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Branch	MECHANICAL ENGINEERING	Semester	III

Course Code	303	Course Name	MATERIAL SCIENCE & ENGINEERING

Course Outcome 1	Explain engineering materials and their properties.	Teach Hrs	Marks
Learning Outcome 1	Classify engineering materials on the basis of mechanical properties.	05	05
Contents	Introduction to engineering materials, classification of engineering materials and their mechanical properties		
Method of Assessment	Paper pen test		
Learning Outcome 2	Illustrate seven basic crystal systems.	06	08
Contents	Unit cell and space lattice, seven basic crystal systems- triclinic, monoclinic, orthorhombic, tetragonal, trigonal, hexagonal, and cubic.		
Method of Assessment	Theory exam		
Learning Outcome 3	Explain crystal structures of metallic elements.	05	08
Contents	Crystal structure for metallic elements: simple cubic, BCC, FCC, HCP and its coordination number, crystal imperfections and its effect on mechanical properties of metals.		
Method of Assessment	Theory exam		

Course Outcome 2	Explain iron carbon equilibrium diagram, TTT curve, heat treatment processes	Teach Hrs	Marks
Learning Outcome 1	Explain solidification, re–crystallization, phase rule, lever rule.	05	05
Contents	Process of nucleation and grain growth, ingot solidification, dendritic and columnar structure, segregation of impurities, grain and grain boundaries, Re-crystallization, phase rule, lever rule and its applications.		
Method of Assessment	Paper pen test		
Learning Outcome 2	Interpret Iron-Carbon equilibrium diagram, TTT curve.	08	08
Contents	Phase transformations– Eutectic Eutectoid, Peritectic, Peritectoid Iron-carbon equilibrium diagram, The solidification and cooling of carbon steels and its structures, effect of carbon content on mechanical properties of steel. TTT curve.		
Method of Assessment	Theory exam		
Learning Outcome 3	Explain heat treatment processes for metals.	08	10
Contents	Objectives of heat treatment, thermal processes: annealing, normalizing, hardening and tempering. Hardening process: Surface hardening, flame hardening, case hardening methods and its uses, limitations and advantages, quenching mediums and their effect on hardness, Hardening defects, hardenability.		
Method of Assessment	Theory exam		

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Branch	MECHANICAL ENGINEERING	Semester	III

Course Code	303	Course Name	MATERIAL SCIENCE & ENGINEERING

Course Outcome 3	Select ferrous and non ferrous metals and its alloy for engineering applications.	Teach Hrs	Marks
Learning Outcome 1	Explain properties and uses of ferrous metals and its alloys.	06	10
Contents	Cast irons, their properties and uses, composition and uses of plain carbon steels, effect of impurities, Alloy steels and its alloying elements, effects of alloying elements on properties and uses of steels.		
Method of Assessment	Paper pen test		
Learning Outcome 2	Explain properties and uses of non ferrous metals and its alloys.	06	10
Contents	Copper and its alloy: brass, bronze, gun metal Its composition, Properties and uses. Aluminium and its Alloys :Hindalium, Duralumin, Y-alloy its composition, properties and uses Nickel and its alloy : nickel-molybdenum, nickel-chromium Its composition, Properties and uses Zinc and its alloy: zinc-Al casting alloy, zinc-lead alloy Its composition, Properties and uses		
Method of Assessment	Theory exam		

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Branch	MECHANICAL ENGINEERING	Semester	III

Course Code	303	Course Name	MATERIAL SCIENCE & ENGINEERING

Course Outcome 4	Explain properties of non metallic materials and plastics.	Teach Hrs	Marks

Learning Outcome 1	Describe the properties and uses of ceramics, rubbers, glasses	06	08
Contents	Introduction, classification, properties, uses of Ceramic Refractories, Rubbers, glasses		
Method of Assessment	Theory exam		
Learning Outcome 2	Compare thermosetting plastic and thermoplastic.	05	06
Contents	Properties, Composition, and uses of plastics: thermosetting plastic and thermoplastic		
Method of Assessment	Theory exam		
Learning Outcome 3	Explain plastic processing methods.	06	10
Contents	Types, uses of different plastic processing methods: injection moulding, blow moulding compression moulding, extrusion, forming , casting		
Method of Assessment	Term Work		

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Course Code	**303**	**Course Name**	**MATERIAL SCIENCE & ENGINEERING**		

Course Outcome 5	Select appropriate metal preservation techniques in a given situation.	Teach Hrs	Marks
Learning Outcome 1	Explain corrosion and its minimization techniques.	04	05
Contents	Nature of corrosion and its causes, methods of minimizing corrosion		
Method of Assessment	Theory exam		
Learning Outcome 2	Describe different metal preservation techniques.	05	07
Contents	Surface coating techniques: hot dipping, electroplating, spraying, diffusion coating, cleaning and finishing of metal surfaces.		
Method of Assessment	Theory exam		