1** |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** | **2** | **1** | **2** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** | **2** | **2** |  | **1** |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** | **2** | **2** | **1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** | **2** | **1** | **2** |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **II Semester** | | |
| **Code: C0B13** | **Engineering Physics Lab**  **(Common to ME, CE and Min. E)** | **L** | **T** | **P** |
| **Credits: 1** | - | **-** | **2** |

**Course objectives:**

The main objective of this course is to provide the necessary exposure to the practical aspects, which is an essential component for learning science.

**List of Experiments:**

1. **Melde’s Experiment – Longitudinal and Transverse modes**

To determine frequency of electrically maintain Tuning fork using Melde’s apparatus.

1. **RLC series circuit**

To determination of resonant frequency, bandwidth and quality factor.

1. **Ultrasonic Interferometer**

To determine the velocity of ultrasonic sound through different liquid media..

1. **Numerical Aperture of an Optical Fiber**

To determine the Numerical aperture of the given fiber.

1. **Bending loss of the given fiber**.

To determine the bending loss of the given fiber.

1. **Diffraction grating**

To determine the wavelength of LASER using Diffraction grating.

1. **B-H Curve**

To study the Magnetization of Ferro magnetic material in presence of magnetic field.

1. **Dispersive Power**

To determine the dispersive power of glass prism.

1. **LASER**

To determination of pitch of the screw gauge using LASER.

1. **Torsional Pendulum**

Determine the rigidity Modulus of given Wire.

1. **Sonometer**

To verify the frequency of AC power Supply**.**

**12**. **NDT** – Magnetic particle testing

**Course Outcomes:**

At the end of the course, students will be able to

1. Develop skills to impart practical knowledge in real time solution.
2. Understand principle, concept, working, application and comparison of results with theoretical calculations.
3. Design new instruments with practical knowledge.
4. Understand measurement technology
5. Use new instruments and real time applications in engineering studies.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping**  **(3/2/1 indicates strength of correlation) 3-Strong, 2-Medium, 1-Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO 1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **1** | **1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO2** | **3** | **1** | **1** |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** | **3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO4** | **3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO5** | **3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **III Semester** | | |
| **Code:C0B02** | **PROBABILITY AND STATISTICS**  **(Common for CE, ME & Min. E )** | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

**Pre-requisite:** Basic Probability

# Course Objectives:

This course is meant to provide a grounding in Statistics and foundational concepts that can be applied in modeling processes and decision making. These would come in handy for the prospective engineers in most branches.

# Module-I: Probability

Introduction to Probability, events, sample space, mutually exclusive events, Exhaustive events, Addition theorem for 2 & n events and their related problems. Dependent and Independent events, conditional probability, multiplication theorem, Baye’s Theorem, Statement of Weak law of large numbers

# Module-II: Random Variables and Probability Distributions

Random variables–Discrete Probability distributions. Bernoulli, Binomial, poisson, mean, variance, moment generating function–related problems. Geometric distributions. Continuous probability distribution, Normal distribution, Exponential Distribution, mean, variance, moment generating function– relatedproblems.Gammadistributions(OnlymeanandVariance)CentralLimitTheorem

# Module-III: Sampling Distributions & Testing of Hypothesis

**A: Sampling Distributions:** Definitions of population-sampling-statistic, parameter. Types of sampling, Expected values of Sample mean and variance, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of variance. Parameter estimations – likelihood estimate, point estimation and interval estimation.

**B: Testing of hypothesis:** Null hypothesis, Alternate hypothesis, type I, & type II errors–critical region, confidence interval, and Level of significance. One tailed test, two tailed test.

Large sample tests:

* 1. Testing of significance for single proportion.
  2. Testing of significance for difference of proportion.
  3. Testing of significance for single mean.
  4. Testing of significance for difference of means.

# Module IV: Small sample tests

Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples, Paired t-test, Snedecor’s F- distribution and it’s properties. Test of equality of two population variances, Chi-square distribution, its properties, Chi-square test of goodness of fit and independence of attributes.

# Module V: Correlation, Regression:

Correlation & Regression: Correlation, Coefficient of correlation, the rank correlation. Regression, Regression Coefficient, The lines of regression: simple regression.

# TEXTBOOKS:

1. Walpole,Probability&Statistics,forEngineers&Scientists,8th Edition,
2. Pearson Education.
3. Paul A Maeyer Introductory Probability and Statistical Applications, John Wiley Publicaitons.
4. MonteGomery,“AppliedStatisticsandProbabilityforEngineers”,6thEdition,WileyPublications.

# REFERENCES:

1. Sheldon M Ross, Introduction to Probability & Statistics, for Engineers & Scientists, 5th Edition, Academic Press.
2. Miller & Freund’s, Probability & Statistics, for Engineers & Scientists, 6th Edition, Pearson Education.
3. Murray R Spiegel, Probability & Statistics, Schaum’s Outlines, 2nd Edition, Tata Mc.Graw Hill Publications.
4. S Palaniammal, Probability & Queuing Theory, 1stEdition, Printice Hall.

# E-Resources:

1. [http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20&%20Statistics.pdf](http://www.csie.ntu.edu.tw/~sdlin/download/Probability%20%26%20Statistics.pdf)
2. (Probability & Statistics for Engineers & Scientists textbook)
3. <http://www.stat.pitt.edu/stoffer/tsa4/intro_prob.pdf>(Randomvariables and its distributions)
4. <http://users.wfu.edu/cottrell/ecn215/sampling.pdf>(NotesonSampling and hypothesis testing)
5. <http://nptel.ac.in/courses/117105085/9>(Mean and variance of random variables)
6. <http://nptel.ac.in/courses/111105041/33>(Testing of hypothesis)
7. <http://nptel.ac.in/courses/110106064/5>(Measures of Dispersion)

# Course Outcomes:

At the end of the course, students will be able to:

1. The students will understand central tendency and variability for the given data.
2. Students would be able to find the Probability in certain realistic situation.
3. Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variables Involved in the probability models. It is quite useful for all branches of engineering.
4. The student would be able to calculate mean and proportions (large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations.
5. The student would be able to calculate mean and proportions (small sample) and to make important decisions from few samples which are taken out of unmanageably huge populations.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **1** | **4** |  | **3** |  |  |  |  | **3** | **1** |  |  |  |
| **CO2** | **3** | **3** | **2** |  | **3** |  |  | **2** | **1** |  | **2** |  |  |  |  |
| **CO3** | **3** | **2** | **1** |  | **3** |  |  |  |  | **2** | **3** |  |  |  |  |
| **CO4** | **3** | **3** | **2** |  | **2** |  | **1** |  | **1** |  |  | **1** |  |  |  |
| **CO5** | **3** | **2** | **2** |  |  |  |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **III Semester** | | |
| **Code:C0306** | **MECHANICS OF SOLIDS** | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

**Prerequisites:** Physics of Materials and Engineering Mechanics

# Course Objectives:

The objective of this subject is to provide the basic concepts of mechanical behaviour of the materials under various loads, provides knowledge on shear force and bending moment diagrams of beams and knowledge about stress distribution across various cross sections of beams.

# MODULE I: Simple Stresses & Strains

Elasticity and plasticity – Types of stresses & strains – Hooke’s law – stress–strain diagram for ductile and brittle material–Working stress–Factor of safety–Lateral strain, Poisson’s ratio & volumetric strain.

Elastic Module & the relationship between them–Bars of varying section–composite bars– Temperature stresses. Strain energy – Resilience–Gradual, sudden, impact and shock loadings

# MODULE II: Shear Force and Bending Moment

Definition of beam –Types of beams–Concept of shear force and bending moment–SF and BM diagrams for cantilever, simply supported and overhanging beams subjected to point loads, UDL, UVL and combination of these loads–Point of contra flexure–Relation between SF and BM and rate of loading at section of a beam.

# MODULE III: Bending Stresses & Shear Stresses

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

B: Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections – rectangular, circular, triangular, I, T and angle sections.

# MODULE IV: Deflection of Beams & Torsion

Deflection of Beams**:** Bending into a circular arc–slope, deflection and radius of curvature – Differential equation for the elastic line of a beam– Double integration and Macaulay’s methods– Determination of slope and deflection for cantilever and simply supported beams subjected to point loads- UDL – uniformly varying load.

Torsion: Theory of pure torsion – Assumptions – Derivation of torsion equation, polar section modulus – power transmitted by shafts – combined bending and torsion.

# MODULE V: Analysis of Pin Jointed Plane Frames , Thin Cylinders

Analysis of Pin- Jointed Plane Frames**:** Determination of forces in the members of various types of cantilever & simply supported trusses using (i) Method of Joints (ii) Method of Sections.

Thin Cylinders**:** Thin seamless cylindrical shells–Derivation of formula for longitudinal and circumferential stresses– hoop, longitudinal and volumetric strains– changes in diameter and volume of thin cylinders.

# TEXT BOOKS

1. S.Timshenko **“Strength of Materials”,** D. Van Nostr and Company, inc., 3rd edition, 1983
2. Ramamrutham **“Strength of materials”,** Dhanpat Rai Publishing, 18th edition, 2014

# REFERENCES

1. R..K. Rajput, **“Strength of Materials”** S. Chand company Pvt, 5th edition, 2014
2. R K Bansal **“Strength of Materials”** Lakshmi – publications, 6th edition, 2015
3. Bhavikatti**“Strength of materials”** Lakshmi publications, 4th edition, 2014.
4. R S Khurmi, **“Strength of Materials”** S Chand, revised edition, 2013.
5. D. S. Kumar, **“Strength of Materials,** S K Kataria& Sons, Reprint 2013.

