

Government College of Engineering, Salem - 11
Department of Metallurgical Engineering
COs - POs and PSO Mapping
Course Articulation Matrix – 22 Regulation

Semester - V																
22MT501 - Forming Processes																
		Program Outcomes												Program Specific Outcomes		
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Understand and describe the fundamentals of metal forming – Yielding, workability	3	3	2	3	3	1	3	-	-	-	-	2	3	2	2
CO2	Exhibit the knowledge in Rolling and forging processes	3	3	2	2	3	1	2	-	-	-	-	2	3	2	2
CO3	Explain the Extrusion and Drawing processes, their defects and remedies	3	2	2	2	3	1	2	-	-	-	-	2	3	2	2
CO4	Understand the fundamentals of various sheet metal forming	3	2	2	1	3	1	3	-	-	2	-	2	3	2	2
CO5	Understand and describe the fundamentals of Powder metallurgy processes	3	2	2	2	3	2	-	-	-	2	-	2	3	2	2
Average		3	2.4	2	2	3	1.2	2.5	-	-	2	-	2	3	2	2

Semester - V																
22MT502 - Steel Making																
Course Outcomes		Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Specify the particular reactions taking place in the steel making process along with the thermodynamics, kinetics and the mechanism of reaction	3	3	2	3	3	1	3	-	-	-	-	2	3	2	2
CO2	Review the older steel making process and modern electric steel making processes	3	3	2	2	3	1	2	-	-	-	-	2	3	2	2
CO3	Discuss and describe the conventional steel making processes viz. oxygen steel making processes	3	2	2	2	3	1	2	-	-	-	-	2	3	2	2
CO4	Describe the secondary steel making processes, the process following the primary refining of raw pig iron	3	2	2	1	3	1	3	-	-	2	-	2	3	2	2
CO5	Specify the casting process for steel and discuss the ingot defects and their respective remedies	3	2	2	2	3	2	-	-	-	2	-	2	3	2	2
Average		3	2.4	2	2	3	1.2	2.5	-	-	2	-	2	3	2	2

Semester - V																
22MT503 - Corrosion Engineering																
Course Outcomes		Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Explain the electro chemical and thermodynamic principles and to discuss the pourbaix diagram.	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3
CO2	Understand the different forms of corrosion and their causes and remedies.	2	3	3	2	1	-	-	-	-	-	1	1	2	3	3
CO3	Describe the processes of ASTM testing methods and polarization methods.	2	2	3	1	1	-	-	-	-	-	1	2	2	2	2
CO4	Understand the corrosion preventive methods such as mechanical and chemical methods.	1	3	3	3	3	1	2	-	-	-	-	1	1	2	2
CO5	Explain the corrosion in petroleum industries and pipe lines.	1	3	2	2	2	-	-	-	-	-	1	2	3	2	2
Average		1.6	2.6	2.8	2	2	1	2	-	-	-	1	1.4	2.2	2.2	2.4

Semester - V																
22MT504 - Casting Engineering																
Course Outcomes		Program Outcomes											Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Explain the solidification of casting, effect of solidification range, fluidity and factors affecting fluidity	3	2	2	3	2	1	-	-	-	-	-	-	3	2	3
CO2	Discuss the cast iron categories, their types and different heat treatment methods like graphitization, spheroidization etc and denote the ASTM standards for all the varieties	3	3	3	3	3	1	-	-	-	-	-	-	3	2	3
CO3	Discuss the alloying element effect on the steels and mention the precaution to be taken in moulding and melting of steels	3	3	3	3	3	1	-	-	-	-	-	-	3	2	3
CO4	Describe the casting methods employed for fabrication of non-ferrous alloys	3	3	2	2	3	1	2	-	-	-	-	2	3	2	2
CO5	Mention the melting procedure that is adopted for the various alloys like steels, stainless steels, discuss the slag-metal reactions	3	3	2	2	3	1	2	-	-	-	-	2	3	2	2
Average		3	2.8	2.4	2.6	2.8	1	2	-	-	-	-	2	3	2	2.6

