

**CURRICULUM OF MECHANICAL ENGINEERING
RGUKT BASAR**

I YEAR

II SEMESTER

Subject code	Course Name	L-T-P	Credits
MA1201	Mathematics-II	4-0-0	4
PH1001	Engineering Physics	4-0-0	4
ME1201	Engineering Drawing and Computer Drafting-II	1-0-3	4
HS1001	English	4-0-0	3
CS1201	Scripting Languages	4-0-0	3
HS1201	Communication Skills-II	2-0-0	1
PH1601	Engineering Physics Lab	0-0-3	2
HS1601	English Lab	0-0-3	2
Total		19-0-9	23

Externals: 60 Marks**L-T-P-C*****Internals: 40 Marks****4-0-0-4****Objectives:**

- To learn the concepts of Eigen values, Eigen vectors, vector spaces and its basis.
- To provide an overview of ordinary differential equations
- To study the methods of solving improper integrals and the concepts of multiple integrals
- To study vector differential and integral calculus

UNIT-I

Linear Algebra: System of Linear equations, Vector spaces, Subspaces, Linear combination of vectors, linear dependence and independence of vectors, Basis and Dimension of Vector Space.

Linear transformations, Range and Kernel of Linear Transformations, Rank-Nullity theorem. Matrix representations of Linear Transformation. Eigenvalues and Eigenvectors of a Linear Transformation and their properties, Cayley - Hamilton Theorem, Hermitian and skew Hermitian matrices. Quadratic forms, reduction of quadratic form to canonical form by orthogonal transformation.

UNIT-II

Ordinary Differential Equations of first order: Exact first order differential equation, finding integrating factors, linear differential equations, Bernoulli's, Riccati, Clairaut's differential equations, finding orthogonal trajectory of family of curves

UNIT-III

Ordinary Differential Equations of higher order: Linear dependence and independence of functions, Wronskian of n - functions to determine Linear Independence and dependence of functions, Solutions of Second and higher order differential equations (homogeneous & non-homogeneous) with constant coefficients, Method of variation of parameters, Euler-Cauchy equation.

UNIT-IV

Integral Calculus :Convergence of improper integrals, tests of convergence, Beta and Gamma functions - elementary properties, differentiation under integral sign, differentiation of integrals with variable limits - Leibnitz rule. Rectification, double and triple integrals, computations of surface and volumes, change of variables in double integrals - Jacobians of transformations, integrals dependent on parameters – applications.

UNIT-V

Vector Calculus : Scalar and vector fields, level surfaces, directional derivative, Gradient, Curl, Divergence, Laplacian, line and surface integrals, theorems of Green, Gauss and Stokes.

Text Books:

1. Advanced Engineering Mathematics (3rd Edition) by R. K. Jain and S. R. K. Iyengar, Narosa Publishing House, New Delhi

Suggested References:

1. Advanced Engineering Mathematics (8th Edition) by Erwin Kreyszig, Wiley-India.
2. Dr. M.D. Raisinghania, Ordinary and Partial differential equations, S.CHAND, 17th Edition 2014.

*L-T-P-C stands for number of lectures, tutorials, practices and credits

Code: PH1001

ENGINEERING PHYSICS

Externals: 60 Marks

L-T-P-C*

Internals: 40 Marks

4-0-0-4

Objectives:

- to acquire the knowledge on basic concepts in Physical Optics, Lasers, Fibre Optics, Wave mechanics, Statistical mechanics and Electromagnetic theory.
- The aim of this course is to acquire the basic knowledge on elements of solid state physics.
- To understand the properties of semiconducting, superconducting, dielectric and magnetic materials in their bulk form.
- To acquire the knowledge on latest material characterization techniques such as X-ray Diffractometry (XRD), Scanning Electron Microscopy (SEM), Atomic Force microscopy (AFM) and Raman Spectroscopy.

UNIT - I

Crystallography and Crystal Structures: Space Lattice, Unit Cell, Lattice Parameters, Crystal Systems, Bravais Lattices, Miller Indices, Crystal Planes and Directions, Inter Planar Spacing of Orthogonal Crystal Systems, Atomic Radius, Co-ordination Number and Packing Factor of SC, BCC, FCC, and hcp Structures.