# E - RESOURCES

1. nptel.ac.in/courses/112107147
2. nptel.ac.in/courses/Web course- contents/…/strength%20of%20materials/homepage.htm
3. [www.springer.com](http://www.springer.com/) › Home › Materials › Characterization & Evaluation of Materials
4. discovermagazine.com/tags/strength of materials
5. nptel.ac.in/courses/105105108/
6. nptel.ac.in/courses/105105108/30

# Course Outcomes:

At the end of the course, students will be able to:

1. Understand types of forces, stresses and strains.
2. Draw shear force and bending moment diagrams for different loaded beams.
3. Analyze the bending stresses in different sections of beams.
4. Analyze the deflections in beams when subjected to different types of loads.
5. Analyze frames and different types of cylinders.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **1** |  | **2** | **2** |  |  | **1** |  |  | **1** |  | **2** | **2** |  |  |
| **CO2** | **2** | **3** | **3** | **2** | **1** |  |  |  |  | **1** |  | **2** | **2** |  |  |
| **CO3** | **3** | **2** | **2** | **3** |  |  |  |  |  | **3** |  | **2** | **2** |  |  |
| **CO4** | **3** | **2** | **2** | **2** |  |  | **2** | **1** |  | **1** | **1** | **2** | **2** |  |  |
| **CO5** | **3** | **3** | **2** | **2** |  |  | **2** | **1** |  | **2** | **1** | **3** | **2** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **III Semester** | | |
| **Code:C0307** | **METALLURGYAND MATERIAL SCIENCE** | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

# Prerequisites: Applied Chemistry Course Objectives:

Apply the knowledge of Physical sciences (basic sciences) and translates this knowledge to understand crystal or amorphous nature of materials various engineering materials, their characteristics and their applications is considered to be the major objective of this course.

**MODULE I: Crystallography, Constitution of Alloys & Metallurgy & Materials Science** Crystallography: Review of crystal structure, space lattice, crystal planes and crystal directions, co-ordination number, number of atoms per unit cell, atomic packing factor, Numerical related to crystallography. Imperfection in metal crystals: Crystal imperfections and their classifications, point defects, line defects, edge & screw dislocations.

Constitution of Alloys: Necessity of alloying, types of solid solutions, Hume Rothery’s rules, intermediate alloy phases and electron compounds.

Metallurgy & Materials Science : Bonds in Solids – Metallic bond - crystallization of metals, grain and grain boundaries, effect of grain boundaries on the properties of metal / alloys – determination of grain size.

# MODULE II: Equilibrium of Diagrams and Phase Transformations

Equilibrium of Diagrams: Experimental methods of construction of equilibrium diagrams, Isomorphous alloy systems, equilibrium cooling and heating of alloys, Lever rule, coring miscibility gaps, eutectic systems, congruent melting intermediate phases, peritectic reaction.

Phase Transformations: Transformations in the solid state– allotropy, eutectoid, peritectoid reactions, phase rule, relationship between equilibrium diagrams and properties of alloys. Study of important binary phase diagrams of Cu-Ni-, Al-Cu, Bi-Cd, Cu-An, Cu-Sn andFe-Fe3C.

# MODULE III: Cast Irons & Steels

A: Cast Irons: Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron and alloy cast irons.

B: Steels: Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

# MODULE IV: Heat treatment of Alloys & Non-ferrous Metals and Alloys

Heat treatment of Alloys: Effect of alloying elements on Fe-Fe3C system, Annealing, normalizing,Hardening, TTT diagrams, tempering, hardenability, surface hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

Non-ferrous Metals and Alloys: Structure and properties of copper and its alloys, Aluminum and its alloys, Titanium and its alloys. Jomney end quench test apparatus and working description

# MODULE V: Ceramic materials & Composite materials

Ceramic materials: Crystalline ceramics, glasses, cermets, abrasive materials, nano-materials– definition, properties and applications.

Composite materials: Classification of composites, various methods of component manufacture of composites, particle reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal-matrix composites and C-composites.

# TEXT BOOKS

* 1. Kodigre V D, Sushil Kodgire, “**Material Science and Metallurgy for Engineers**”, Everest Publishing House, ISBN: 9788186314005, 8186314008, 39th edition, 2017.
  2. V. Rahghavan**“Elements of Material science”,** PHI Publications, 6th edition, 2015

# REFERENCES

1. Agarwal, “**Science of Engineering Materials”**, Tata McGrawHill, 8th edition, 2012.
2. William D callister, “**Materials Science and Engineering”,** 8th edition, 2010., 4th Edition 2002.
3. Pakirappa, “**Materials Science and Engineering”,** 6th edition, 2013
4. SidneyH.Avener**“Introduction to Physical Metallurgy”,** Tata McGraw Hill publications, 2nd edition, 2013.

# E - RESOURCES

1. <http://nptel.ac.in/courses/113106032/>
2. <https://link.springer.com/journal/10853>
3. <https://www.journals.elsevier.com/materials-science-and-engineering-a/>

# Course Outcomes:

At the end of the course, students will be able to:

1. Analyse the structure of materials and the necessity of alloying, solid solutions.
2. Analysing the equilibrium diagrams and applying for cooling and heating of alloys, Lever rule &application of Fe-Fe3C (Iron carbide) diagram.
3. Application of different alloys for creating Cast Iron and Steel types.
4. Understanding Heat treatment of alloys, methods of heat treatment and application of TTT diagram for achieving surface hardening techniques.
5. Understand the Structure and properties of Ceramic material and its classification and its application.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **1** |  | **2** | **2** |  |  | **1** |  |  | **1** |  | **2** | **2** |  |  |
| **CO2** | **2** | **3** | **3** | **2** | **1** |  |  |  |  | **1** |  | **2** | **2** |  |  |
| **CO3** | **3** | **2** | **2** | **3** |  |  |  |  |  | **3** |  | **2** | **2** |  |  |
| **CO4** | **3** | **2** | **2** | **2** |  |  | **2** | **1** |  | **1** | **1** | **2** | **2** |  |  |
| **CO5** | **3** | **3** | **2** | **2** |  |  | **2** | **1** |  | **2** | **1** | **3** | **2** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLAREDDYENGINEERINGCOLLEGE**  **(Autonomous)** | **B.Tech.**  **III Semester** | | |
| **Code:C0308** | **KINEMATICS OF MACHINES** | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

**Prerequisites:** Engineering Mechanics & Engineering Graphics

# Course Objectives:

The objective of this subject is to provide basic concept of Mechanisms used in different machine elements like cams, gears and other power transmitting elements.

# MODULE I: Mechanisms & Machines

Mechanisms: Elements or Links, Classification, Rigid Link, flexible and fluid link, Types of kinematic pairs, sliding, turning, rolling, screw and spherical pairs, lower and higher pairs, closed and open pairs, constrained motion, completely, partially or successfully constrained and incompletely constrained.

Machines: Mechanism and machines, classification of machines, kinematic chain, inversion of mechanisms, inversions of quadratic cycle chain, single and double slider crank chains.

**MODULE II: Straight Line Motion Mechanisms, Steering Mechanisms & Hooke’s Joint** Straight Line Motion Mechanisms: Exact and approximate copiers and generated types Peaucellier, Hart and Scott Russel, Grasshopper, Watt T.Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

Steering Mechanisms: Conditions for correct steering, Davis Steering gear, Ackerman’s steering gear mechanisms, velocity ratio. Hooke’s Joint – Single and double Hooke’s joint, Universal coupling application problems.

# MODULE III: Kinematics & Plane motion of body

A: Kinematics: Velocity and acceleration - Motion of link in machine - Determination of Velocity and acceleration diagrams - Graphical method - Application of relative velocity method four bar chain. Analysis of Mechanisms: Analysis of slider crank chain for displacement, velocity and acceleration of slider - Acceleration diagram for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration. B: Plane motion of body: Instantaneous centre of rotation, centroids and axodes - relative motion between two bodies - Three centres in line theorem - Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

# MODULE IV: Cams & Analysis of Motion of Followers

Cams: Definitions of cam and followers, their uses, types of followers and cams, terminology. Types of follower motion - Uniform velocity, Simple harmonic motion and uniform acceleration. Maximum velocity and maximum acceleration during outward and return strokes in the above three cases. Analysis of motion of followers: Roller follower circular cam with straight, concave and convex flanks.

# MODULE V: Gears & Gear Trains

Gears: Higher pairs, friction wheels and toothed gears, types, law of gearing, condition for constant velocity ratio for transmission of motion, Forms of teeth: cycloidal and involute profiles. Velocity of sliding phenomena of interferences, Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact - Introduction to Helical, Bevel and worm gearing.

Gear Trains: Introduction - Train value - Types - Simple and reverted wheel train, Epicyclic gear train. Methods of finding train value or velocity ratio - Epicyclic gear trains. Selection of gear box-Differential gear for automobiles.

# TEXT BOOKS

1. Thomas Bevan **“Theory of Machines”,** CBS Publishers, 3rd edition, 2005
2. S.S.Rattan**“Theory of Machines and Mechanisms”**, Tata McGraw Hill Publishers, 4th edition, 2014.

