



RAJASTHAN TECHNICAL UNIVERSITY KOTA
First Year B.Tech. Scheme
for
University Teaching Departments

SN	Subject Code	Course Title	L	T	P	C	Marks		
							IA	External	Total
		Theory Papers							
1.	MA-101	Engineering Mathematics-I	3	1	0	4	50	100	150
2.	HU-101/ CS-101	Professional Communication Skills/ Computer Programming	2	0	0	2	50	100	150
3.	PY-101/ CY-101	Engineering Physics/ Engineering Chemistry	3	1	0	4	50	100	150
4.	ME-101/ EE-101	Engineering Mechanics/ Basic Electrical and Electronics Engineering	3	0	0	3	50	100	150
5.	CE-101	Environmental Engineering	2	0	0	2	50	100	150
6.	CE-102/ ME-102	Basics of Civil Engineering/ Basic Mechanical Engineering	3	0	0	3	50	100	150
		Total	16	2	0	18	300	600	900
		Practical and Sessionals							
6.	HU-102/ CS-102	Professional Communication Skills Lab./ Computer Programming Lab	0	0	2	1	70	30	100
7.	PY-102/ CY-102	Engineering Physics Lab/ Engineering Chemistry Lab	0	0	2	1	70	30	100
8.	ME-103/ EE-102	Mechanical Workshop Practice/ Basic Electrical and Electronics Engineering. Lab.	0	0	2	1	70	30	100
9.	CE-104	Computer Aided Engineering Graphics I (Practical Geometry)	0	0	3	2	70	30	100
		Total	16	2	9	23	580	720	1300

L = Lecture, **T** = Tutorial, **P** = Practical **C**= Credits



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SN	Subject Code	Course Title	L	T	P	C	Marks		
							IA	External	Total
		Theory Papers							
1.	MA-102	Engineering Mathematics-II	3	1	0	4	50	100	150
2.	CS-101/ HU-101	Computer Programming/ Professional Communication Skills	2	0	0	2	50	100	150
3.	CY-101/ PY-101/	Engineering Chemistry/ Engineering Physics	3	1	0	4	50	100	150
4.	EE-101/ ME-101	Basic Electrical and Electronics Engineering/ Engineering Mechanics	3	0	0	3	50	100	150
5.	CE-102/	Human Values and Ethics	2	0	0	2	50	100	150
6.	ME-102/ CE-102	Basic Mechanical Engineering/ Basic Civil Engineering	3	0	0	3	50	100	150
		Total	15	2	0	17	300	600	900
		Practical and Sessionals							
6.	CS-102/ HU-102	Computer Programming Lab/ Professional Communication Skills Lab	0	0	2	1	70	30	100
7.	CY-102/ PY-102/	Engineering Chemistry Lab/ Engineering Physics Lab	0	0	2	1	70	30	100
8.	EE-102/ ME-103	Basic Electrical and Electronics Engineering. Lab Mechanical Workshop Practice	0	0	2	1	70	30	100
9.	ME-104	Computer Aided Engineering Graphics II (Machine Drawing)	0	0	3	2	70	30	100
		Total	15	2	9	22	580	720	1300

L = Lecture, **T** = Tutorial, **P** = Practical



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ME-101 ENGINEERING MECHANICS

Engineering Mechanics

Objectives:

To explain the importance of mechanics in the context of engineering and conservation equations. To explain the significance of centroid, centre of gravity and moment of inertia. To introduce the techniques for analyzing the forces in the bodies. To apply the different principles to study the motion of a body, and concept of relative velocity and acceleration. To describe the trajectory of a particle under projectile motion.



Statics of particles and rigid bodies: Fundamental laws of mechanics, Principle of transmissibility, System of forces, Resultant force, Resolution of force, Moment and Couples, Resolution of a force into a force and a couple, Free body diagram, Equilibrium, Conditions for equilibrium, Lami's theorem.

Plane trusses: Types of structures, Trusses, Support Conditions, Types of Loadings, Classification of trusses, Determinacy of trusses, Basic assumptions of truss analysis, Method of joints, Method of sections.

Centroid & Moment of inertia (M.I): Location of centroid, Moment of inertia (mass and area), Parallel axis and perpendicular axis theorems, M.I of composite section, M.I. of solid bodies, Polar moment of inertia.

Virtual work: Principle of Virtual Work, Active forces and active force diagram, Stability of equilibrium.

Friction: Types of Friction, Laws of friction, Angle of friction, Angle of repose, Ladder, Wedge, Belt Friction.

Kinematics of particles and rigid bodies: Velocity, Acceleration, Types of Motion, Equations of Motion, Rectangular components of velocity and acceleration, Angular velocity and Angular acceleration, Radial and transverse velocities and accelerations,



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Projectiles motion on plane and Inclined Plane, Relative Motion.

Kinetics of particles and rigid bodies: Newton's second law, Equation of motion in rectangular coordinate, Equation of motion in radial and transverse components, Equation of motion in plane for a rigid body, D'Alembert principle.