X-ray Diffraction: Basic Principles, Bragg's Law, Powder Method, Applications of X-ray Diffraction.

Defects in Crystals: Point Defects: Vacancies, Substitutional, Interstitial, Frenkel and Schottky Defects- Calculation of concentration, Qualitative treatment of line (Edge and Screw Dislocations) Defects, Burger's Vector.

UNIT- II

Elements of Statistical Mechanics: Phase space, Ensemble, Difference between micro, canonical & grand canonical ensemble, Qualitative explanation of Maxwell - Boltzman Statistics, Bose – Einstein Statistics, and Fermi – Dirac Statistics, Density of states quantitative treatment.

UNIT-III

Principles of Quantum Mechanics: Waves and Particles, de Broglie Hypothesis , Matter Waves, Davisson and Germer's Experiment, G. P. Thomson Experiment, Heisenberg's Uncertainty Principle, Schrödinger's Time Independent Wave Equation -Physical Significance of the Wave Function -Particle in One Dimensional Potential Box.

UNIT-IV

Free electron theory of Metals: Classical free electron theory (Drunde and Lorentz), Electrical conductivity of a metals, Relaxation time, Collision time and mean free path, Success of classical free electron theory, Breakdown of free electron theory, Fermi – Dirac distribution function- variation with temperature, The quantum free electron theory.

UNIT-V

Band Theory of Solids: Bloch ψ Theorem, Kronig-Penny Model (Qualitative Treatment), E-K curve ,velocity of ψ , point of ψ inflection, effective mass of an electron and its significance, Origin of Energy Band Formation in Solids, Classification of Materials into Conductors, Semi Conductors & Insulators.

Text Books:

1. Engineering Physics, P K Palanisamy, Sitech Publications

Reference Books:

1. Introduction to Solid State Physics, Charles Kittel, John Wiley Publisher
2. Solid State Physics, Neil W. Ashcroft, N. David Mermin,, Thomson Publisher,
3. Statistical Mechanics, Donald Allan McQuarrie, University Science Books Publisher, California
4. Statistical Mechanics, Sathya Prakash, Pragathi Prakashan Publisher
5. Quantum Mechanics by G. Aruldas
6. Applied Physics, M Chandrashekar and P Applu Naidu, VGS Book Links

CODE: ME1201

ENGINEERING DRAWING AND COMPUTER DRAFTING – II

Externals: 60 Marks

L-T-P-C*

Internals: 40 Marks

3-1-0-4

Objectives:

- To understand the Engineering drawing concepts of section of solids and development of their surfaces.
- To know basic concepts of isometric projections.
- To determine the orthographic projections for solid sections.
- To analyze and obtain the perspective views for different solid bodies

UNIT – I

Scales: Construction of Plain, Diagonal, Comparative, Vernier Scales and Scale of chords.

UNIT – II

Intersection of Similar and Dis-similar Solids: Line method, Cutting plane method, Intersection of Prism Vs Prism, Cylinders Vs Cylinder (Under Similar category) and Cylinder Vs Prism (Under Dis-similar category)

UNIT – III

Isometric Projections/views: Principles of Isometric Projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines.

Conversion of Orthographic Views to Isometric Views of simple objects.

Transformation of Projections: Conversion of isometric views to orthographic views of simple objects.

UNIT –IV

Perspective Projections: Principle, Perspective elements, Perspective View of Points, Lines, Plane Figures and Simple Solids - Vanishing Point Method, Visual ray method.

UNIT –V

Introduction to Computer Aided Drafting: Generation of points, lines, curves, polygons, simple solids, dimensioning.

TEXT BOOKS:

1. Bhatt, N.D. (1998). Elementary Engineering Drawing", Charotar Publisher.
2. Narayana, K.L. and Kannaiah, P. (2001). "Text book on Engineering Drawing" SciTech Publications.
3. French, T.E. et al. (1993). "Engineering Drawing and Graphic Technology McGraw-Hill International Editions.
4. Venugopal, K. (1998). "Engineering Drawing and Graphics plus AutoCAD New Age International (P) Ltd, New Delhi.
5. Siddique, N et al. (2004). "Engineering Drawing with a Primer.c AutoCAD" Prentice Hall of India Pvt., Ltd., New Delhi.