# REFERENCES

1. Shiegley**“The Theory of Machines”** , Oxford University Press, 5th edition, 2017.
2. JS Rao and RV Dukkipati, **“Mechanism and Machine Theory”,** New Age International Publishers, 2nd edition, 1992.
3. R.K Bansal “**Theory of Machines”,** Laxmi Publication, 4th edition, 2006
4. R.S. Khurmi and J K Gupta“**Theory of Machines”**, S Chand Publisher, 14th edition, 2008.
5. B.V. R. Gupta, “**Theory of Machines”**, I. K. International Publishers, 2nd edition, 2011

# E - RESOURCES

1. [www.umt.fme.vutbr.cz/~ruja/vyuka/kinematics/LectureNotes.pdf.](http://www.umt.fme.vutbr.cz/~ruja/vyuka/kinematics/LectureNotes.pdf)
2. [www.springer.com/la/book/9789400711556](http://www.springer.com/la/book/9789400711556)
3. tps://[www.elsevier.com/journals/mechanism-and-machine-theory/0094-114X?...](http://www.elsevier.com/journals/mechanism-and-machine-theory/0094-114X)
4. [www.nptelvideos.in/2012/12/kinematics-of-machines.html](http://www.nptelvideos.in/2012/12/kinematics-of-machines.html)
5. nptel.ac.in/courses/112104121/16

# Course Outcomes:

At the end of the course, students will be able to:

1. Analyze the mechanism of the links subjected to various types of mechanisms and analyze the degrees of freedoms.
2. Undertake problem identification, formulation and solution using a range of analytical methods
3. Apply knowledge of links and structural elements to analyze velocity and acceleration for simple mechanisms.
4. Understand the different types of cam and followers
5. Understand the cycloidal and involute profiles

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSO**  **s** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **1** | **2** | **2** | **3** |  | **1** | **1** | **2** | **2** | **3** | **1** | **1** | **2** |  | **2** |
| **CO2** | **2** | **2** |  |  |  | **2** |  |  |  |  |  | **2** | **2** |  | **2** |
| **CO3** | **1** | **2** | **1** | **3** | **1** | **1** | **1** | **1** |  |  |  | **2** | **2** |  | **2** |
| **CO4** | **2** | **3** |  |  |  | **2** | **1** |  | **2** |  | **2** | **2** | **2** |  | **2** |
| **CO5** | **2** | **2** | **3** |  | **1** | **2** | **2** |  | **1** |  | **3** | **2** | **2** |  | **2** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLAREDDYENGINEERINGCOLLEGE**  **(Autonomous)** | **B.Tech.**  **III Semester** | | |
| **Code:C0309** | **THERMODYNAMICS**  *(Use of standard Psychrometry charts is permitted)* | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

# Prerequisites: NIL

**Course Objectives:**

To understand the basic concepts of thermodynamics applied in devices/machines employed in industries/other applications like heat engines, automobiles, heat transfer, refrigeration & air conditioning.

# MODULE I: Introduction & Zeroth Law of Thermodynamics

Introduction: System – Control volume –Surrounding – Boundaries – Universe – Types of systems – Macroscopic and Microscopic viewpoints –Concept of continuum –Thermodynamic equilibrium, State, Property, Process, Cycle and reversibility–Quasi-static process –Irreversible process, Causes of irreversibility–Energy in state and intransition – Types – Work and Heat – Point and Path function.

Zeroth Law of Thermodynamics: Concept of quality of Temperature– Principles of Thermometry– Reference Points–Constant Volume gas Thermometer–Scales of Temperature, Ideal Gas Scale – PMM I – Joule’s Experiments – First law of Thermodynamics – Corollaries–First law applied to process and applied to a flow process– Steady Flow Energy Equation.

# MODULE II: Second Law of Thermodynamics

Second Law of Thermodynamics –Thermal Reservoir – Heat Engine, Heat pump, Parameters of performance, Second law of thermodynamics, Kelvin-Planck and Clausius statements and their equivalence/corollaries, PMM of second kind.

Carnot’s principle, Carnot cycle and its specialties, Thermodynamic scale of Temperature, Clausius Inequality, Entropy, Principle of entropy increase –Energy equation –Availability and irreversibility

–Thermodynamic potentials –Gibbs and Helmholtz functions –Maxwell relations –Elementary treatment of the Third law of Thermodynamics.

# MODULE III: Perfect Gas Laws & Pure Substances

A: Perfect Gas Laws: Equation of State –specific and Universal gas constants – Various Non-flow processes –Properties –End states –Heat and Work Transfer –Changes in Internal Energy– Throttling and free expansion processes–Flow processes–Deviations from perfect gas model– Vander Waals equation of state– Compressibility charts– Variable specific Heats– Gas Tables.

B: Pure Substances: PVT surface, T-s and h-s diagrams, Phase transformations–Triple point – Critical state –Properties during change of phase, Dryness Fraction – Clausius – Clapeyron Equation – Property tables. Various Thermodynamic processes and energy Transfer– use of Mollier charts - Steam Calorimetry.

# MODULE IV: Power Cycles & Mixtures of Perfect Gases

Power Cycles: Otto, Diesel, Dual cycles –Sterling cycle –Atkinson cycle – Ericcson cycle – Lenoir cycle–Description and representation on P–V and T-S diagram –Thermal efficiency, Mean effective pressures on Air standard basis– Comparison of Cycles.

Mixtures of perfect Gases–Mole Fraction, Mass fraction – Gravimetric and volumetric analysis– Dalton‘s law of partial pressure –Avogadro‘s law of additive volumes–Mole fraction –Volume fraction and partial pressure –Equivalent gas constant and Molecular Internal Energy, Enthalpy, Specific heats and Entropy of mixture of perfect gases and Vapour - Atmospheric air.

# MODULE V: Refrigeration Cycles & Introduction to Psychrometry

Refrigeration Cycles: Brayton cycle –Performance evaluation–Combined cycles –Bell-Coleman cycle, Vapour compression cycle – Performance Evaluation.

Introduction to Psychrometry: Psychrometric properties–Dry bulb temperature – Wet bulb temperature –Dew point temperature –Thermodynamic Wet bulb temperature –Specific humidity – Relative humidity –Saturated air –Vapour pressure –Degree of saturation–Adiabatic Saturation – Carrier‘s Equation–Psychrometric chart.

# TEXT BOOKS

1. Yunus Cengel& Boles, **“Thermodynamics an Engineering Approach”**, 7th edition TMH, 2010
2. P.K. Nag **“Engineering Thermodynamic”**,TMH, 5th Edition, 2013.

# REFERENCES

1. Doolittle, “**Thermodynamics for Engineers**”, John Wiley & Sons,1984
2. Sonntag& Van Wylen, **“Fundamentals of Thermodynamics”**, Wiley, 8th Edition,2014
3. S.R. de Groot, **“Non Equillibrium Thermodynamics”**, Courier corporation, 1st Edition,2013
4. P.L.Dhar, **“Engineering Thermodynamics”**,Elsevier**,**2008**.**
5. Jones & Dugan **“Engineering Thermodynamics”,** Prentice Hall Publisher, 1st Edition, 1996

# E - RESOURCES

1. <http://ores.su/en/journals/international-journal-of-applied-thermodynamics>
2. https:/[/www.journals.elsevier.com/the](http://www.journals.elsevier.com/the-journal-of-chemical-thermodynamics)-[journal-of-chemical-thermodynamics](http://www.journals.elsevier.com/the-journal-of-chemical-thermodynamics)
3. <http://www.sciencedirect.com/science/book/9780444633736>
4. <http://nptel.ac.in/courses/112103016/>
5. <http://nptel.ac.in/courses/112105123/>
6. <http://nptel.ac.in/courses/101104063/>

# Course Outcomes:

At the end of the course, students will be able to:

1. Apply the principles Zeroth & first law of thermodynamics to solve relevant engineering problems.
2. Correlate the real life situations to the concept of second law of thermodynamic.
3. Apply the different fundamentals of perfect gases and their mixtures to practical problems.
4. Analyse different power cycles and the effects caused due to mixing of different gases.
5. Analyse different refrigeration cycles and determine Psychometric properties.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** |  | **3** |  | **2** | **1** |  |  |  |  | **3** | **2** |  |  |
| **CO2** | **3** | **3** |  | **3** |  | **2** | **1** |  |  |  |  | **3** | **2** |  |  |
| **CO3** | **3** | **3** |  | **3** |  | **2** | **1** |  |  |  |  | **3** | **2** |  |  |
| **CO4** | **3** | **3** |  | **3** |  | **2** | **1** |  |  |  |  | **3** | **2** |  |  |
| **CO5** | **3** | **3** |  | **3** |  | **2** | **1** |  |  |  |  | **3** | **2** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **III Semester** | | |
| **Code:C0310** | **PRODUCTION TECHNOLOGY** | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

# Prerequisites: Nil

**Course Objectives:**

The objective of this subject is to provide knowledge of various manufacturing methods of components and various metal joining processes.

# MODULE I: Casting & Methods of Melting

Casting: Steps involved in making a casting - Advantage of casting and its applications. Patterns and Pattern making - Types of patterns - Materials used for patterns, pattern allowances and their construction, Principles of Gating, Gating ratio and design of Gating systems. Solidification of casting - Concept - Solidification of pure metal and alloys, short & long freezing range alloys. Risers - Types, function and design, casting design considerations, special casting processes- Centrifugal, Die and Investment casting, Slush casting, Shell mould casting. Defects in casting Mould making machines.

Methods of Melting - Crucible melting, cupola operation and steel making process

# MODULE II: Welding & Cutting of Metals

Welding: Classification of welding process types of welds, welded joints and their characteristics, design of welded joints, Gas welding, Arc welding, Forge welding, resistance welding, Thermit welding.

Cutting of Metals: Oxy-acetylene gas cutting, cutting of ferrous metals. Inert Gas welding - TIG & MIG welding, Friction welding, Induction welding, Explosive welding, Laser welding, Submerged Arc Welding, Soldering & Brazing. Heat affected zones in welding; welding defects

- causes and remedies - destructive nondestructive testing of welds.

# MODULE III: Hot and Cold Working Processes & Stamping, Forming Processes

A: Hot and cold working processes: Cold working, Hot working, strain hardening, recovery, re - crystallization and grain growth, Comparison of properties of Cold and Hot worked parts, Rolling fundamentals - theory of rolling, types of rolling mills and products. Forces in rolling and power requirements.

B: Stamping, forming processes: Blanking, Piercing, Bending, forming drawing and its types, wire drawing and tube drawing, Embossing,coining, hot and cold spinning. Types of presses and press tools. Forces and power requirements in the above operations.

# MODULE IV: Extrusion of Metals & Forging Processes

Extrusion of Metals: Basic extrusion process and its characteristics. Hot extrusion and cold extrusion – Forward and backward extrusion, Impact extrusion, Hydrostatic extrusion.

Forging Processes: Principles of forging, Tools and dies, Types of Forging - Smith forging, Drop Forging and Roll forging, forging hammers, forging defects.

# MODULE V: Processing of Plastics & Moulding Equipment

Processing of Plastics: Types of Plastics –Thermo Plastics, Thermosets, Rubbers, Carbon fibre reinforced plastics, Graphite fibre reinforced plastics, Properties, applications and their Processing Methods.

