CURRICULUM OF CIVIL ENGINEERING
RGUKT BASAR

I YEAR
II SEMESTER

Subject Code	Course Name	L-T-P	Credits
MA1201	Mathematics-II	4-0-0	4
CE1201	Engineering Mechanics-II	4-0-0	4
CE1001	Engineering Drawing	4-0-0	4
CY1001	Chemistry	4-0-0	4
CS1201	Scripting Languages	4-0-0	3
HS1201	Communication Skills-II	2-0-0	1
ME1601	Engineering Workshop	0-0-3	2
CY1601	Chemistry Lab	0-0-3	2
Total		22-0-6	24

MA1201 **MATHEMATICS – II**

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 combinationof vectors, linear dependence and independence of vectors, Basis and Dimension of Vector Space.

Linear transformations, Range and Kernelof 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,OrdinaryandPartialdifferentialequations,S.CHAND,17thEdition2014.

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

CE1201 **ENGINEERING MECHANICS - II**

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

Objectives:

- To understand the mass moment of inertia analysis for the different bodies.
- To know basic concepts of dynamic loads, their behaviour, analysis and motion bodies.
- To determine the work energy principles and impulsive momentum theory.

UNIT-I:

Centre of Gravity and Mass moment of inertia. Centre of Gravity and mass moment of inertia foor solids and composite bodies. Radius of gyration.

Virtual Work: Basic concepts and principles of virtual work method, and its applications.

UNIT-II:

Kinematics: Rectilinear motion, curvilinear motion, Velocity andacceleration, Types of Rigid body motion, and its analysis in a plane.

UNIT-III:

Kinetics: Analysis as a particle, Analysis as a rigid body in translations, Force motion, Fixed axis rotation. Rolling bodies, Plane motion.

UNIT-IV:

Work – Energy: Principles of work-energy, and its applications to translation, Particle motion and connected systems. Fixed axis rotation and plane motion.

UNIT-V:

Impulsive momentum:

Linear impulsive momentum, Conservation of momentum, Elastic impact, Plane motion.

Suggested readings:

1. Ferdimand L. Singer. “Engineering Mechanics”. Harper & Collins, Singapore, 1975.
2. S.P.Timoshenko and D.H.Young. “Engineering Mechanics”, McGraw-Hill International Publications, 1983.
3. S.Rajashekaran and G.Sankarasubramanyan“Engineering Mechanics”, Vikas Publications, 2002.
4. S.B.Junakar and H.J.Shah, “Applied Mechanics”, Charotar Publishers, 2001.
5. LH.Shames, “Engineering Mechanics”, Prentice Hall of India, 1987.

CE1001 **ENGINEERING DRAWING**

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

Objectives:
To understand the basic concepts of drawing and use of drafter.
To draw the basic geometrical constructions and curves used in engineering.
To understand and draw the projections of points, lines, planes and solids.
To know about isometric projections.

Concepts and conventions (Not for Examination): Importance of graphics in engineering applications – Use of drafting instruments – BIS conventions and specifications – Size, layout and folding of drawing sheets – Lettering and dimensioning

UNIT-1
Plane curves and free hand sketching: Basic Geometrical constructions, Curves used in engineering practices: Conics – Construction of ellipse, parabola and hyperbola by eccentricity method – Construction of cycloid – construction of involutes of square and circle – Drawing of tangents and normal to the above curves, Scales: Construction of Diagonal and Vernier scales. Visualization concepts and Free Hand sketching: Visualization principles – Representation of three Dimensional objects – Layout of views- Free hand sketching of multiple views from pictorial views of objects

UNIT-II
Projection of points, lines and plane surfaces: Orthographic projection- principles- Principal planes- First angle projection-projection of points. Projection of straight lines (only First angle projections) inclined to both the principal planes - Determination of true lengths and true inclinations by rotating line method and traces - Projection of planes (polygonal and circular surfaces) inclined to both the principal planes by rotating object method

UNIT-III
Projection of solids: Projection of simple solids like prisms, pyramids, cylinder, cone and truncated solids when the axis is inclined to one of the principal planes by rotating object method and auxiliary plane method.

UNIT-IV

Projection of sectioned solids and development of surfaces: Sectioning of above solids in simple vertical position when the cutting plane is inclined to the one of the principal planes and perpendicular to the other – obtaining true shape of section. Development of lateral surfaces of simple and sectioned solids – Prisms, pyramids cylinders and cones. Development of lateral surfaces of solids with cut-outs and holes

UNIT V

Isometric and perspective projections: Principles of isometric projection – isometric scale –Isometric projections of simple solids and truncated solids - Prisms, pyramids, cylinders, cones- combination of two solid objects in simple vertical positions and miscellaneous problems. Perspective projection of simple solids-Prisms, pyramids and cylinders by visual ray method.

Computer aided drafting (demonstration only)

Introduction to drafting packages and demonstration of their use.

