

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-312	Course Name: Mechanical Working of Metals
Credit:4	L-T-P: 3-1-0
Version:	Approved on:
Pre-requisite course:	
<p>Syllabus</p> <p>Metallurgical Aspects: Introduction to mechanical working, Principles of mechanical working, classification of working processes. Rolling: Forces and geometrical relationship in rolling, classification of rolling mill, Terminology in rolling, variables in rolling, Roll bite conditions. Roll pass design, types of passes, Rolling of blooms, billets, slabs, rods, rails, sheets and structural sections. Rolling defects. Forging: Classification of forging operations, Metallurgical variables associated with forging, Forging equipments and Forging defects. Extrusion: Classification of extrusion processes, Variables in extrusion, Flow of metal during extrusion, Extrusion equipment, Hydrostatic extrusion, Defects in extrusion. Rod and wire Drawing: Mechanism of drawing, Variables in wiredrawing, Defects in rod and wire products Sheet Metal forming: Classification of forming operations, Defects informed products. Miscellaneous working operations: Manufacturing of seamless and welded tubes, rail road wheels and tyres, High energy rate forming.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. Manufacturing Engineering and Technology – SerpeKalpkjian & Steven R. Schmid 2. Manufacturing Science – Gupta & Malik 3. Mechanical Metallurgy – George E. Dieter 4. Engineering Metallurgy – Raymond A, Higgins 	

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-314	Course Name: Polymeric and Ceramic Materials
Credit: 4	L-T-P:3-1-0
Version:	Approved on:
Pre-requisite course:	
<p>Syllabus</p> <p>Plastics-thermoplastics and thermosetting plastics. Classification of thermoplastics. Typical thermoplastic materials of each such class, their properties and applications. Role of plastics in engineering and their importance over other materials. Advantages and disadvantages of plastics. High temperature plastics. Mechanical, thermal and chemical behaviour of plastics. Processing of plastics. Elastomers and their importance in engineering. Various types of elastomers. Mechanical behaviour of elastomers. Damping property of elastomers. Ceramics: Role of ceramics in engineering. Traditional and modern (or technical) ceramics. Classification of modern ceramics as oxides and non-oxide ceramics as well as classification based on their applications. Characteristics of oxide and non-oxide modern ceramic materials. Examples of important technical ceramics. Uses of ceramics as refractories and abrasives. Glass-ceramic materials. Optical fibres.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. J. R. Fried, Polymer Science and Technology, Prentice Hall of India, New Delhi 2. Premanoy Ghosh, Polymer Science and Technology, Tata McGraw Hill 3. Polymer Science by V.R. Gowarikar, N.V. Viswanathan and J.Sreedhar, New Age International (P) Ltd. 4. Brent Strong, Plastics: Materials and Processing, Prentice Hall, N.Jersey. 5. Michel Barsoum, Fundamentals of Ceramics, McGraw Hill Int. 6. David W. Richerson, Modern Ceramic Engineering, Marcel Dekker, Inc. N. York. 	

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-316	Course Name:Materials In Industries
Credit:4	L-T-P:3-1-0
Version:	Approved on:
Pre-requisite course:	
Syllabus High strength materials, Materials for low and high temperature applications. Corrosion and oxidation resistant materials Wear and abrasion resistant materials, Spring materials, Bearing materials Creep and fatigue resistant materials, Superconducting materials.	
Books: <ol style="list-style-type: none">1. E.C. Rollason, Metallurgy for Engineers, ELBS and Edward Arnold (Pub) Ltd.2. Kenneth G. Bundinski and Michael K. Bundinski, Engineering Materials, Prentice – Hall of India Pvt. Ltd.3. E.R. petty, Physical Metallurgy of Engineering Materials, George Allen and Unwin Ltd.4. Ramond A. Higgins, Engineering Metallurgy -Part 1: Applied Physical Metallurgy, ELBS5. B.K. Agarwal, Engineering Materials, Tata McGraw Hill Co. New Delhi6. Metals Handbook, Vol. 1 and Vol.27. C.P. Sharma, Engineering Materials, PHI, New Delhi.	