Moulding Equipment: Injection moulding, Types of Injection moulding, Tranfer moulding, Extrusion moulding, Thermo forming, Compression moulding, Blow moulding.

# TEXT BOOKS

* 1. SeropeKalpakjin& Stephen Schmid **“Manufacturing Engineering and Technology”,**

Pearson Edu, 7th edition, 2014.

* 1. P.N.Rao, “**Manufacturing Technology**”, Tata McGraw-Hill Publishing Limited, II Edition, 2017.

# REFERENCES

1. R.K. Jain **“Production Technology”,** Khanna Publications, 7th edition, 2012.
2. R. S Paramar**“Welding Processes and Technology”,** Khanna Publishers, 2013.
3. B.S. Magendran Parashar & R.K. Mittal, “**Elements of Manufacturing Processes**”, Prentice Hall of India, 2004.
4. Rajput R.K, “**A text book of Manufacturing Technology**’, Lakshmi Publications, 2015.
5. Sharma P.C **“A text book on Production Technology”,** S. Chand Publication, 8th edition, 2014.

# E - RESOURCES

1. <http://me.emu.edu.tr/me364/lecnotes.html>
2. <http://www.nptel.ac.in/courses/112107084/>
3. <https://www.academia.edu/16073401/A_Review_on_Various_Welding_Techniques>
4. <http://www.nptel.ac.in/courses/112107083/6>
5. <http://nptel.ac.in/courses/112107215/>

# Course Outcomes:

At the end of the course, students will be able to:

1. Explain the process involved in design of different foundry elements and foundry techniques
2. Understand different metal cutting and joining processes.
3. Differentiate various hot and cold forming processes
4. Understand various extrusion methods and forging processes
5. Discuss types of plastics for specific applications

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **2** | **1** |  |  |  | **1** | **2** | **1** |  |  |  |  |  | **3** |  |
| **CO2** | **2** | **1** |  |  |  | **1** | **2** | **1** |  |  |  |  |  | **3** |  |
| **CO3** | **2** | **2** |  |  |  | **1** | **2** | **1** |  |  |  |  |  | **3** |  |
| **CO4** | **2** | **3** |  |  |  | **1** | **2** | **1** |  |  |  |  |  | **3** |  |
| **CO5** | **2** | **3** |  |  |  | **1** | **2** | **1** |  |  |  |  |  | **3** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **III Semester** | | |
| **Code:C0311** | **METALLURGY AND MECHANICS OF SOLIDS LAB** | **L** | **T** | **P** |
| **Credits:1** | **-** | **-** | **2** |

# Course Objectives:

Students will be able to experimentally learn the microstructure, compositions and various mechanical properties of the metals and alloys

**List of Experiments**

**METALLURGY LABORATORY**

1. Preparation and study of the microstructure of steels
2. Study of microstructures of cast irons
3. Preparation and study of the microstructure of non ferrous alloys
4. Preparation and study of the microstructure of heat treated steels
5. Hardenability of steels by Jomney end quench test
6. To find out the hardness of various treated and untreated steels.

# MECHANICS OF SOLIDS LABORATORY

1. Tensile test using UTM
2. Bending test on a) simply supported beam and b) cantilever beam
3. Torsion test
4. Hardness test on a) Brinell hardness tester and b) Rockwell hardness tester
5. Test on springs a) compression spring b) tension spring
6. Impact test a) Izod b) Charpy
7. Fatigue test.
8. Hoop stress andstrain relationship for the Thin Cylinder

# Course Outcomes

At the end of the course, students will be able to

1. Understand the microstructures of various metals and alloys.
2. Identify the methods of heat treatment for varying the hardness
3. Understand the measurement of bending and tensile forces using UTM.
4. Understand the hardness, tension, compression and impact testing measurement methods for metals.
5. Find out the Young’s modulus of some engineering materials.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme**  **Outcomes(POs)** | | | | | | | | | | | | **PSO**  **s** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **2** | **2** | **3** |  |  |  |  |  |  |  | **2** | **2** |  |  |
| **CO2** | **3** | **2** | **2** | **2** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |
| **CO3** | **3** | **1** | **2** | **3** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |
| **CO4** | **3** | **2** | **2** | **2** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |
| **CO5** | **3** | **1** | **2** | **3** |  |  |  |  | **3** |  |  | **2** | **2** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **III Semester** | | |
| **Code:C0312** | **PRODUCTION TECHNOLOGY LAB** | **L** | **T** | **P** |
| **Credits:1** | **-** | **-** | **2** |

# Course Objectives:

Student will be able to learn and practice the various production processes like casting, melting,

welding, forming and processing of plastics.

**List of Exercises**

* 1. **Metal Casting Lab:**
     1. Pattern making - for one casting drawing.
     2. Sand properties testing - Exercise -for strength and permeability.
     3. Mould making.
     4. Melting and Casting – demonstration.

# Welding Lab:

* + 1. Arc Welding. 2. Spot Welding. 3. TIG Welding. 4. Gas Welding. 5. Plasma Welding.

# Mechanical Press Working:

* + 1. Blanking & Piercing operations and study of simple, compound and progressive press tools.
    2. Hydraulic Press: Deep drawing.
    3. Bending and other operations.

# Processing Of Plastics:

* + 1. Injection Moulding. 2.Blow Moulding.

# Course Outcomes:

At the end of the course, students will be able to:

* + - 1. Prepare the pattern by using wood turning lathe.
      2. Create the mould and make the required part by using a casting process.
      3. Prepare various joints like lap joint, T-joint and butt joint by using Arc welding, spot welding, TIG welding, gas welding and Plasma welding.
      4. Perform various press working operations like bending, blanking and piercing.
      5. Make various plastic articles by injection moulding and blow moulding process.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** |  |  |  | **3** | **3** | **3** |  | **3** |  |  | **3** |  | **3** |  |
| **CO2** | **3** |  |  |  | **3** | **3** | **3** |  | **3** |  |  | **3** |  | **3** |  |
| **CO3** | **3** |  |  |  | **3** | **3** | **3** |  | **3** |  |  | **3** |  | **3** |  |
| **CO4** | **3** |  |  |  | **3** | **3** | **3** |  | **3** |  |  | **3** |  | **3** |  |
| **CO5** | **3** |  |  |  | **3** | **3** | **3** |  | **3** |  |  | **3** |  | **3** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech. III Semester** | | |
| **Code:C00M2** | **ENVIRONMENTAL SCIENCE**  **(Common for CE, ME and Min.E)** | **L** | **T** | **P** |
| **Credits: Nil** | **2** | **-** | **-** |

# Pre-requisite: Nil

# Course Objectives:

An interdisciplinary approach to complex environmental problems using basic tools of the natural and social

sciences, including geo systems, biology, chemistry, economics, political science and international

processes. The ability to work effectively as a member of an interdisciplinary team on complex problem

of environment.

# Module I: Ecosystems:

Definition, Scope and Importance of ecosystem, Concept of ecosystem, Classification of ecosystems, Structure and Structural Components of an ecosystem, Functions of ecosystem, Food chains, food webs and ecological pyramids. Flow of energy. Biogeochemical cycles, Homeostasis/Cybernetics, food chain concentration, Biomagnification, ecosystems value, services, serices and carrying capacity.

Activity: Plantation.

# Module II: Natural resources, Biodiversity and Biotic resources Natural Resources:

Classification of Resources: Living and Non-Living resources, Renewable and non- renewable resources.

Water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources–case studies. Energy resources: growing energy needs, introduction to renewable and non renewable energy sources.

# Biodiversity and Biotic resources:

Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and intrinsic values. Hot spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-Wildlife conflicts, conservation of biodiversity: In- Situ and Ex-situ conservation, food and fodder resources, Timber and non-timber forest products.

Activity: case studies.

# Module III: ENVIRONMENTAL POLLUTION AND CONTROL:

Classification of pollution and pollutants, Causes, effects and control technologies. Air Pollution: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. Water pollution: Point and non-point sources of pollution, Major pollutant of water and their sources, drinking water quality standards.

Soil Pollution, Soil as sink for pollutants, Impact of modern agriculture on soil, degradation of soil. Marine Pollution: Misuse of International water for dumping of hazardous waste, Coastal pollution due to sewage and marine disposal of industrial effluents.

Noise Pollution: Sources, Industrial Noise-Occupational Health hazards, standards, Methods of controls of Noise, Thermal pollution : Thermal Comfotrs, Heat Island effect, Radiation effects.

Nuclear Pollution: Nuclear power plants, nuclear radiation, disasters and impacts, genetical disorders, Solid waste types, Collection processing and disposal of industrial and municipal solid wastes composition and

characteristics of e-waste and its management.

Activity:Fieldvisit.

# Module IV: Global Environmental Problems and Global effects:

Green house effect, Green House Gases (GHG), Global Warming, Sea level rise, climate change and their impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions/Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

Activity: Poster Making.

# Module V: Towards sustainable future:

Concept of Sustainable Development, Threats to Sustainability, Population and its explosion, Crazy Consumerism, Over-exploitation of resources, Strategies for Achieving Sustainable development, Environmental Education, Conservation of Resources, Urban Sprawl, Sustainable Cities and Sustainable Communities, Human health, Role of IT in Environment, Environmental Ethics, Environmental Economics, Concept of Green Building, Clean Development Mechanism(CDM).

# Text Books:

1. R.Rajagopalan,**“Environmental Studies from crisis to cure”**, Oxford University Press 2nd Edition, 2005.
2. Anubha Kaushik, C.P.Kaushik, **“Environmental studies”** New age International Publishers,4th Edition,2012

# Reference Books:

1. ErachBharucha,**“Environmental studies”** University Grants Commission, and University Press,I Edition, 2005.
2. M. Anji Reddy **“Text book of Environmental Science and Technology”** 3rd Edition, 2007
3. Richard T.Wright,**“Environmental Science: towards a sustainable future”** PHL Learning, Private Ltd. New Delhi, 2nd Edition., 2008
4. Gilbert McMasters and Wendell P.Ela,**“Environmental Engineering and science”**, 3rd Edition, PHI Learning Pvt. Ltd.,2008.

