Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-212	Course Name: Iron making
Credit:4	L-T-P:3-1-0
Version:	Approved on:
Pre-requisite course:	

Syllabus

Iron making: Raw materials and their properties. Reactions in the Blast Furnace. Removal of sulphur. Blast Furnace irregularities and their control. Modern developments. Blast Furnace Stoves,Desiliconization.
Ferro alloy production techniques. Numerical problems of material and heat balance.

Books:

1. Principles of Blast Furnace Ironmaking - A.K.Biswas
2. An Introduction to Modern Iron making – R.H. Tupkary

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-214	Course Name: Transport Phenomena
Credit: 4	L-T-P:3-1-0
Version:	Approved on:
Pre-requisite course:	

Syllabus

Fluid Behaviour: Newton's Law of viscosity, Laminar and turbulent flow. Differential mass balance (Continuity equation), Differential momentum balance (Equation of Motion) Navier Stokes Equations Application of differential balance equation. Overall Mass balance and overall momentum balance/. Euler's equations and its integration to obtain Bernoulli's equation. Flow through fluidisedbeds.Heat Transfer: Heat conduction equation and its application, concept of heat transfer coefficient, Forced and free convection. Aspects of Radiative Heat transfer.

Mass transfer – Diffusion and convective mass transfer, General differential equation for convective mass transfer, concept of mass transfer coefficient.

Books:

1. Rate Processes in Met. – R.H. Tupkary

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-216	Course Name: Introduction to Nano Materials and Technology
Credit: 4	L-T-P:3-1-0
Version:	Approved on:
Pre-requisite course:	

Syllabus

Synthesis routes for nano and ultra-fine grained materials: bottom up and top down approaches, specific routes such as vapor deposition, sol-gel, rapid solidification processing, high energy ball milling, cryo rolling, and equal channel angular extraction; Specific nano materials such as carbon nanotubes, semiconducting nanomaterials, magnetic ferroelectric, multiferroicnanomaterials, nano ceramic, nanomaterials for structural applications, nano biomaterials, and nanocomposites; Characterization techniques from the perspective of nanomaterials; Properties of nanomaterials: mechanical and functional; Mechanical behaviour of nanomaterials, and superplasticity; Thermodynamics and stability of nanomaterials; Specific applications of nanomaterials.

Books:

1. Di Venttra, Massimiliano; Evoy, Stephen; Helflin Jr. , Jmes R.(Eds.),Introduction to Nanoscale Science and technology, 2004,632 p. ,Springer Verlag, ISBN:978-1-4020-7720-3.
2. Ed Regis Nano : The Emerging Science of Nanotechnology (Paperback)
3. NalwaEncyclopaedia of nano science and technology.

Template for Course Details

UG	**Department: Metallurgical and Materials Engineering**
Course Code: MTT-218	**Course Name: Mechanical Behavior& Testing of Materials**
Credit: 4	**L-T-P: 3-1-0**
Version:	**Approved on:**
Pre-requisite course:Introduction to Engineering Materials	

Syllabus

Imperfections in crystal structures – point, line and surface imperfections.Dislocations – Properties and sources of dislocations, dislocation reactions and interactions.Elastic and plastic deformation: Mechanisms of plastic deformation in single crystals and polycrystalline materials; superplasticity.Strengthening mechanisms in solids.

Recovery, recrystallization and grain growth.Tensile testing – Engineering stress-strain curve, tensile properties,

true stress – strain curve, factors affecting tensile properties, tensile testing machines.Hardness Testing – Various hardness tests, advantages and limitations of various hardness tests, Microhardness testing.Impact testing – Various impact tests and their relative merits and demerits.Ductile - brittle transition behaviour and its significance.

Fatigue Testing – S-N curves, mechanisms of fatigue in metals,factors affecting fatigue properties.

Creep Testing – Typical creep curve, Mechanisms of creep deformation in metals, factors affecting creep behaviour.

Books:

1. G.E. Dieter, Mechanical Metallurgy, McGraw Hill Int. Co.
2. R.W. Hertzberg, Deformation and Fracture Mechanics of Engineering Materials,
3. T.H. Courtney, Mechanical Behaviour of Materials,
4. Robert E. Reed-Hill, Physical Metallurgy Principles,
5. A.V.K. Suryanarayana, Testing of Metallic Materials, PHI Learning Pvt. Ltd., New Delhi.

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-220	Course Name:Mineral Processing
Credit: 4	L-T-P: 3-1-0
Version:	Approved on:
Pre-requisite course:	

Syllabus

Comminution and liberation. Jaw crushers, Gyratry crushers, Cone crushers. Roll crushers. Ball Mill, rod mill, tube mill. Sizing and classification: Laboratory methods of sizing and interpretation. Laws of settling of solids in fluids. Type of classifiers. Gravity concentration by Wilfley table, spiral shaking tables, Jigging. Heavy media
separation. Froth flotation, Function of various reagents.
Filtration.Electromagnetic, electrostatic, amalgamation techniques of cancentration.Separation of solids from fluids: Thickning: Filtration, dust elemination, drying.
Coal washing: Washability curves, curshing, screening and cleaning of coal by gravity concentration and flotation methods. Dewatering and drying of coal. Simple flow sheet for the beneficiation of coal.

Books:

1. Principles of Mineral processing by A.M. Gaudin
2. Mineral Processing by S.K.Jain.

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTP-222	Course Name:Testing of Materials
Credit:2	L-T-P: 0-0-3
Version:	Approved on:
Pre-requisite course:	

Syllabus

1. Brinell, Rockwell, Vickers Hardness
2. Tensile testing of mild steel & Al-based alloys
3. Effect of temperature on Impact energy
4. Fractography of ductile and brittle materials
5. Fatigue testing
6. Creep testing
7. Sheet metal testing
8. Tensile strength of polymers
9. Analysis of Dynamic mechanical analyzer data

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTP-224	Course Name:Mineral Processing
Credit:2	L-T-P: 0-0-3
Version:	Approved on:
Pre-requisite course:	

Syllabus

1. Study of various minerals
2. Sieve analysis
3. Determination of reduction ratio in Jaw crusher
4. Determination of capacity of Roll crusher
5. Experiment on ball mill & rod mill
6. Experiment on disc pullveriser
7. Experiment on vibrating screen (single and double deck)
8. Experiment on thickener
9. Experiment on froth floatation,
10. Experiment on mineral jig

Template for Course Details

UG	**Department: Metallurgical and Materials Engineering**
Course Code:MTP-226	**Course Name:Metal Joining**
Credit:2	**L-T-P: 0-0-3**
Version:	**Approved on:**
Pre-requisite course:	
Syllabus 1. Study of various joining techniques 2. Arc welding, 3. Gas welding, 4. TIG, 5. MIG, 6. Brazing, 7. Soldering, 8. Joining & fastening 9. Study of heat effected zone	