REFERENCES:

1. Engineering graphics with Auto CAD- R.B Choudary / Anuradha Publishes
2. Engineering Drawing, K.Venugopal/G.Sreekanjana, New Age International Publishers.
3. Engineering Drawing, B.V.R.Gupta, M.Raja Roy/I.K.International Publishing House.

HS1001

ENGLISH

Externals: 60 Marks

L-T-P-C*

Internals: 40 Marks

4-0-0-3

Objectives:

- To improve the English language learning ability of the students by emphasizing on LSRW.
- To complement the comprehensibility of the Technical subjects in a better way.
- To make them competent to attempt and qualify in various tests.
- To develop the study skills in formal and informal situations.

UNIT -I

A Road Not Taken Robert Frost: Understanding the Poem - Decision Making -Themes of the Poem -Figures of Speech –Simile- Alliteration- Onomatopoeia

UNIT-II

Phonetics: Consonants - Vowels – BBC Phonetic Transcription – Syllabification - Word Stress - Voiced and Voiceless - Rules of Pronunciation - Tongue Twisters

UNIT-III

What's Up? An Excerpt from The Hindu (September 29, 2015): Article,Tenses, Prepositions and Speech: A Revision -Common Errors in English Usage -Commonly Mispronounced Words - Punctuation

UNIT-IV

Malala's Speech: An Excerpt from www.noble.org (10 December 2014) :Interviews/Self-Introduction - Debate - Group Discussion

UNIT-V

The Nightingale and the Rose by Oscar Wilde: Recollecting the Rules of Spelling - Commonly Mis-spelt Words list -Dialogue writing: Seeking Permission, Requesting, Interrupting - Skimming and Scanning

UNIT -VI

Anand's Super 30 for IIT-JEE: An Excerpt from The India Today (July 11,15): Essay Writing-How to Write a Report- Formats of report writing- Letter writing - Formal Letter - Informal Letter- Notice Writing - On various events e.g. Annual Day -Email writing - Emailing e.g. Formal and In Formal - Curriculum Vitae or Resume preparation

UNIT –VII

Education and Technology-Burj Khalifa: www.natgeotv.com : Burj Khalifa (Documentary Video)-JAM/PPT Presentations

UNIT-VIII

A Missile Man-Dr. APJ Kalam: An Excerpt from The Hindu (Sept 25, 2006) -Binomials and Portmanteau - Words often Confused - Reading Comprehension - Affixes (Prefixes and Suffixes)
- One Word Substitutes on How to Describe People -Homophones, Homonyms and Homographs
- Antonyms and synonyms - Spotting the Error -Commonly Used Phrasal Verbs/Idioms

Supplementary Sources:

The King's Speech : Speech Therapy Tricks

Invictus : Inspirational Story

Lord of the Flies : Thematic Movie

Tangled : A Fairy Tale

- Debates from (BBC and NDTV)
- A course in Spoken English

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CS1201

Scripting Languages

Externals: 60Marks

Internals: 40Marks

L-T-P-C

4-0-0-4

Prerequisites

1. Programming in C and Data Structures.

Objectives

1. To learn scripting languages- Python, Perl, PHP

Outcome

1. Student will be able to write dynamic web pages and will also be able to build a basic search engine using python and also search through text files using Perl.

UNIT-I

Python - Introduction-Variables, Strings, numbers, comments, Lists- introducing list, lists and looping, common list operations, removing items from list, numerical lists, list comprehensions, strings as lists, tuples, file I/O, functions, conditional statements and iterative statements.

UNIT –II

Python - Dictionaries, common operations with dictionaries, looping through dictionaries, nesting, classes, inheritance, modules and classes, exceptions and testing. Exceptions, sorting, introduction to standard libraries, building a Search Engine using all the above concepts.