# E-Resources:

1. **Concerned Website links:**
2. <http://www.gdrc.org/uem/ait-terms.html>(Glossary of Environmental terms).
3. <http://www.environmentalscience.org/>(Environmental sciences Lectures series).

# Concerned Journals/ Magazines links:

1. Journal of earth science and climatic change (OMICS International Journal).
2. Journal of pollution effects & control (OMICS International Journal).

# NPTEL Videos:

1. nptel.ac.in/courses/120108004/ (Principles of Environment Management Lectures).
2. <http://www.nptelvideos.in/2012/12/fundamentals-of-environmental-pollution.html(NPTEL> online video courses IIT lectures).

# Course Outcomes:

After completion of the course, students will be able to:

* 1. To enable the students to realize the importance of ecosystem, its structure, services. To make the students aware of Different natural functions of ecosystem, which helps to sustain the life on the earth.
  2. To use natural resources more efficiently.
  3. To make the students aware of the impacts of human actions on the environment, its effects and minimizing measures to mitigate them.
  4. To educate the students regarding environmental issues and problems at local, national and international level.
  5. To know more sustainable way of living

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **1** |  |  | **1** |  | **2** | **3** |  |  |  |  | **1** |  |  |  |
| **CO2** | **1** |  |  | **1** |  | **2** | **3** |  |  |  |  | **1** | **1** | **1** |  |
| **CO3** | **1** |  |  | **1** |  | **2** | **3** |  |  |  |  | **1** | **1** | **1** |  |
| **CO4** | **1** |  |  | **1** |  | **2** | **3** |  |  |  |  | **1** | **1** | **1** |  |
| **CO5** | **1** |  |  | **1** |  | **2** | **3** |  |  |  |  | **1** | **1** | **1** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLAREDDYENGINEERINGCOLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code:C0313** | **DYNAMICS OF MACHINES** | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

**Prerequisites:** Kinematics of Machines

# Course Objectives:

The objective of this subject is to understand the static and dynamic behavior of mechanisms under different loading conditions.

# MODULE I: Gyroscopic Motion

Gyroscopic Motion: effect of gyroscopic motion on the stability of moving vehicles such as motor car, motor cycle, aero planes and ships.

# MODULE II: Static and Dynamic Forces & Synthesis of Linkages

Static and Dynamic Force Analysis of Planar Mechanisms: Introduction - Free Body Diagrams – Conditions for equilibrium – Two, Three and Four Members – Inertia forces and D‘Alembert‘s Principle – planar rotation about a fixed centre.

Synthesis of Linkages: Three position synthesis – Four position Synthesis – Precision positions – Structural error – Chebychev‘s spacing, Freudenstein’s equation, Problems.

# MODULE III: Clutches, Brakes, Dynamometers and Fly Wheels

A: Clutches and Brakes: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.: Simple block brakes, internal expanding brake, band brake of vehicle. B: Dynamometers and Fly Wheels: Turning moment – Inertia Torque connecting rod angular velocity and acceleration, crank effort and torque diagrams – Fluctuation of energy – Fly wheels and their design. Dynamometers – absorption and transmission types. General description and methods of operations.

# MODULE IV: Balancing & Vibration

Balancing: Balancing of rotating masses Single and multiple - single and different planes. Balancing of Reciprocating Masses - Primary, Secondary and higher order balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples of V- engine, multi cylinder in line and radial engines for primary and secondary balancing, locomotive engine balancing.

Vibration: Free Vibration, Forced vibration- mass attached to vertical spring - simple problems on forced damped vibration, Vibration Isolation & Transmissibility Whirling of shafts, critical speeds, torsional vibration, two and three rotor systems.

# MODULE V: Governors

Governers: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and hartung with auxiliary springs, Pickering governors. Sensitiveness, isochronism and hunting. Effort and Power of Governor, Controlling force of governors and coefficient of Insesitiviness.

# TEXT BOOKS

1. Thomas Bevan, **“Theory of Machines”,** CBS Publishers, 3rd edition, 2005.
2. Jagadish Lal &J.M.Shah, **“Theory of Machines”,** Metropolitan, 2002.

3 Khurmi, **“Theory of machines”**, S.Chand Publications, 14th edtion, 2005

# REFERENCES

1. Shiegly“Theory of Machines”, MGH Publishers,5th edition,1988.
2. JS Rao and RV Dukkipati, “Mechanism and Machine Theory”, New Age International Publishers, 2008.
3. S.S Ratan, “Theory of Machines”, Mc. Graw Hill Publishers, 3rd editions, 2009.
4. V.P. Singh, “Theoty of machines”, Dhanpat Rai Publishing Company (P) Limited, 2004.

# E - RESOURCES

1. nptel.ac.in/courses/112104114/
2. nptel.ac.in/courses/112101096/
3. nptel.ac.in/syllabus/112104114/
4. [www.nptelvideos.in/2012/12/dynamics-of-machines.html](http://www.nptelvideos.in/2012/12/dynamics-of-machines.html)
5. freevideolectures.com › Mechanical › IIT Kanpur

# Course Outcomes:

At the end of the course, students will be able to:

1. Understand the gyroscopic effects in ships, aero planes and road vehicles
2. Understand the Concept of static force and dynamic force analysis.
3. Characterize and design flywheels.
4. Analyze balancing problems in rotating and reciprocating machinery.
5. Analyze and design centrifugal governors.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSO**  **s** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **3** | **2** | **2** |  | **2** | **1** | **2** |  |  |  | **3** |  |  |
| **CO2** | **3** | **3** | **2** | **2** | **3** |  |  |  | **1** |  |  |  | **2** |  |  |
| **CO3** | **3** | **2** | **1** | **2** | **1** |  |  |  |  |  |  |  | **2** |  |  |
| **CO4** | **3** | **3** | **3** |  | **1** |  |  |  |  |  |  |  | **3** |  |  |
| **CO5** | **3** | **3** | **1** | **3** | **1** |  | **2** |  |  |  |  |  | **3** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLAREDDYENGINEERINGCOLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code:C0314** | **FLUID MECHANICS AND HYDRAULIC MACHINES** | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

# Prerequisites: Nil

**Course Objectives:**

The objective of this subject is to provide the knowledge of fluid power and analyze the performance of various hydraulic machines like turbines, compressors and pumps.

# MODULE I: Fluid Statics

Dimensions and units: physical properties of fluids- specific gravity, viscosity surface tension- vapor pressure and their influence on fluid motion- atmospheric gauge and vacuum pressure – measurement of pressure- Piezometer, U-tube and differential manometers.

Hydro static forces on plane and curved surfaces. Buoyancy and floatation: Meta center, stability of floating body, Submerged bodies, Calculation of metacentric height.

# MODULE II: Fluid Kinematics & Fluid Dynamics

Fluid kinematics: Stream line, path line and streak lines and stream tube, classification of flows- steady & unsteady, uniform & non uniform, laminar & turbulent, rotational and irrotational flows-equation of continuity for one dimensional flow. Velocity potential and stream function – flow net.

Fluid dynamics : Surface and body forces –Euler‘s and Bernoulli‘s equations for flow along a stream line, Measurement of flow: pitot tube, venturimeter and orifice meter, Flow nozzle, Turbine flow meter, momentum equation and its application on pipe bend.

# MODULE III: Closed Conduit Flow & Boundary Layer Concepts

A: Closed conduit flow: Reynold‘s experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel - total energy line - hydraulic gradient line.

B: Boundary Layer Concepts: Definition, thickness, characteristics along thin plate, laminar and turbulent boundary layers (No derivation) boundary layer in transition, separation of boundary layer, submerged objects – drag and lift.

# MODULE IV: Turbo Machinery and Hydraulic Turbines

Basics of turbo machinery: Hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, workdone and efficiency, flow over radial vanes.

Hydraulic Turbines : Classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, workdone, efficiencies, hydraulic design – draft tube theory - functions and efficiency. Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer.

# MODULE V:Centrifugal Pumps & Reciprocating Pumps

Centrifugal pumps: Classification, working, workdone – manomertic head- losses and efficiencies specific speed- pumps in series and parallel-performance characteristic curves, NPSH. Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

# TEXT BOOKS

1. Modi and Seth, “**Hydraulics, fluid mechanics including hydraulic machines**”, Standard Publishers, 19th Edition, 2013
2. R.K. Bansal, “**Fluid Mechanics and hydraulic Machines**”, Laxmi Publications, 9th Edition, 2010.

# REFERENCES

1. R.K. Rajput, “**Fluid Mechanics and Hydraulic Machines**”, S.Chand, 5th Edition, 2013.
2. D. Rama Durgaiah, **“Fluid Mechanics and Machinery”**, New Age International (P) Ltd, 1st editions, 2007
3. James W. Dally, William E. Riley **“Instrumentation for Engineering Measurements”,**

John Wiley & Sons Inc. 3rd editions, 1989.