Semester - V																
22MT505 - Welding Engineering																
Course Outcomes		Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Explain the working principle, merits and demerits of different arc welding processes.	1	2	2	3	2	-	-	-	-	-	2	3	2	3	3
CO2	Describe the working principle, merits and demerits of different solid state & special welding processes.	1	2	3	1	2	-	-	-	1	-	2	2	2	2	2
CO3	Solve welding heat flow related problems.	1	2	2	1	1	-	-	-	-	-	2	2	3	2	3
CO4	Demonstrate the working principle and importance of brazing and soldering in Joining processes.	1	2	2	1	2	1	-	-	1	-	1	2	2	2	3
CO5	Describe the working principle, merits and demerits of surfacing by welding and cutting processes.	3	1	1	1	2	-	-	-	-	-	1	1	2	2	2
Average		1.4	1.8	2	1.4	1.8	1	-	-	1	-	1.6	2	2.2	2.2	2.6

Semester - V																
22MT506 - Introduction To Instrumentation																
Course Outcomes		Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Understanding the general characterization of a measurement system	1	1	1	1	2	-	-	-	-	-	1	1	3	2	1
CO2	Select Tools suitable for linear, angular and surface measurements	2	1	1	1	3	-	-	-	-	-	1	2	2	2	2
CO3	Understanding force, torque and strain measurements	1	1	1	2	2	-	-	-	-	-	1	1	3	3	3
CO4	Choose instruments for different temperature and pressure measurements.	1	1	1	1	2	-	-	-	-	-	1	1	2	2	1
CO5	Understanding the basics of microprocessors and micro controllers	2	1	1	1	-	-	-	-	-	-	1	2	3	2	1
Average		1.4	1	1	1.4	2.2	-	-	-	-	-	1	1.4	2.6	2.2	1.6

Semester - V																
22MT507 - Heat Treatment Laboratory																
		Program Outcomes												Program Specific Outcomes		
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Conduct and explain the process of annealing and normalizing process on Carbon steels.	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3
CO2	Determine the effect of Quenching and Tempering process of Hardened steel.	2	1	3	2	1	-	-	-	-	-	1	1	2	3	3
CO3	Conduct the process of carburizing of steels.	2	2	1	1	1	-	-	-	-	-	1	2	2	2	2
CO4	Observe and determine the defects in Heat treated steels	1	3	3	3	3	1	1	-	-	-	-	1	1	2	2
CO5	Determine the Age hardening of aluminium alloys	1	3	2	2	2	-	-	-	-	-	1	2	3	2	2
Average		1.6	2.2	2.2	2	2	1	1	-	-	-	1	1.4	2.2	2.2	2.4

Semester - V																
22MT508 - Corrosion Science Laboratory																
Course Outcomes		Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Determine the corrosion rate by weight loss method.	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3
CO2	Analyze the effect of inhibitor on corrosion rate.	2	3	3	2	1	-	-	-	-	-	1	1	2	3	3
CO3	Investigate galvanic corrosion and pitting corrosion.	2	2	3	1	1	-	-	-	-	-	1	2	2	2	2
CO4	Perform electroplating of copper and nickel.	1	3	3	3	3	1	2	-	-	-	-	1	1	2	2
CO5		1	3	2	2	2	-	-	-	-	-	1	2	3	2	2
Average		1.6	2.6	2.8	2	2	1	2	-	-	-	1	1.4	2.2	2.2	2.4

Semester - VII																
22MT701 - Characterization Of Materials																
Course Outcomes		Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Describe the principle of various optical metallographic techniques.	1	2	-	2	3	1	2	1	3	1	1	-	1	3	3
CO2	Demonstrate the Bragg's law of diffraction and the principle of XRD.	2	1	3	-	2	3	3	-	2	-	1	2	2	2	-
CO3	Describe the principle of various electron optical techniques.	-	3	2	1	-	-	-	3	2	2	2	-	-	3	1
CO4	Describe the various surface analyzing techniques.	3	-	1	3	1	2	1	2	1	3	3	3	2	-	3
CO5	State the thermal analysis technique and apply them to determine various thermal events in materials.	1	2	3	-	2	1	-	1	1	-	2	-	1	1	2
Average		1.7	2	2.2	2	2	1.7	1.5	1.5	1.8	2	2.2	2.5	1.5	2.2	2.2