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-318	Course Name: Heat Treatment
Credit:4	L-T-P: 3-1-0
Version:	Approved on:
Pre-requisite course:	
<p>Syllabus</p> <p>Purpose of heat treatment, heat treatment process variables.Heating and cooling of steels for heat treatment, homogeneity of austenite, austenitic grain size, determination and importance of austenitic grain size.TTT curves-formation and significance CC curves-significance.</p> <p>Heat treatment processes for steels: Annealing, normalizing,hardening,tempering, stress-relieving, spheroidizing, sub-zero treatment, austempering, martempering.Heat treatment defects.Hardenability – concept, determination and significance.</p> <p>Case hardening processes for steels.Thermomechanicaltreatments.Precipitationhardening.Heat treatment of some steels, namely, high speed steels, maraging steels, spring steels and ball bearing steels.</p> <p>Heat treatment of cast irons.Heat treatment of some important alloys of Al, Cu, Ti, Ni and Co.</p> <p>Books:</p> <ol style="list-style-type: none"> 1. ASM, Metals Hand Book: Heat Treating, Vol. 4, 9th Ed., Metals Parks, Ohio. 2. Lakhtin, Yu M., Engineering Physical Metallurgy and Heat Treatment, Mir Publishers, Moscow. 3. Thelning, K.E., Steel and its Heat Treatment, Butterworths, London 4. Krauss George, Principles of Heat Treatment of Steel, ASM, Metals Park, Ohio. 5. Davies, D.J. and Oelmann, L.A., The Structure, Properties and Heat Treatment of Metals, Pitman Books, London. 6. Singh, Vijendra, Heat Treatment of Metals, Standard Publishers distributors, Delhi. 	

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTT-320	Course Name:Steel Making
Credit:4	L-T-P: 3-1-0
Version:	Approved on:
Pre-requisite course:	
Syllabus Steel making: Raw materials for steel making. Principles of steel making – Physical chemistry of carbon, phosphorus, silicon, manganese, sulphur reactions & deoxidation of steel. Bessemer process acid & basic practice. Open Hearth Furnace process Oxygen steel making process. Special processes. Secondary steel making processes. Numerical problems on material and heat balance.	
Books: 1. An Introduction to Modern Steel making -R.H.Tupkary & V.R.Tupkary	

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTP-322	Course Name:Mechanical Working of Metals
Credit:1	L-T-P: 0-0-2
Version:	Approved on:
Pre-requisite course:	
Syllabus <ol style="list-style-type: none">1. To study the lathe machine & materials for various components. To prepare tensile specimen of D type2. To study the wire drawing machine and calculate drawability of wire3. To study quick return mechanism of shaper & prepare surface finish of forged product4. To study about the spinning lathe and form a sheet metal of required shape5. To study the operation of forging hammer & determination of metal losses in forging6. To perform bend test on cold rolled & annealed mild steel strips7. To study about the recrystallization of brass	

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTP-324	Course Name:Experimental Techniques
Credit:1	L-T-P: 0-0-2
Version:	Approved on:
Pre-requisite course:	
Syllabus <ol style="list-style-type: none">1. Optical microscope and sample observation2. Experimental techniques of XRD and analysis of given XRD pattern3. Sample preparation for SEM4. Scanning electron microscopy and its application5. Specimen preparation for TEM studies6. SADP analysis7. Analysis of DSC data8. Analysis of Raman Spectra9. Analysis of FTIR spectra10. Analysis of TGA data	

Template for Course Details

UG	Department: Metallurgical and Materials Engineering
Course Code:MTP-326	Course Name:Extractive Metallurgy
Credit:1	L-T-P: 0-0-2
Version:	Approved on:
Pre-requisite course:	
Syllabus <ol style="list-style-type: none">1. To study the effect of time on roasting of Zinc Sulphide2. To study the effect of temperature on roasting of Zinc Sulphide3. To determine Heat Transfer Coefficient4. To find viscosity of molten metal/ slag by inclined plane method5. To find viscosity of molten metal/ slag by Brookefield viscometer6. To find the efficiency of electrolyte cell for copper refining7. To study the effect of time & temperature on leaching of copper oxide8. To study the effect of time of time on cementation of copper9. To study the effect of time on reduction of mill scale by coal10.To study the effect of temperature on reduction of mill scale by coal	

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UG	Department: Metallurgical and Materials Engineering
Course Code:MTP-328	Course Name: Heat Treatment
Credit:1	L-T-P: 0-0-2
Version:	Approved on:
Pre-requisite course:	
Syllabus <ol style="list-style-type: none">1. Study various heat treatment process, such as normalizing, annealing, QT, etc.2. Effect of annealing temperature on properties of steel3. Effect of quenching temperature on properties of steel4. Effect of various quenching media on properties of steel5. Effect of tempering temperature on properties of steel/Al based alloys6. Jominy end quench testing of steel7. Jominy end quench testing of Al based alloy8. Study of precipitation hardening9. Effect of temperature of cold worked structure	