Work, Energy and Power: Work of a force, weight, spring force and couple, Power, Efficiency, Energy, Kinetic energy of rigid body, Principle of work and energy, Conservative and Non-conservative Force, Conservation of energy.

Impulse and Momentum: Linear and angular momentum, Linear and angular impulse, Principle of momentum for a particle and rigid body, Principle of linear impulse and momentum for a particle and rigid body, Principle of angular momentum and Impulse, Conservation of angular momentum, Angular momentum of rigid body, Principle of impulse and momentum for a rigid body, Central impact, Oblique impact, System of variable mass, Rocket.

Vibrations: Free vibrations of particles, Simple, compound and torsional pendulum, Energy Method.

Outcome:



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The terminal objectives of the course is that, on successful completion of teaching-learning and evaluation activities, a student would be able to identify and analyze the problems by applying the fundamental principles of engineering mechanics and to proceed to research, design and development of the mechanical systems.

Text Book

1. Engineering Mechanics, Sharma, Pearson Education.

Reference Books

1. Engineering Mechanics, Beer and Johnston, Tata McGraw-Hill.
2. Engineering Mechanics, Hibbeler, Pearson Education.
3. Engineering Mechanics, Meriam and Kraige, John Wiley & Sons.
4. Engineering Mechanics, Timoshenko and Young, Tata McGraw-Hill.
5. Engineering Mechanics, Shames, Pearson Education.

ME 102 BASIC MECHANICAL ENGINEERING

Objectives:

1. To explain the importance of concepts of Mechanical Engineering



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2. To identify the basic elements of a mechanical system.
3. To introduce the various properties of materials.

Fundamentals: Introduction to mechanical engineering, concepts of thermal engineering, mechanical machine design, industrial engineering and manufacturing technology.

Steam Boilers, Steam Turbines and Power Plants:

Introduction, classification and types of steam boilers and steam turbines. Discuss working of steam boilers and steam turbines.

Introduction and Classification of power plants.

Pumps and IC Engines:

Applications and working of Reciprocating and Centrifugal pumps.

Introduction, Classification of IC Engines, Main Components of IC Engines, Working of IC Engines and its components.

Refrigeration and Air Conditioning:

Introduction, classification and types of refrigeration systems and air-conditioning. Applications of refrigeration and Air-conditioning.

Transmission of Power:



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Introduction and types of Belt and Rope Drives.

Introduction to Gears and Gear Trains.

Primary Manufacturing Processes:

Metal Casting Process: Introduction to Casting Process, Patterns, Molding, Furnaces.

Metal Forming Processes: Introduction to Forging, Rolling, Extrusion, Drawing.

Metal Joining Processes: Introduction to various types of Welding, Gas Cutting, Brazing, and Soldering.

Metal Removal or Machining Processes: Introduction to machining process and various machine tools.

Engineering Materials and Heat Treatment of Steel:

Introduction to various engineering materials and their properties.

Introduction to Heat Treatment and types of Heat Treatment Processes.

Introduction to CAD, CAM, FMS, MEMS and CIM:

Introduction to modern manufacturing systems and their applications.

Outcome:



The outcome of the course is that, a student would be able to identify, appreciate and analyze the problems by applying the fundamentals of mechanical engineering.

Text Book:

1. G. Shanmugam and S Ravindran, Basic Mechanical Engineering, Mc Graw hill, fourth edition.

Reference book:

1. K Venu Gopal and Prabhu Raja V, Basic Mechanical Engineering, Anuradha agencies pub, Chennai.

ME-103 WORKSHOP PRACTICE

Objectives:

Introduction to the use of tools and machinery in Carpentry, Welding, Foundry, Fitting and Sheet Metal Working.

Carpentry Shop:

1. T – Lap joint
2. Bridle joint

Foundry Shop:

1. Mould of any pattern
2. Casting of any simple pattern

Welding Shop:

1. Lap joint by gas welding
2. Butt joint by arc welding
3. Lap joint by arc welding
4. Demonstration of brazing, soldering & gas cutting

Machine Shop Practice:

1. Demonstration of various machine tools such as Lathe, Shaper, Milling, Grinding and Drilling

Fitting Shop



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1. Finishing of two sides of a square piece by filing
2. Making mechanical joint and soldering of joint on sheet metal
3. To cut a square notch using hacksaw and to drill a hole and tapping

Sheet Metal Shop

Making of Funnel using sheet metal

Text Book:

1. Elements of Workshop Technology Hajra & Choudhary, Media Promoters & Publisher.

Reference Books:

1. Mechanical Workshop Practice, K.C. John, PHI Learning New Delhi.
2. Workshop Technology, W.A.J.Chapman, CBS Publisher & Distributor New Delhi.