1. Vijay Gupta and S.K.Gupta, “**Fluid Mechanics and Applications**”, New-Age International Ltd. 1999.
2. Banga & Sharma, “**Hydraulic Machines**”, Khanna Publishers, 7th Edition, 2007

# E - RESOURCES

1. nptel.ac.in/courses/112105183/
2. [www.nptelvideos.in/2012/11/fluid-mechanics.htm](http://www.nptelvideos.in/2012/11/fluid-mechanics.htm)
3. nptel.ac.in/courses/112104117/
4. [www.sanfoundry.com/best-reference-books-fluid-mechanics-and-machinery/](http://www.sanfoundry.com/best-reference-books-fluid-mechanics-and-machinery/)
5. https:/[/www.elsevier.c](http://www.elsevier.com/journals)o[m/journals](http://www.elsevier.com/journals)

# Course Outcomes:

At the end of the course, students will be able to:

1. Understand the behavior fluids at different conditions.
2. Understand the concept of fluid kinematics and dynamics.
3. Understand and solve the problems of closed conduit flow & boundary layer concepts.
4. Analyze the performance of turbo machinery and hydraulic turbines.
5. Understand the principles of centrifugal and reciprocating pumps.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **2** | **2** | **1** | **1** |  | **2** |  |  |  |  | **1** | **1** |  |  |
| **CO2** | **3** | **2** | **2** | **1** | **1** |  | **2** |  |  |  |  | **1** | **1** |  |  |
| **CO3** | **3** | **2** | **2** | **1** | **1** |  | **2** |  |  |  |  | **1** | **2** |  |  |
| **CO4** | **3** | **3** | **2** | **2** | **1** |  | **2** |  |  |  |  | **1** | **2** |  |  |
| **CO5** | **3** | **3** | **2** | **2** | **1** | **1** | **2** |  |  |  |  | **1** | **2** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLAREDDYENGINEERINGCOLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code:C0315** | **MACHINE TOOLS** | **L** | **T** | **P** |
| **Credits: 3** | 3 | - | - |

**Prerequisites:** Production Technology

# Course Objectives:

The objective of this subject is to provide knowledge of all machine tools and to measure cutting forces while machining.

# MODULE I: Metal Cutting Theory

Metal Cutting Theory: Elements of cutting process- Geometry of single point cutting tool and angles, Tool signature, chip formation and types of chips- built up edge and its effects, chip breakers. Mechanics of orthogonal cutting- Merchant's Force diagram, cutting forces- cutting

speeds, feed, depth of cut, tool life, coolants, machinability - Tools materials. Cutting tool temperature measuring methods.

# MODULE II: Lathe Machine

Lathe Machine: Principle of working, Specification of Lathe- types of Lathe- Work holders, tool holders-Box tools, Taper turning, thread cutting for Lathe attachments. Turret and Capstan lathe- collet chucks- other work holders- tool holding devices- box and tool layout. Principal features of automatic lathe- Classification- Single spindle and multi-spindle automatic lathe.

# MODULE III: Shaping, Slotting, Planning, Drilling and Boring Machines

A: Shaping, Slotting and Planning Machines: Principles of working- Principal parts- specification, classification, operations performed. Machining time calculations.

B: Drilling and Boring Machines: Principles of working, specifications, types, operations

performed- tool holding devices- twist drills- Boring machines-Fine Boring machines- Jig Boring machine. Deep hole drilling machine.

# MODULE IV: Milling Machine & Grinding Machine

Milling Machine : Principles of working-specifications-classifications of milling machines- principal features of horizontal, vertical and universal milling machines- machining operation types, geometry of milling cutters- milling cutters- methods of indexing.

Grinding Machine: Fundamentals- Theory of grinding- classification of grinding machine- cylindrical and surface grinding machine- Tool and cutter grinding machine- special types of grinding machines- Different types of abrasives- bonds specification of a grinding wheel and selection of a grinding wheel.

# MODULE V: Lapping, Honing and Broaching Machines & Principles ofDesign of Jigs and Fixtures

Lapping, Honing and Broaching Machines : Lapping, honing and broaching machines- principle of working, specification of broaching machines, methods of broaching, broaching tools, Classification of Broaching machines, operations.

Comparison to grinding- lapping and honing- Kinematics scheme of Lapping, Honing and Broaching machines. Constructional features of speed and feed units, machining time calculations. Principles of design of Jigs and Fixtures: Classification of Jigs and Fixtures.

# TEXT BOOKS

1. P.C. Sharma, **Production Technology (Machine Tools**) , S.Chand Publishers, 7thedition, 2006.
2. Pakirappa, **Metal Cutting and Machine Tool Engineering** , Durga publication house,1st edition, 2012.

# REFERENCES

1. C.Elanchezhian and M.Vijayan, "**Machine Tools**", Anuradha Agencies Publishers,2ndedition, 2008
2. B.S.Raghuvamshi, "**Workshop Technology-Vol** II", Anuradha Agencies Publishers,Dhanpat rai & company, 10th revised edition, 2014.
3. Steve F.Krar, Arthur R.Gill, PeterSmid Krar, Stephen F, "**Technology of Machine tools"**,Mc Graw-Hill, 7th edition , 2011.
4. B.L.Juneja,"**Fundamentals of Metal cutting and machine tools**", New age Int. publishers,2nd edition , 2017.
5. R.K.Jain and S.C.Gupta, "**Production Technology**", Khanna Publications, 16th edition,2014.

# E - RESOURCES

1. <http://nptel.ac.in/courses/112105126/5>
2. https:/[/www.journals.elsevier.com/international-journal-of-machine-tools](http://www.journals.elsevier.com/international-journal-of-machine-tools)
3. [www.sciencedirect.com/science/journal/08906955/64](http://www.sciencedirect.com/science/journal/08906955/64)

# Course Outcomes

At the end of the course, students will be able to

1. Understand the basic concepts of metal cutting theory.
2. Know the working principles of different Lathes and its parts.
3. Know the working principles of special machines like shaping, slotting, planning&drilling machines.
4. Know the working principles of milling and grinding machines.
5. Know the working principles of lapping, honing, broaching and jigs & fixtures.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSO**  **s** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **2** | **2** | **1** | **2** |  |  |  |  |  |  |  |  | **1** | **1** |
| **CO2** | **3** | **2** | **2** | **1** | **2** |  |  |  |  |  |  |  |  | **1** | **1** |
| **CO3** | **3** | **2** | **2** | **1** | **2** |  |  |  |  |  |  |  |  | **1** | **1** |
| **CO4** | **2** | **2** | **2** | **1** | **2** |  |  |  |  |  |  |  |  | **1** | **1** |
| **CO5** | **2** | **2** | **2** | **1** | **2** |  |  |  |  |  |  |  |  | **1** | **1** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLAREDDYENGINEERINGCOLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code:C0316** | **THERMAL ENGINEERING-I** | **L** | **T** | **P** |
| **Credits:3** | **3** | **-** | **-** |

**Prerequisites:** Thermodynamics

# Course Objectives:

The objective of this course is to provide knowledge on working and performance of IC engines, combustion process and compressors.

# MODULE I: Actual Cycles & I.C. Engines

Actual Cycles and their Analysis: Introduction, comparison of air standard and actual cycles. time loss factor, heat loss factor, exhaust blow down, loss due to gas exchange process, volumetric efficiency. loss due to rubbing friction, actual and fuel - air cycles of CI Engines.

I.C. Engines: Classification - working principles, valve and port timing diagrams, air standard efficiency, air - fuel and actual cycles - engine systems - fuel, carburetor, fuel injection system, ignition, cooling and lubrication.

# MODULE II: Combustion in S.I. Engines & C.I. Engines

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking – Fuel requirements and fuel rating, antiknock additives – combustion chamber – requirements, types.

Combustion in C.I. Engines : four stages of combustion – delay period and its importance – effect of engine parameters – diesel knock – need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

# MODULE III: I.C. Engine Testing and Performance

A: Testing and Performance - I: Terminologies, performance parameters - measurement of cylinder pressure, fuel consumption, air intake, exhaust gas composition, torque, brake power, dynamometer working & types.

B: Testing and Performance - II: Determination of brake power, frictional power, indicated power and mechanical efficiency – volumetric efficiency – MEP – Performance test – Heat balance test - Morse Test.

# MODULE IV: Reciprocating Compressor

Introduction– Classification –positive displacement and rotor dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating Compressor: Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, under cooling, saving of work, minimum work condition for stage compression.

# MODULE V: Rotary & Axial Flow Compressors

Rotary Compressors: Roots Blower, vane sealed compressor, Lysholm compressor – mechanical details and principle of working – efficiency considerations. Centrifugal compressors: Mechanical details and principle of operation – velocity and pressure variation. Energy transfer-impeller blade shape - losses, slip factor, power input factor, pressure coefficient and adiabatic coefficient – velocity diagrams – power.

Axial Flow Compressors: Mechanical details and principle of operation – velocity triangles and energy transfer per stage degree of reaction, work done factor - isentropic efficiency - pressure rise calculations – Polytrophic efficiency.

# TEXT BOOKS

1. V. Ganesan, **“I.C. Engines”,** Tata McGrawHill editions, 4th edition, 2012.
2. SM Yahya, **“Turbines, Pumps, Compressors”,** Tata McGrawHill editions, 4th edition, 2005.

3 R.K. Rajput, **“Thermal Engineering**”, Lakshmi Publications, 10th Edition,2017

# REFERENCES

1. Mathur & Sharma, **“IC Engines”,** Dhanpath Rai & Sons, 4th edition, 2010
2. Pulkrabek, **“Engineering fundamentals of IC Engines”,** Pearson PHI, 2nd edition, 2004.
3. Rudramoorthy, **“Thermal Engineering”,** TMH Publishers, 3rd edition, 2003.
4. B. Yadav, **“Thermodynamics & Heat Engines”**, Central Book Depot., Allahabad, 6th edition, 2012.
5. B.Srinivasulu Reddy, **“Thermal Engineering data book”,** JK International Pub, 2014.