Suggested Readings:

1. Bhatt N.D. and Panchal V.M., "Engineering Drawing", Charotar Publishing House, 50 Edition, 2010.
2. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age publications
3. Gopalakrishna K.R., "Engineering Drawing" (Vol. I&II combined), Subhas Stores, Bangalore, 2007.
4. Luzzader, Warren.J. and Duff,John M., "Fundamentals of Engineering Drawing with an introduction to Interactive Computer Graphics for Design and Production, Eastern EconomyEdition, Prentice Hall of India Pvt. Ltd, New Delhi, 2005.
5. Venugopal K. and Prabhu Raja V., "Engineering Graphics", New Age

CY1001 **CHEMISTRY**

Externals: 60 Marks **L-T-P-C**

Internals: 40 Marks **4-0-0-4**

Objectives:

1. To understand the basic organic reactions and their mechanisms with examples
2. To understand the importance of the spectroscopy in determining the structures of chemical compounds
3. To understand the importance of electrochemistry in technical filed
4. To understand the rates of some of the reactions and derivation of their rate laws
5. To understand the phase rule with some examples

Unit1: Organic reactions and Mechanisms

Elimination reactions: types of elimination reactions. α-eliminations with examples, Reimer-Tiemann reaction and its mechanism, β-eliminations with examples, Hofmann elimination and Saytzeff elimination reactions and their mechanisms, Classification of β-eliminations into E1 and E2 reactions with examples, γ-elimination reactions with examples, Aldol condensation with mechanism.

Addition and Substitution reactions: Classification of addition reactions into electrophilic, nucleophilic and free radical addition reactions with examples and their mechanisms, Markonikov's law, anti-Markonikov's rule and Kharasch effect, Michael reaction, Skraup synthesis, Polyvinyl chloride synthesis and their mechanisms. Classification of substitution reactions into electrophilic, nucleophilic and free radical substitutions with examples and their mechanisms, S_N^1 and S_N^2 reactions with examples, S_E^1 and S_E^2 reactions with examples.

Bio-organic Reactions: amino acids and proteins, peptide bond formation and examples, methods of representing a peptide bond and its synthesis, Lipids, functions of lipids, classification of lipids, lipid metabolism, occurrence of lipids, properties of lipids, analysis of fats and oils.

Polymerization reactions: classification of polymerization, detailed reaction mechanism of free radical polymerization with examples, condensation polymerization reaction with mechanism, ionic polymerization with examples, classification of ionic polymerization into cationic and anionic polymerization.

Mechanism of catalytic reactions: catalyst definition, characteristics and types of catalysis, theories of catalysis, intermediate compound formation theory with examples and mechanism, drawbacks of intermediate compound formation theory, adsorption or contact theory with examples and mechanisms, enzyme catalysis, characteristics and mechanism of enzyme catalysis.

Unit 2: Spectroscopy

Introduction to spectroscopy, electromagnetic radiations, different types of spectroscopy, principle of spectroscopy, spectrophotometer

Microwave spectroscopy: principle, microwave spectra of diatomic molecules, selection rules for microwave spectra, applications of microwave spectroscopy: determination of bond length, dipolemoment measurement, determination of isotopic mass of an element.

Infrared spectroscopy: introduction and principles of IR, types of vibrations: bending and stretching, Hooke's law for stretching vibrations, characteristic frequencies of common functional groups, IR instrumentation, interpretation and applications of IR spectrum with examples.

Ultra-violet spectroscopy: Introduction and principle of UV spectroscopy, color interpretation with VBT and MOT, types of electronic transitions, selection rules, chromophores and auxochromes with examples, conjugation effect, absorption and intensity shifts, applications of UV spectroscopy.

Unit 3: Electrochemistry

Types of electrodes: introduction, metal-metal ion electrodes, metal-insoluble salt-anion electrodes, calomel electrode, gas-ion electrodes, hydrogen and chlorine electrodes, oxidation-reduction electrodes, amalgam electrodes.

Types of cells: classification into chemical and concentration cells, chemical cells with transference and without transference, classification of concentration cells into electrolyte and electrode concentration cells, electrolyte concentration cells with and without transference, amalgam and gas concentration cells, examples for these cells.

EMF and applications of EMF: determination of pH, determination of the valency of the ions, potentiometric titrations.

Thermodynamic data: enthalpy and entropy of cell reactions, Gibbs-Helmholtz equation and applications.

Activity coefficients: fugacity and activity, their derivations, determination of activity and activity coefficients from cell potentials, ionic strength and its determination.

Solubility product: solubility and solubility product definitions, determination of solubility product using potentiometric and conductometric methods.

pH: definition of pH and determination of pH by various methods, acid-base titrations.

Corrosion: introduction, causes of corrosion, factors affecting the corrosion: nature of the metal and nature of the environment, thermodynamics of the corrosion, theories of corrosion: electrochemical/wet/immersion theory and chemical/dry/direct chemical attack theory.