**CE-104 COMPUTER AIDED ENGINEERING GRAPHICS I
(PRACTICAL GEOMETRY)**

Introduction to Engineering Drawing: Prerequisite for Engineering Drawing, Drawing Instruments, Drawing Margins & title Block, Lettering, Lines & Dimensions

Scales: Representative fraction, Types of scales, construction of Scales: plain Scales Vernier Scales, Diagonal Scales, Comparative scales

Projections of Point & Lines: Positions of Point, Notation system, systematic Approach for projections of points, Front view & Top view of point, Positions of straight lines, line parallel to Both the RPs, Line perpendicular to either of the RPs, Line inclined to one RP and parallel to the other, Line Inclined to Both the RPs, Traces of a line



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Projections of planes: Positions of planes, Terms used in projections of planes, plane parallel to RP, plane inclined to one RP and perpendicular to the other RP, plane perpendicular to Both the RPs, plane Inclined to Both RPs, True shape of the plane, Distance of a point from plane, Angle between two planes

Projection of solids: Basic solids, Frustums and truncated solids, Positions of the solids, solid with Axis perpendicular to an RP, solid with axis inclined to one RP and parallel to the other solid with axis Inclined to Both the RPs Solid with Axis parallel to Both the RPs,

Section of solids: Theory of sectioning, section of prisms and cubes, sections of pyramids and Tetrahedron section of Cylinders, Section of cones, Section of spheres

Development of surfaces: Methods of development, parallel line developments, Radial line Development, Anti-Development

Isometric Projection: Principle of Isometric Projection Isometric scale, Isometric projections and Isometric Views, Isometric Views of standard shapes, Isometric views of standard solids,

Computer Aided Drafting: Introduction to CAD, Advantages of CAD software's, Auto CAD, Auto CAD Commands and tool bars, Creating the Drawing, Changing properties, Dimensioning other object, Text editing, Isometric drawing

Suggested Readings:

1. Engineering Drawing Geometrical Drawing P.S.Gill , S.K.Katara & Sons
2. Engineering Drawing,Dhanarajay A Jolhe ,Tata McGraw Hill.



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3. Engineering Drawing, Basant Agarwal & CM Agarwal ,Tata McGraw Hill
4. Engineering Drawing, N.D.Bhatt, Charotar Publishing House Pvt. Ltd.

ME-104 COMPUTER AIDED ENGINEERING GRAPHICS (Machine Drawing)

Objectives

The student is expected to possess the efficient drafting skill depending on the operational function in order to perform day to day activity. Irrespective of engineering discipline, it has become mandatory to know the basics of engineering drawing.

It is to provide neat structure of industrial drawing and enables the knowledge about position of the component and its forms. It is going to help interpretation of technical graphics assemblies, preparation of machine components and related parts.

Introduction: Principles of drawing, conventional representation of machine components and materials, lines, types of lines, dimensioning types, rules of dimensioning.

Conversion of pictorial views into orthographic views: (1 drawing sheet) Introduction to orthographic projection, concept of first angle and third angle projection, drawing of simple machine elements in first angle projection, missing view problems.

Sectional view : (1 drawing sheet) Introduction, cutting plane line, type of sectional views-full section, half section,



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partial or broken section, revolved section, removed section, offset section, sectioning conventions-spokes, web, rib, shaft, pipes, different types of holes, conventions of section lines for different metals and materials.

Fasteners: (1 drawing sheet) Temporary and permanent fasteners, thread nomenclature and forms, thread series, designation, representation of threads, bolted joints, locking arrangement of nuts, screws, washers, foundation bolts etc., keys, types of keys, cotter and knuckle joints. Riveted joints, rivets and riveting, types of rivets, types of riveted joints etc.

Assembly drawing: (1 drawing sheet) Introduction to assembly drawing, assembly drawing of simple machine elements; like rigid or flexible coupling, muff coupling, plummer block, footstep bearing, bracket etc.

Free hand sketching: Need for free hand sketching, Free hand sketching of conventional representation of materials, screw fasteners, foundation bolts, studs.

Bearing: Ball, roller, needle, foot step bearing.

Coupling: Protected type, flange, and pin type flexible coupling.

Other components: Welded joints, belts and pulleys, pipes and pipe joints, valves etc.

Computer aided drafting: Concepts of computer aided 2D drafting using any drafting software like AutoCAD/ Solid works/Creo/Catia etc., basic drawing and modify commands, making 2D drawings of simple machine parts.

Outcome



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Towards the end of the course it is expected that the students would be matured to visualize the engineering components.

Text Book:

1. Laxminarayan and M.L. Mathur, Machine Drawing, Jain Brothers

Reference Books:

1. Gill P S, Machine Drawing, Kataria & Sons 2009
2. Basudeb Bhattacharya, Machine Drawing, Oxford University Press 2011
3. Dhawan, R.K., A Text Book of Machine Drawing, S. Chand & Company, 1996
4. Ostrowsky, O., Engineering Drawing with CAD Applications, ELBS, 1995.
5. Siddeshwar N., P Kannaiah, VVS Shastry, Machine Drawing, Tata McGraw Hill