Course code	MEE-102				
Category	Program Core Course				
Course title	Engineering Mechanics				
Scheme and Credits	L	T	P	Credits	
	3	0	0	3	
Class work	30 Marks				
Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes (COs):

At the end of the course, the student shall be able to:

1. Understand the basic force system.
2. Apply principles of particle kinematics.
3. Grasp the concepts of particle dynamics.
4. Learn energy methods & momentum methods.

UNIT-I

Introduction: Force system, dimensions and units in mechanics, laws of mechanics, vector algebra, addition and subtraction of forces, cross and dot products of vectors, moment of a force about a point and axis, couple and couple moment, transfer of a force to a parallel position, resultant of a force system using vector method, Problems involving vector application

Equilibrium: Static and dynamic equilibrium, static in determinacy, general equations of equilibrium, Varingnon's theorem, Lami's theorem, equilibrium of bodies under a force system, Problems.

UNIT-II

Truss and Frames: Truss, classification of truss, assumptions in truss analysis, perfect truss, analysis of perfect plane truss using method of joints and method of sections, Problems.Centroid , Centre of mass and Centre of gravity, Determination of centroid, centre of mass and centre of gravity by integration method of regular and composite figures and solid objects, Problems.

UNIT-III

Moment of Inertia: Area moment of inertia, mass moment of inertia, parallel axis andperpendicular axis theorems, radius of gyration, polar moment of inertia, product of inertia, principle axis, problem based on composite figures and solid objects.

Kinematics: Concept of rigid body, velocity and acceleration, relative velocity, translation and rotation of rigid bodies, equations of motion for translation and rotation, problems.

UNIT-IV

Particle Dynamics: Energy methods and momentum methods, Newton's laws, work energy Equation for a system of particles, linear and angular momentum equations, projectile motion, problem. Shear Force and Bending Moment Diagram for statically determinant beams classification Of beams, types of loads, shear force and bending moment calculation and their graphical presentation, point of inflection, problem.

RecommendedBooks:-

- Engineering Mechanics– Irving H. Shames, PHI Publication
- Engineering Mechanics–U.C. Jindal, Galgotia Publication
- Engineering Mechanics–A.K.Tayal, Umesh Publication

Course code	BSC-102				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry				
Scheme and Credits	L	T	P	Credits	
	2	0	0	2	
Class work	30Marks				
Theory Exam	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:

1. To analyse microscopic chemistry
2. Understand the concept of hardness of water and phenomenon of corrosion
3. Rationalise periodic properties
4. Distinguish the ranges of the electromagnetic spectrum

UNIT-I

Atomic and molecular structure: Schrodinger equation (Introduction and concept only). Forms of the hydrogen atom wave functions and the plots of these functions to explore their spatial variations (derivation excluded). Molecular orbital energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions.

UNIT-III

Periodic properties: Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes,ionization energies, electron affinity and electronegativity, polarizability, oxidation states.

UNIT-III

Stereochemistry: Representations of 3 dimensional structures, structural isomers and stereoisomers, configurations, symmetry and chirality, enantiomers, diastereomers, optical activity, absolute configurations and conformational analysis.

Organic reactions: Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization (mechanism excluded).

UNIT-IV

Intermolecular forces: Ionic, dipolar and Van der Waals interactions.

Water Chemistry: Hardness of water- Introduction, Types, Measurement of hardness by EDTA method, Methods of water softening (Lime soda process, Zeolite Process, Demineralisation process).

Suggested Text Books:

(i) University Chemistry, Bruce M. Mahan, Pearson Education.
(ii) Chemistry: Principles and Applications, by M. J. Sienko and R. A. Plane

(iii) Essentials of Analytical Chemistry, Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Education.
(iv)Fundamentals of Molecular Spectroscopy, by C. N. Banwell
(v) Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan
(vi) Physical Chemistry, by P. W. Atkins
(vii) Organic Chemistry: Structure and Function by K. P. C. Volhardt and N. E. Schore, 5th Edition.

Course Outcomes:
The course will enable the student to:

- Analyse microscopic chemistry in terms of atomic and molecular orbitals and intermolecular forces.
- Understand the concept of hardness of water and phenomenon of corrosion.
- Distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
- Rationalise periodic properties such as ionization potential, electronegativity, oxidation states and electron affinity.

Course code	BSC-102P				
Category	BASIC SCIENCE COURSES				
Course title	Chemistry (P)				
Scheme and Credits	L	T	P	Credits	
	0	0	2	1	
External Practical	50 Marks				
Internal Practical	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Objective:
The chemistry laboratory course will consist of experiments illustrating the principles of chemistry relevant to the study of science and engineering.

