Courses of the 2nd Year B.Sc. Engineering

2nd Year Odd Semester

SL. No.	Course No.	Course Title	Contact Hours/ Week	Credits
Theory Courses				
1.	Math 2131	Statistics, Numerical and Power Series	3.00	3.00
2.	MSE 2101	Crystallography and Structure of Materials	3.00	3.00
3.	MSE 2103	Phase Transformation of Materials	3.00	3.00
4.	ME 2159	Basic Mechanical Engineering	3.00	3.00
5.	ME 2169	Fluid Mechanics and Machinery	3.00	3.00
Sessional Courses				
6.	MSE 2102	Crystallography and Structure of Materials Sessional	3.00	1.50
7.	MSE 2104	Metallography Sessional	3.00	1.50
8.	ME 2160	Basic Mechanical Engineering Sessional	1.50	0.75
9.	ME 2170	Fluid Mechanics and Machinery	1.50	0.75
Total			24.00	19.50

2nd Year Even Semester

SL. No.	Course No.	Course Title	Contact Hours/ Week	Credits
Theory Courses				
1.	Hum 2231	Industrial Law and Accounting	3.00	3.00
2.	MSE 2211	Crystal Defect, Deformation and Fracture	3.00	3.00
3.	MSE 2221	Strength of Materials	3.00	3.00
4.	ME 2259	Heat and Mass Transfer	3.00	3.00
5.	EEE 2291	Electrical Machines and Electronics	3.00	3.00
Sessional courses				
6.	MSE 2220	Materials & Metallurgical Analysis	3.00	1.50
7.	MSE 2212	Crystal Defect, Deformation and Fracture Sessional	3.00	1.50
8.	MSE 2222	Application to Computers in Strength of Materials	1.50	0.75
9.	EEE 2292	Electrical Machines and Electronics Sessional	1.50	0.75
Total			24.00	19.50

Math 2131 (Statistics, Numerical and Power Series)

Lecture: 3 hrs. /week *No. of Credit: 3.00*

Numerical Analysis: Interpolation with equal and unequal intervals, central difference formulae, trapezoidal and Simpson's rule; solution of algebraic and transcendental equations; Bisection and Regula falsi method, initial approximation and convergence criteria of iteration method, Newton-Raphson method, solution of simultaneous linear algebraic equations, Gauss elimination method, Gauss Jordan method, Jacobi method, Gauss Seidal method. Application of Numerical Analysis.
Power Series: Method of Frobenius, Bessel's equation, Bessel's function, Legendre's equation, and Legendre's polynomials, Application of Bessel's function especially in heat transfer and mechanics.
Statistics: Review of central tendency and dispersion; moments, skewness and kurtosis; correlation and regression; elementary probability and probability distributions (e.g. Binomial Poison and Normal distributions).

ME 2169 (Fluid Mechanics and Machinery)

Lecture: 3 hrs. /week *No. of Credit: 3.00*

Fluid properties; Fluid statics: Manometry, forces on submerged planes and curved surfaces, buoyancy and floatation. **Fluid dynamics:** One dimensional flow of fluid: equation of continuity. Euler's equation. Flow of fluid in pipes, Bernoulli's equation, flow through venturimeter, head losses. **Open channel flow:** flow through weirs and notches. **Fluid Machinery:** Impulse and momentum principles, fans and blowers. Study of centrifugal and reciprocating compressors, Centrifugal and reciprocating pumps.

ME 2170 (Fluid Mechanics and Machinery)

Lecture: 1.5 hrs. /week *No. of Credit: 0.75*

Sessional based on ME 2169

ME 2159 (Basic Mechanical Engineering)

Lecture: 3 hrs. /week *No. of Credit: 3.00*

Energy: Concept and fundamental; forms and sources of energy- conventional and renewable energy; energy conservation and management.
Laws of Thermodynamics: First law of thermodynamics and its corollaries, first law applied to open and closed system; second law of thermodynamics and its corollaries; statement of third law of thermodynamics; Zeroth law, thermal equilibrium; reversibility, irreversibility, enthalpy, entropy and internal energy.
Fuels: Introduction to solid, liquid and gaseous fuels; conventional and alternate fuels; fuel compositions, fuel properties; proximate and ultimate analysis of fuel.
Basic Mechanical Devices/Systems: Introduction to steam, gas and water turbines with their accessories; internal combustion engines; refrigeration and air conditioning systems.
Study of Steam Generating Unit: Introduction, operation of modern steam boilers, accessories and mountings; performance study of steam generator.

ME 2160 (Basic Mechanical Engineering Sessional)

Lecture: 1.5 hrs. /week *No. of Credit: 0.75*

Sessional based on ME 2159

MSE 2101 (Crystallography and Structure of Material)

Lecture: 3 hrs. /week *No. of Credit: 3.00*

Solid Materials: Types of solids: crystalline, amorphous and polycrystalline solids. Types of crystalline solids: ionic, covalent, molecular and metallic crystals. Cohesive energy of ionic crystals, lattice energy, Born-Haber cycle, isomorphism, polymorphism, enantiotropy and monotropy.

Crystals and Crystal Structures: The nature of crystalline states, faces, edges and interfacial angle, space lattice, unit cells and patterns, periodicity in crystals. Atomic packing: hcp and ccp structures. Construction of crystals: closed packed hexagonal and square layers of atoms, body-centered cubic crystal, and some simple ionic and covalent structures. Selected crystal structures: Pure metals, diamond and graphite, co-ordination in ionic crystals, AB-type compounds, silica, alumina, complex oxides, silicates, crystallinity in polymers.

Representation and Study of Crystals in Projection: Introduction, representation in two dimensions, stereographic projection and its construction, stereographic projection in small circle, stereographic net, use of stereographic projection in crystallography, gnomonic projection.

Symmetry in Crystal: Two-dimensional symmetry elements, the five-plane lattice. Bravais lattices and crystal systems: the fourteen space (Bravais) lattices, the symmetry of fourteen Bravais lattices.

X-ray Diffraction: X-rays and their generation, origin and characteristics of x-rays, optical grating and diffraction of light, crystals and diffraction of x-rays, Laue equations, Bragg's law, x-ray diffraction experiment, powder methods, single crystal method. Structure of sodium chloride crystal from X-ray studies. Avogadro's number from crystal dimension, radius ratio, effect of ion size on crystal geometry.

MSE 2102 (Crystallography and Structure of Material Sessional)

Lecture: 3 hrs. /week *No. of Credit: 1.50*

Sessional based on MSE 2101

MSE 2103 (Phase Transformation of Materials)

Lecture: 3 hrs. /week *No. of Credit: 3.00*

Factors affecting the formation of alloys. Types of binary phase diagrams. The phase rule. Industrially important binary diagrams of metallic and ceramic systems including details of iron - iron carbide diagram. Diffusional, martensitic and mixed transformations. Nucleation and growth theory. Precipitation hardening. Types, mechanism and factors influencing diffusion, measurement of diffusion coefficients. Ternary phase diagrams: Composition triangles and space models, isothermal and vertical sections of isomorphus and other systems. Equilibrium and nonequilibrium freezing of typical ternary alloys.

MSE 2104 (Metallography Sessional)

No. of Credit: 1.50

Lecture: 3 hrs. /week

Sessional based on MSE 2103