Prevention of corrosion: protective coating - metal and nonmetal coatings, cathodic and anodic protection and their limitations, corrosion inhibitors – organic and inorganic inhibitors with examples.

Unit 4: Chemical kinetics

Complex reactions: definition and classification of complex reactions, definition of reversible reactions with examples, rate law derivation for reversible reactions.

Consecutive reactions: definition, rate law derivation and examples of consecutive reactions.
Parallel reactions: definition, rate law derivation and examples of parallel reactions.

Steady-state approximation: introduction, kinetic rate law derivation by applying steady state approximation in case of the oxidation of NO and pyrolysis of methane.
Chain reactions: introduction, types and mechanism of chain reactions, stationary and non-stationary chain reactions with examples, deriving the kinetic rate equation using a general chain reaction.
Photochemical reactions: introduction, Stark-Einstein law of photochemical equivalence, photophysical processes: IC, ISC, fluorescence and phosphorescence with examples, kinetic rate law derivation incase of photochemical decomposition of HI and photochemical combination of H_2 and Br_2.

Unit 5: Phase and reaction equilibrium

Phase equilibrium: introduction, definition of phase equilibrium, phase rule, definition and explanation of the terms used in the phase equilibrium: phase, components, degrees of freedom with examples, Lead – silver system.

Chemical equilibrium in mixture: energy changes, degree of advancement of reaction, effect of adding an inert gas on equilibrium.

Reference books:

1. Applied Chemistry – A textbook for engineers and technologist by H.D. Gesser
2. Engineering Chemistry: by P C Jain & Monika Jain
3. A Text Book of Engineering Chemistry: by Shashi Chawla
4. Fundamental of Organic Spectroscopy by Y. R. Sharma
5. Introduction to spectroscopy by Pavia, Lampman, Kriz

CS1201 **Scripting Languages**

Externals: 60Marks **(L-T)-P-C**

Internals: 40Marks **4-0-4**

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:

CODE: ME1601 **ENGINEERING WORKSHOP**

Externals: 60 **L-T-P-C***
Internals: 40 **0-0-3-2**

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

1. TRADES FOR EXERCISES:
a. Carpentry shop–
Two joints (exercises) involving tenon and mortising, groove and tongue: Making middle lap T joint, cross lap joint, mortise and tenon T joint, Bridle T joint from out of 300 x 40 x 25 mm soft wood stock

b. Fitting shop–
Two joints (exercises) from: square joint, V joint, half round joint or dove tail joint out of 100 x 50 x 5 mm M.S. stock

c. Sheet metal shop–
Two jobs (exercises) from: Tray, cylinder, hopper or funnel from out of 22 or 20 guage G.I. sheet

d. House-wiring–
Two jobs (exercises) from: wiring for ceiling rose and two lamps (bulbs) with independent switch controls with or without looping, wiring for stair case lamp, wiring for a water pump with single phase starter.

e. Foundry–
Preparation of two moulds (exercises): for a single pattern and a double pattern.

f. Welding –
Preparation of two welds (exercises): single V butt joint, lap joint, double V butt joint or T fillet joint

2. TRADES FOR DEMONSTRATION:

a. Plumbing
b. Machine Shop
c. Metal Cutting

Apart from the above the shop rooms should display charts, layouts, figures, circuits, hand tools, hand machines, models of jobs, materials with names such as different woods, wood faults, Plastics, steels, meters, gauges, equipment, CD or DVD displays, First aid, shop safety etc. (though they may not be used for the exercises but they give valuable information to the student). In the class work or in the examination knowledge of all shop practices may be stressed upon rather than skill acquired in making the job.

REFERENCE BOOKS:

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

CY1601 **CHEMISTRY LAB**

Externals: 60 Marks **L-T-P-C**

Internals: 40 Marks **0-0-3-2**

Objectives:

1. To learn the preparation of organic compounds in the laboratory
2. To estimate the hardness and alkalinity of the given sample of water
3. To understand the Job's method for determining the composition
4. Learns how to use the pH meter and polarimeter

1. **Synthesis**
   i. Synthesis of soap from cheap oil.
   ii. Synthesis of Thiokol rubber

2. **Volumetric analysis**
   i. Estimation of alkalinity of water
   ii. Estimation of total hardness of water by EDTA method

3. **Job's method**
   i. Determination of composition of Ferric-Thiocyanate complex by Job's method

4. **pH meter**
   i. Estimation of the strength of a weak acid by pH metry

5. **Polarimeter**
   i. Determination of specific rotation of sucrose by polarimeter

Reference books:

1. College Practical Chemistry by V K Ahluwalia, Sunita Dhingra, Adarsh Gulati
2. Practical Engineering Chemistry by K Mukkanti
3. A Text Book of Engineering Chemistry: by Shashi Chawla
4. Essentials of Experimental Engineering Chemistry by Shashi Chawla
5. Comprehensive Practical Organic Chemistry – Preparation and Quantitative analysis byV K Ahluwalia, Renu Aggarwal