Semester - VII																
22MT7-2 - Introduction To Industrial Management																
Course Outcomes		Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Describe the principle of various optical metallographic techniques.	1	2	-	2	3	1	2	1	3	1	1	-	1	3	3
CO2	Demonstrate the Bragg's law of diffraction and the principle of XRD.	2	1	3	-	2	3	3	-	2	-	1	2	2	2	-
CO3	Describe the principle of various electron optical techniques.	-	3	2	1	-	-	-	3	2	2	2	-	-	3	1
CO4	Describe the various surface analyzing techniques.	3	-	1	3	1	2	1	2	1	3	3	3	2	-	3
CO5	State the thermal analysis technique and apply them to determine various thermal events in materials.	1	2	3	-	2	1	-	1	1	-	2	-	1	1	2
Average		1.4	1.6	1.8	1.2	1.6	1.4	1.2	1.4	1.8	1.2	1.8	1	1.2	1.8	1.8

Semester - VII																
22MT703 - Non-Ferrous Extractive Metallurgy																
		Program Outcomes												Program Specific Outcomes		
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Exposure to different sources non ferrous metals and understand the process principles of pyrometallurgical extraction.	2	3	2	3	3	1	2	-	-	-	-	2	3	2	1
CO2	Understand the process principles of hydrometallurgical extraction.	3	3	2	2	3	1	2	-	-	-	-	2	3	2	1
CO3	Explain the process principles of electrometallurgical extraction and refining of metals.	3	2	2	2	3	1	2	-	-	-	-	2	3	2	1
CO4	Explain the extraction of metals from sulphide and oxide ores.	3	2	2	1	3	1	2	-	-	2	-	2	3	2	1
CO5	Explain the production of precious metals and rare earth metals. Recovery of metals from metallurgical wastes.	3	2	2	2	3	2	2	-	-	2	-	2	3	2	1
Average		2.8	2.4	2	2	3	1.2	2	-	-	2	-	2	3	2	1

Semester - VII																
22MT704 - Material Characterization Laboratory																
		Program Outcomes												Program Specific Outcomes		
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Determine the volume fraction of phases, nodule count and nodularity	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3
CO2	Illustrate the index of XRD pattern.	2	1	3	2	1	-	-	-	-	-	1	1	2	3	3
CO3	Analyze SEM and TEM images	2	2	1	1	1	-	-	-	-	-	1	2	2	2	2
CO4	Interpret DSC curves	1	3	3	3	3	1	1	-	-	-	-	1	1	2	2
Average		1.7	2	2.2	2	2	1	1	-	-	-	1	1.2	2	2.2	2.5

Semester - VII																
22MT706 - Welding And Non-Destructive Testing Laboratory																
		Program Outcomes											Program Specific Outcomes			
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Prepare square butt joints	1	2	2	3	2	-	-	-	-	-	2	3	2	3	3
CO2	Analyze the weld bead characteristics using profile projector	1	2	3	1	2	-	-	-	1	-	2	2	2	2	2
CO3	Understand the basics of GTA and GMA processes	1	2	2	1	1	-	-	-	-	-	2	2	3	2	3
CO4	Perform liquid penetrant, magnetic particle and eddy current inspection	1	2	2	1	2	1	-	-	1	-	1	2	2	2	3
CO5	Interpret the radiograph and study of IIW block	3	1	1	1	2	-	-	-	-	-	1	1	2	2	2
Average		1.4	1.8	2	1.4	1.8	1	-	-	1	-	1.6	2	2.2	2.2	2.6

Semester - VII

22MT707 - Casting And Forming Processes Laboratory

		Program Outcomes												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO1	Determine the strength, collapsibility of the moulding sand	1	-	-	2	2	-	-	-	-	-	1	2	3	2	2
CO2	Roll the different sheets to obtain a reduced thickness of given sheets	1	1	1	2	1	-	-	-	-	-	2	1	3	3	3
CO3	Vary the material properties of cold worked alloys by changing the recrystallisation annealing temperature and time	1	2	2	2	3	-	-	-	-	-	1	2	2	2	3
CO4	Understanding the effect of Recrystallisation annealing temperature & time on cold worked alloys	1	2	3	2	3	-	-	1	1	-	2	1	3	2	3
CO5	Simulating metal flow using a model material	1	1	2	1	-	-	-	-	-	2	1	3	3	3	1
Average		1	1.2	1.6	1.8	2.2	-	-	1	1	2	1.4	1.8	2.8	2.4	2.4