LIST OF EXPERIMENTS: -
1. Determination of surface tension of given liquid by drop number method.
2. Determine the viscosity of given liquid by using Ostwald's viscometer / Redwood viscometer.
3. Calculate the Rf value of given sample using Thin layer chromatography / Paper chromatography.
4. Removal of Ca^{2+} and Mg^{2+} hardness from given water sample using ion exchange column.
5. Determination of chloride content in given water sample.
6. Calculate the strength of strong acid by titrating it with strong base using conductometer.
7. Calculate the emf value of given cell.
8. To prepare the of urea formaldehyde and phenol formaldehyde resin.
9. To determine the rate constant of a reaction.
10. To Prepare iodoform.
11. Calculate the saponification value / acid value of given oil sample.
12. Chemical analysis of two anions and two cations in given sample of salt.
13. Determination of the partition coefficient of a substance between two immiscible liquids.
14. To determine the total hardness of given water sample by EDTA method.

Note: At least 08 experiments are to be performed by the students.

Suggested Books:
1. A Text book on Experiments and Calculation –Engineering Chemistry by S.S.Dara, S.Chand & Company Ltd.
2. Essentials of Analytical Chemisty, Shobha Ramakrishnan, Pearson Education.
3. Essential of Experimental Engineering chemistry, Shashi Chawla, Dhanpat Rai Publishing Co.
4. Theory & Practice Applied Chemistry – O.P.Virmani, A.K. Narula (New Age).
5. Engineering Chemistry, K.Sesha Maheswaramma and Mridula Chugh, Pearson Education.

Course code	MEE- 104P				
Category	Engineering Science Course				
Course title	Engineering Graphics and Drawing (P)				
Scheme and Credits	L	T	P	Credits	
	1	0	3	2.5	
Class work	50 Marks				
Exam	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes:

On completion of this course, the students will be able to:

- Introduction to engineering design and its place in society
- Exposure to the visual aspects of engineering design
- Exposure to engineering graphics standards
- Exposure to solid modeling

UNIT-I

Module 1: Introduction to Engineering Drawing

Principles of Engineering Graphics and their significance, usage of Drawing instruments, lettering, Conic sections including the Rectangular Hyperbola (General method only); Cycloid, Epicycloid, Hypocycloid and Involute; Scales – Plain, Diagonal and Vernier Scales.

Module2: Orthographic Projections

Principles of Orthographic Projections-Conventions - Projections of Points and lines inclined to both planes; Projections of planes inclined Planes –Auxiliary Planes;

UNIT-II

Module3: Projections of Regular Solids

Those inclined to both the Planes- Auxiliary Views; Draw simple annotation, dimensioningand scale.Floor plans that include: windows, doors, and fixtures such as WC, bath, sink, shower, etc.

Module4: Sections and Sectional Views of Right Angular Solids

Prism, Cylinder, Pyramid, Cone – Auxiliary Views; Development of surfaces of RightRegular Solids - Prism, Pyramid, Cylinder and Cone; Draw the sectional orthographic views of geometrical solids, objects from industry and dwellings(foundation to slab only)

Module5: Isometric Projections

Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions;Isometric Views of lines, Planes, Simple and compound Solids; Conversion of IsometricViewsto OrthographicViews andVice-versa,Conventions;

UNIT- III

Module6: Overview of Computer Graphics

Listing the computer technologies that impact on graphical communication, Demonstrating knowledge of the theory of CAD software [such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), Drawing Area(Back ground, Crosshairs, Coordinate System),Dialog boxes and windows, Shortcut menus (Button Bars), The Command Line(where applicable),The Status Bar, Different methods of zoom as used in CAD, Select and eraseobjects.; IsometricViews of lines,Planes,Simple andcompound Solids]

UNIT-IV

Module7: Annotations, layering & other functions

Applying dimensions to objects, applying an notations to drawings; layers to create drawings, orthographic projection techniques; Drawing sectional views of composite right regular geometric solidsand project the true shape of the sectioned surface; Drawing annotation, Computer-aided design (CAD) software modeling of parts and assemblies.

Drawing of Engineering objects like coupling, crank shaft, pulley.

Module8: Demonstration of a simple team design project that illustrates

Geometry and topology of engineered components, Applying colour coding according to building drawing practice; Drawing sectional elevation showing foundation to ceiling; Introduction to Building Information Modelling (BIM).

SuggestedText/ReferenceBooks:

(i) Shah, M.B. & Rana B.C., Engineering Drawing, Pearson Education

(ii)Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House

(iii) A grawal B. & Agrawal C. M.(2012), Engineering Graphics, TMH Publication

(iv) Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

(v) CAD Software Theory and User Manuals