UNIT-III

Perl – Data types, scalar functions, Quoting Basics, Functions, Control Structures, Inputs, Error Handling.

UNIT-IV

Perl – File input output, text processing functions, Hashes, DBM Databases, Regular Expressions.

UNIT- V

HTML – Styles, links, images, Static and Dynamic pages, Paragraphs and Fonts, Lists, CSS introduction, Introduction to HTML5 and semantics. PHP – Loops, String Functions, Email function, Data and time, Image Uploading, Error Handling.

Text Books:-

3. Programming Python, 4th Edition Powerful Object-Oriented Programming By Mark Lutz
4. Learning Perl, Randal L Schwartz.
5. Web Programming, building internet applications, Chris Bates 2nd edition, WILEY Dreamtech

HS1201

Communication Skills – II

Externals: 60

L-T-P-C*

Internals: 40

2-0-0-1

Objectives:

- To improve the English language learning ability of the students by emphasizing on LSRW.
- To complement the comprehensibility of the Technical subjects in a better way.
- To make them competent to attempt and qualify in various tests.

UNIT-I

Conversations – Introduction - Types of Conversations - Telephonic conversations – Typing messages - Strategies for Effectiveness - Conversation Practice

UNIT-II

Poetry Recitation - Reading to understand and express– Newspaper Review – Movie reviews – Gossip articles

UNIT-III

E-mail Writing– Paragraph Writing - Essay Writing – Descriptive Writing - Narrative Writing – **Picture perception**

Suggested References:

PH 1601

ENGINEERING PHYSICS LAB

Externals: 60Marks

L-T-P-C*

Internals: 40Marks

0-0-2-2

1. Coupled Pendula
2. Specific rotation - Polarimeter
3. Diffraction Grating
4. Dispersive power of a prism
5. Franck Hertz experiment
6. Photoelectric effect
7. Four probe Experiment
8. Hall effect
9. Ultrasonic Waves

HS1601

ENGLISH LAB

Externals: 60 Marks

L-T-P-C*

Internals: 40 Marks

0-0-3-2

Objectives:

- * To sensitize students to their communication skills.
- * To make the students practice the language skills (L, S, R, W).

UNIT- I

Grammar – Adjectives – Comparatives and Superlatives – Adverbs – Countable and Uncountable Nouns – Pronouns – Simple present – Present continuous – Simple past- Conjunctions – Prepositions – Plurals – Articles a, an, the – Infinitive or –ing – Questions and Negatives -1 - Questions and Negatives -2

UNIT-II

Pronunciation – Pill/Fill – Buy/My – Tie/Die – Ship/Chip – Yet/ Jet – Game/ Came – Wail/Veil – Think/Sink – There/Dare – Price/ Prize – Asia/ Hard – Ran/Rang – Right/Light – Ship/Sheep – Head/Had- Schwa – Luck/ Look - Hat/Heart – But/Boot – Who/ Her – Pot/Port – Hair/ Hear – Pay/Pie – Boy/Buy – Know/ Now

UNIT-III

Writing – Writing a Thank You Letter – Writing about your life – Writing Instructions – Writing a Story – Writing an Essay – Writing a Business Letter – Writing a Film Review – Writing a Biography – Writing a Complaint Letter – Writing a Covering Letter - Writing a Pen friend Post - Writing about a Special Day - Writing an E-mail of Apology - Writing a Short Report - Writing a Post Card

UNIT – IV

Reading - The diamond thief – The guru and sweets – Taking a course – Reading a story - Using a dictionary – Making a journey – Reading a newspaper – Making friends – Reading an email – Finding information – A pen friend letter – The doctor says...- Choosing a holiday – Struck by lightning – Health matters :Yoga

UNIT – V

Listening – What shall we play? – An exciting weekend – A school outing – The morning assembly – Instructions on planting – Excuse me, can you lend me...- Manish's summer – Vignesh's hobby – What can I do for you? – What are you doing Ramesh? – I've got a few questions...- Geetha's day – Anil's new purchase – What are we having tonight? – What is the problem?

Suggested References:

1. Clarity English Success