# E - RESOURCES

1. https:/[/www.journals.elsevier.com/](http://www.journals.elsevier.com/applied-thermal-eng)a[pplied-thermal-eng](http://www.journals.elsevier.com/applied-thermal-eng)
2. eds.yildiz.edu.tr/journal-of-thermal-engineering
3. https:/[/www.r](http://www.researchgate.net/.../1359-4311_Applied_Thermodynamics)e[searchgate.net/.../1359-4311\_Applied\_Thermodynamics](http://www.researchgate.net/.../1359-4311_Applied_Thermodynamics)
4. [www.nptelvideos.com/mechanical/](http://www.nptelvideos.com/mechanical/)
5. <https://www.btechguru.com/courses--nptel--mechanical>

# Course Outcomes

At the end of the course, students will be able to

1. Learn the various types of cycles and various engine systems.
2. Understand the phenomenon of combustion and knock in diesel engine and petrol engine.
3. Analyze the performance parameters of IC engines
4. Understand the working principles of various types of compressors.
5. Understand and analyze the performance of Rotary and axial flow compressors.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **1** | **1** | **1** |  | **1** | **3** |  |  |  |  |  | **3** |  |  |
| **CO2** | **3** | **1** | **1** | **3** | **1** | **1** | **3** |  |  | **1** |  | **3** | **3** |  |  |
| **CO3** | **3** | **3** | **3** | **3** | **1** | **3** |  | **1** |  | **3** |  | **3** | **3** |  |  |
| **CO4** | **3** | **1** | **1** | **2** | **1** | **1** | **2** | **1** |  | **1** | **1** | **2** | **3** |  |  |
| **CO5** | **3** | **1** | **1** | **2** | **1** | **1** | **2** | **1** |  | **1** | **1** | **2** | **3** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLAREDDYENGINEERINGCOLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code: C0317** | **OPERATIONS RESEARCH** | **L** | **T** | **P** |
| **Credits: 3** | **3** | **-** | **-** |

# Prerequisites: Nil Course Objectives:

The objective of this course is to provide knowledge and training in using optimization techniques

under limited resources for the engineering and business problems.

# MODULE I: Linear Programming and Transportation

Linear Programming: Origin of Operations Research – Study, The phase of an operation research - Linear programming – Formation of model (Product mix Problem) - Graphical method – Simplex algorithm – Artificial variables technique – Big ‘M’ method - Two phase method .Duality principle

Transportation: Optimal solution by North West corner method – VAM – Least cost method – MODI method.

# MODULE II: Assignment and Sequencing

Assignment: Formulation - Unbalanced Assignment Problem – Hungarian algorithm – Traveling Salesman Problem.

Sequencing: Processing ‘n’ jobs through two machines, processing ‘n’ jobs through three machines

- processing ‘n’ jobs through ‘m’ machines.

# MODULE III: Replacement and Game Theory

A: Replacement: Replacement of items due to deterioration with and without time value of money, Group replacement policy.

B: Game Theory: Theory of games, competitive games, rules for game theory, saddle point - minimax (maximin) method of optimal strategies, mixed strategies - Value of the game- two person zero sum game, method of dominance, graphical method .

# MODULE IV: Queuing and Inventory Models

Queuing Models: Queuing systems and structures – Notation parameter – Single server and multi- server models – Poisson input – Exponential service – Constant rate service – Infinite population.

Inventory Models: Economic order quantity models - With and without shortages. (Deterministic Demand). Quantity discount models –Inventory control models in practice.

# MODULE V: Network Model and Simulation

Network Model: Basic terminologies, constructing a project network, network computations in CPM and PERT, Introduction to cost crashing. crashing the network

Simulation: Types of simulation models and phases of simulation - Application, advantages and disadvantages of simulation Inventory and queuing problems.

# TEXT BOOKS

1. Premkumar Gupta and D.S.Hira, “**Operations Research**”, S.Chand Publications, 2005.
2. S.D.Sharma, “**Operations Research**”, Kedarnath ram Nath, Delhi, 2009.

# REFERENCES

1. Taha H.A., “**Operations Research**”, Prentice Hall of India, New Delhi, 6th Edition, 2003.
2. Shennoy G.V. and Srivastava U.K., “**Operation Research for Management**”, New AgeInternational, New Delhi, 2nd Edition, 2009
3. Hillier and Libermann“ **Introduction to Operations Research**” McGraw hill edition, 2001
4. Budnick F.S. and Richard D Irwin “**Principles of Operations Research for Management**”, 3rd Edition, 2003.
5. Bazara M.J., Jarvis and Sherali H., “**Linear Programming and Network Flows**”, John Wiley,New Jersey, 4thEdition, 2010.

# E - RESOURCES

1. <http://www.inderscience.com/jhome.php?jcode=IJOR>
2. https:/[/www.journals.elsevier.com/](http://www.journals.elsevier.com/european-journal-of-operational-research/)e[uropean-journal-of-operational-research/](http://www.journals.elsevier.com/european-journal-of-operational-research/)
3. <http://nptel.ac.in/courses/112106134/>
4. <http://nptel.ac.in/courses/112106131/>
5. <http://www.nptel.ac.in/courses/110106059/>

# Course Outcomes

At the end of the course, students will be able to

1. Solve problems by using linear programming model and assignment model.
2. Analyze sequencing methods, sequencing models and study on theory of games.
3. Solve waiting problems by various methods and models.
4. Study and Analysis of inventory of given situations and able to solve it by different inventory models.
5. Analyze network model for all type of projects and make use of simulation.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSO**  **s** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **3** | **3** | **3** | **3** | **3** | **1** | **2** | **1** |  |  | **3** |  |  |  | **1** |
| **CO2** | **3** | **3** | **3** | **3** | **3** | **1** | **3** | **3** |  | **3** | **3** | **1** |  |  | **1** |
| **CO3** | **3** | **3** | **3** | **3** | **3** | **1** | **3** | **3** |  |  | **3** |  |  |  | **1** |
| **CO4** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **3** |  | **3** | **2** |  |  | **1** |
| **CO5** | **3** | **3** | **3** | **3** | **3** | **3** | **3** | **2** | **1** | **2** | **3** | **3** |  |  | **1** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code:C0318** | **FLUID MECHANICS AND HYDRAULIC MACHINES LAB** | **L** | **T** | **P** |
| **Credits:1** | **-** | **-** | **2** |

# Course Objectives:

To provide practical knowledge of fluid flow properties, flow losses, performance testing of hydraulic turbines and hydraulic pumps.

**List of Experiments**

1. Performance test on impact of jet on Vanes.
2. Performance test on Pelton Wheel.
3. Performance test on Francis Turbine.
4. Performance test on Kaplan Turbine.
5. Performance test on Single Stage Centrifugal Pump.
6. Performance test on Multi Stage Centrifugal Pump.
7. Performance test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of minor losses (sudden contraction, expansion, pipe bend and union) for a given pipeline.
12. Validation of Bernoulli's Theorem.

# Course Outcomes:

At the end of the course, students will be able to

1. Analyze the performance of turbines.
2. Analyze the performance of centrifugal and reciprocating pump.
3. Analyze the performance of venturimeter and orifice meter.
4. Evaluate the Minor losses in given pipe system
5. Apply the Bernoulli’s equation in Bernoulli’s apparatus

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSO**  **s** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO1**  **0** | **PO1**  **1** | **PO1**  **2** | **PSO**  **1** | **PSO**  **2** | **PSO**  **3** |
| **CO1** | **3** | **2** | **2** | **1** | **1** |  | **2** |  |  |  | **1** | **1** | **2** |  |  |
| **CO2** | **3** | **2** | **2** | **1** | **1** |  | **2** |  |  |  | **1** | **1** | **2** |  |  |
| **CO3** | **3** | **2** | **2** | **1** | **1** |  | **2** |  |  |  | **1** | **1** | **2** |  |  |
| **CO4** | **3** | **2** | **2** | **1** | **1** |  | **2** |  |  |  | **1** | **1** | **2** |  |  |
| **CO5** | **3** | **2** | **2** | **1** | **1** |  | **2** |  |  |  | **1** | **1** | **2** |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code:C0319** | **MACHINE TOOLS LAB** | **L** | **T** | **P** |
| **Credits:1** | **-** | **-** | **2** |

# Course Objectives:

Student will be able to learn and practice various operations in lathe machine, shaper, planner, slotter, grinding machine, milling machine, cylindrical grinder, surface grinder and tool and cutter different measuring instruments.

**List of Experiments**

**Note: Any 6 experiments need to be performed from each Lab**

**Machine Tools Lab**

1. Study of general purpose machines - Lathe, Drilling machine, Milling machine, Shaper, Planning machine, slotting machine, Cylindrical Grinder, surface grinder and tool and cutter grinder.
2. Step turning, taper turning (swelling compound rest), grooving on lathe machine.
3. Taper turning by taper turning attachment.
4. Thread cutting and knurling using lathe machine.
5. Make a hole using lathe machine.
6. Drilling and Tapping using Radial drilling machine.
7. Cutting ‘V’ groove using shaping machine.
8. Cutting slots on circular shaft using slotting machine.
9. Cutting key ways using milling machines.
10. Surface Grinding using surface grinding machine.
11. Setting tool angles using tool & cutter grinder.
12. Cutting grooves/Plain surface using planning machine.
13. Cylindrical grinding by cylindrical grinding machine.

# Course Outcomes:

After completion of the course, students will be able to:

* 1. Perform taper turning, Thread cutting, knurling and Drilling operations on lathe.
  2. Perform the Drilling and Tapping using Radial drilling machine
  3. Perform machining operations on shaping machine and slotting machine.
  4. Perform the machining operations on milling machines and surface grinding machine.
  5. Perform the machining operations on Cylindrical grinding machine.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **2** | **1** |  |  |  |  | **1** |  |  |  |  | **1** |  | **2** |  |
| **CO2** | **2** | **1** |  |  |  |  | **1** |  |  |  |  | **1** |  | **2** |  |
| **CO3** | **2** | **1** |  |  |  |  |  |  |  |  |  | **1** |  | **2** |  |
| **CO4** | **2** | **1** |  |  |  |  |  |  |  |  |  | **1** |  | **2** |  |
| **CO5** | **2** | **1** |  |  |  |  | **1** |  |  |  |  | **1** |  | **2** |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code:C0554** | **Fundamentals of Data Structures Lab (Common for CE,EEE,ME,ECE, MiE)** | **L** | **T** | **P** |
| **Credits:2** | **-** | **-** | **4** |

# Prerequisites: C Programming.

**Course Objectives:**

This course will deliver the knowledge in introducing the concepts of various data structures such as linked

lists, stacks, queues, trees and graphs along with the applications.

# Software Requirements: C

**List of Programs:**

1. Write a program to create one dimensional array, with the following operations: Insertion

Deletion

Display the elements Count number of elements

1. Write a program to create a single linked list, with the following operations: Insertion

Deletion

Display the elements Count number of elements.

1. Write a program to create a circular linked list, with the following operations: Insertion

Deletion

Display the elements Count number of elements.

1. Write a program to create a double linked list, with the following operations:
   1. Insertion
   2. Deletion
   3. Display the elements
   4. Count number of elements.
2. Write a program to implements stack operation susing:
   1. Arrays
   2. Linked list
3. Write a program to:
   1. Evaluate Postfix expression.
   2. Convert in fix expression into postfix expression
4. Write a program to implements Linear Queue operations using:
   1. Arrays
   2. Linked list
5. Write a program to implements Circular Queue operations using Arrays
6. Write a program to implements Double-ended Circular Queue operations using Arrays
7. Write are cursive program to create a Binary Tree of integers, traverse the tree in preorder, in order and post order of the tree.
8. Write a program to create a Binary Search Tree(BST) and perform insert and search operations on it.
9. Write a program for implementing the following graph traversal algorithms:
   1. Breadth First Search(BFS)
   2. Depth First Search (DFS)

# TEXTBOOKS

1. Jean Paul Tremblay, Paul G Sorenson, “**An Introduction to Data Structures with Applications**”, Tata Mc Graw Hills, 2ndEdition, 1984.
2. Richard F.Gilberg, Behrouz A.Forouzan, “**Data Structures: A Pseudo code approach with C**", Thomson(India), 2ndEdition, 2004.

# REFERENCES

1. Horowitz, Ellis, Sahni, Sartaj, Anderson-Freed, Susan, “**Fundamentals of Data Structure in C**”, University Press (India),2nd Edition, 2008.
2. A.K.Sharma, “**Data Structures using C**”, Pearson,2nd Edition,June,2013.
3. R.Thareja, “**Data Structures using C**”, Oxford University Press, 2nd Edition, 2014.

# \Course Outcomes:

At the end of the course, students will be able to

1. Identify the appropriate recursive algorithms and analyze the performance of algorithms.
2. Understand and implement single, double, and circular linked-lists.
3. ImplementlineardatastructuressuchasStacksandQueuesusingarrayandlinked-listrepresentations.
4. Implement nonlinear data structures such as trees and graphs.
5. Linear data structures such as Stacks and Queues

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** | **2** | **3** | **2** |  |  |  |  |  |  |  |  |  | **3** | **2** |  |
| **CO2** | **2** | **2** | **3** |  |  |  |  |  |  |  |  |  | **2** | **3** |  |
| **CO3** |  | **2** | **3** |  |  |  |  |  |  |  |  |  |  | **3** | **1** |
| **CO4** |  | **2** | **3** |  |  |  |  |  |  |  |  |  | **2** | **3** |  |
| **CO5** | **2** | **3** | **2** |  |  |  |  |  |  |  |  |  | **2** | **3** | **2** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **2022-23**  **Onwards (MR-22)** | **MALLA REDDY ENGINEERING COLLEGE**  **(Autonomous)** | **B.Tech.**  **IV Semester** | | |
| **Code:C00M1** | **GENDER SENSITIZATION**  **(Common for CE, ME and Min.E)** | **L** | **T** | **P** |
| **Credits: Nil** | **-** | **-** | **2** |

# Course Objectives:

To develop students' sensibility with regard to issues of gender in contemporary India. To provide a critical perspective on the socialization of men and women. To introduce students to information about some key biological aspects of genders. To expose the students to debates on the politics and economics of work. To help students reflect critically on gender violence. To expose students to more egalitarian interactions between men and women.

**MODULE -I:- UNDERSTANDING GENDER**

Gender: Why Should We Study It? *(Towards a World of Equals:* Unit -1) Socialization: Making Women, Making Men *(Towards a World of Equals:* Unit -2)

Introduction. Preparing for Womanhood. Growing up Male. First Lessons in Caste.Different Masculinities.

Just Relationships: Being Together as Equals *(Towards* a *World of Equals:* Unit *-2)* Mary iKorn and Onler. Love and Acid just do not Mix. Love Letters. Mothers aniJFathers.

Further Reading: Rosa Parks-The Brave Heart.

**MODULE -II:- GENDER AND BIOLOGY**

Missing Women: Sex Selection and Its Consequences *(Towards a World of Equals:* Unit - 4) Declining Sex Ratio. Demographic Consequences.

Gender Spectrum: Beyond the Binary *(Towards* a *World of Equals:* Unit - 10) Two or Many? Struggles with Discrimination.

Additional Reading: Our Bodies, Our Health *(Towards a World of Equals:* Unit -13)

**MODULE -III:- GENDER AND LABOUR**

A: Housework: the Invisible Labour*(Towards a World* of *Equals:* Unit - 3) "My Mother doesn't Work." "Share the I.oad."

B: Women's Work: Its Politics and Economics *(Towards a World of Equals:* Unit -7) Fact and Fiction. Unrecognized and Unaccounted work. Further Reading: Wages and Conditions of Work.

**MODULE -IV:- ISSUES OF VIOLENCE**

Sexual Harassment: Say Nol*(Towards a World of Equals:* Unit -6)

Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading:

*"Chdpulum.* Domestic Violence: Speaking Out *(Towards a World of Equals:* Unit -5) Is Home a Safe Place? When Women Unite (Film" Rebuilding Lives. Further Reading: New Forums for Justice. Thinking about Sexual Violence *(Towards a World of Equals:* Unit -11)

Blaming the Victim-1 Fought for my Life " - Further Reading: The Caste Face of Violence.

**MODULE -V:- GENDER STUDIES**

Knowledge: Through the Lens of Gender *(Towards a Work/ of Equals:* Unit -5)

Point of View. Gender and the Structure of Knowledge. Further Reading: Unacknowledged Women Artists of Telangana.

Whose History? Questions for Historians and Others *(Towards a World of Equals:* Unit -9) Reclaiming a Past. Writing other Histories. Further Reading: Missing Pages from Modern Telangana History.

Essential Reading: All the Units In the Textbook, *"Towards a World of Equals: A Bilingual Textbook on Gender"* written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Mina Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Thant

Note: Since it Is Interdisciplinary Course, Resource Persons can be drawn from the fields of English Literature or Sociology or Political Science or any other qualified faculty who has expertise in this field.

**TEXT BOOKS:**

**1.** Towards a World of Equals: A bilingual Textbook on Gender , A Suneetha -etall

**REFERENCES:**

1. Sen, Amartya. "More than One Million Women are Missing.' New York Review of Books

37.20 (20 December 1990). Print. We *Were Making History...' Life Stories of Women in the ToIrmgana People's Struggle.* New Delhi: Kali for Women, 1989.

1. TriptiLahiri. "By the Numbers: Where Indian Women Work." Women's Studios Journal (14 November 2012) Available online at: http:// blogs.visj.com/ India real time/2012/11/14/by - the-numbers-where-Indan-womenworkP
2. K. Satyanarayana and Susie Thant (Ed.) Steel Nibs Are Sprouting: New Dalit Writing From South India, Dossier 2: Telugu And Kannada htto:/[/harooreollins.co.in/BookDetailasp?Flook](http://harooreollins.co.in/BookDetailasp?Flook)Cndet,3732
3. Vimata. "Vantillu (The Kitchen)". Women Writing in India: 600 BC to the Present. Volume II: The 20th Century. Ed. Susie Thaw and K. Lalita. Delhi: Oxford University Press 1995. 599-601.
4. Shatrughna, Veena et al. Women's Work and its Impact on Child Health end Nutrition, Hyderabad, National Institute of Nutrition, Indian Council of Medical Research. 1993.
5. Stree Shakti Sanghatana. 'We Were Making I listory ....' Life Stories of Women in the Telangana People's Struggle. New Delhi: Kali for Women, 1989.

**E - RESOURCES:**

1. <http://www.actforyouth.net/resources/rf/rf_gender1_1213.cfm>(UNDERSTANDING GENDER)
2. <https://www.simplypsychology.org/gender-biology.html>(GENDERAND BIOLOGY)
3. [http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-](http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/)

[india/40442/](http://www.yourarticlelibrary.com/essay/essay-on-gender-issues-in-labour-market-in-india/40442/) (GENDER AND LABOUR)

1. Journals/Magazines links:-
2. <http://journals.sagepub.com/doi/abs/10.1177/1077801200006007004> (ISSUES OF VIOLENCE)
3. <http://www.nordiclabourjournal.org/emner/likestilling>(GENDER AND BIOLOGY)

**Course Outcomes:**

1. After completion of the course, students will be able to:
2. Develop a better understanding of important issues related to gender in contemporary India.
3. Sensitize about the basic dimensions of the biological, sociological, psychological and legal

aspects of gender. This will be achieved through discussion of materials derived from research,

facts, everyday life, literature and film.

1. Attain a finer grasp of how gender discrimination works in our society and how to counter it.
2. Acquire insight into the gendered division of labour and its relation to politics and economics.
3. Develop a sense of appreciation of women in all walks of life.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO- PO Mapping (3/2/1indicatesstrengthofcorrelation)3-Strong,2-Medium,1-**  **Weak** | | | | | | | | | | | | | | | |
| **COs** | **Programme Outcomes(POs)** | | | | | | | | | | | | **PSOs** | | |
| **PO1** | **PO 2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |
| **CO1** |  |  |  |  |  | **3** |  | **3** | **3** |  | **3** | **3** |  |  |  |
| **CO2** |  |  |  |  |  | **3** |  | **3** | **3** |  | **3** | **3** |  |  |  |
| **CO3** |  |  |  |  |  | **3** |  | **3** | **3** |  | **3** | **3** |  |  |  |
| **CO4** |  |  |  |  |  | **3** |  | **3** | **3** |  | **3** | **3** |  |  |  |
| **CO5** |  |  |  |  |  | **3** |  | **3** | **3** |  | **3** | **3** |  |  |  |