

Government College of Engineering, Salem - 11

Department of Metallurgical Engineering

COs - POs and PSO Mapping

Course Articulation Matrix – 18 Regulation

Semester - III																	
18MA204 - Fourier Series and Transform																	
Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Acquire the knowledge about Fourier series	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
2	Learn the techniques of solving boundary value problems	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
3	Familiar with the transform techniques.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
Average		3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-

Semester - III

18MT301 - Elements of Physical Metallurgy

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Understand the basic crystal structure, orientation and their influence on macroscopic properties.	1	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	Explain and relate the role of imperfections in strengthening the materials.	1	1	1	-	1	-	-	-	-	-	-	2	-	-	1	-
3	Apply the diffusion mechanism in solidification of materials under different conditions.	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
4	Understand and apply the concept of phase diagrams in equilibrium transformation of materials phases.	1	1	2	1	2	-	-	-	-	-	-	2	-	2	-	1
5	Explain and apply the common strengthening processes viz. Cold working and Hot working and post treatment process.	1	1	2	2	3	-	-	-	-	-	-	2	-	-	2	-
Average		1	1	1.4	1.5	2.0	-	-	-	-	-	-	1.6	1.5	2.0	1.5	1.0

Semester - III

18MT302 - Mineral Dressing, Fuel & Furnace

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Explain the basic mineral dressing principles, processes and equipments used in mineral dressing.	1	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	Understand the chemical processing of ores and gain knowledge on classification, froth floatation and other mineral beneficiation processes.	1	1	1	-	1	-	-	-	-	-	-	2	-	-	1	-
3	Explain the different types of fuels, testing of the fuels and quality valuation of the fuels.	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
4	Understand and explain the basic operation of furnace, different types of furnaces and various methods of heat recovery.	1	1	2	1	2	-	-	-	-	-	-	2	-	2	-	1
5	Gain knowledge on the testing of refractories, explain the various refractories, their properties and applications	1	1	2	2	3	-	-	-	-	-	-	2	-	-	2	-
Average		1	1	1.4	1.5	2.0	-	-	-	-	-	-	1.6	1.5	2.0	1.5	1.0

Semester - III

18MT303 - Metallurgical Thermodynamics and Kinetics

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Explain the basic concepts of thermodynamics and the first law of thermodynamics	1	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	Understand the second and third laws of thermodynamics.	1	1	1	-	1	-	-	-	-	-	-	2	-	-	1	-
3	Know the thermodynamic potential and phase diagram.	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
4	Describe the thermodynamics of the solution and various important equations.	1	1	2	1	2	-	-	-	-	-	-	2	-	2	-	1
5	Discuss the concept of electrochemical processes and kinetics.	1	1	2	2	3	-	-	-	-	-	-	2	-	-	2	-
Average		1	1	1.4	1.5	2.0	-	-	-	-	-	-	1.6	1.5	2.0	1.5	1.0

Semester - III

18MT304 - Testing of Materials

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Understand and explain the material properties, testing machines – their types and testing procedures	1	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	Explain the different types of hardness test and impact tests and their uses.	1	1	1	-	1	-	-	-	-	-	-	2	-	-	1	1
3	Understand the basic concepts of NDT and the principle of techniques like Visual inspection, Liquid penetrant inspection, Magnetic particle inspection and Eddy current testing.	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
4	Explain the principles of radiography and ultrasonics.	1	1	2	1	2	-	-	-	-	-	-	2	-	2	-	-
5	Explain the principle of NDT methods like, Thermal inspection, Holography, Acoustic emission testing, Pressure testing, Leak testing and LASER shearography	1	1	2	2	3	-	-	-	-	-	-	2	-	-	2	-
Average		1	1	1.4	1.5	2.0	-	-	-	-	-	-	1.6	1.5	2.0	1.5	1.0

Semester - III

18CE305 - Engineering Mechanics

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Understand the basics and statics of the particle	3	2	1	-	-	-	1	-	-	-	-	1	2	2	-	-
2	Establish the equilibrium of rigid bodies and draw the free body diagram and mention the supports and the reactions for the diagram	3	2	1	-	1	1	1	1	-	-	-	2	-	-	1	-
3	Determine the areas and volumes of the surfaces using the various theorems and find the moment of inertia of different body shapes	3	3	1	-	-	1	1	1	-	-	-	1	1	-	-	-
4	Comprehend the frictional forces acting on a rolling and the resting body	3	3	2	1	2	1	-	-	-	-	-	2	-	2	-	-
5	Understand the laws of motion, the kinematics of motion and the interrelationship.	2	2	2	2	3	1	-	1	-	-	-	2	-	-	2	-
Average		2.8	2.4	1.4	1.5	2.0	1.0	1.0	1.0	-	-	-	1.6	1.5	2.0	1.5	-

Semester - III

18MT305 - Metallography Laboratory

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Observe and Explain the metallurgical microscope	1	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	Operate the process of sample preparation and mounting	1	1	1	-	-	-	-	-	-	-	-	2	-	-	1	1
3	View and analyze the microstructure of various samples	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
4	Conduct the process of sulphur printing and phosphor printing	1	1	1	-	-	-	-	-	-	-	-	2	-	2	-	-
5	Observe the unconventional structure in steel and determine the ASTM grain size.	1	1	1	-	-	-	-	-	-	-	-	2	-	-	2	-
Average		1	1	1	-	-	-	-	-	-	-	-	1.6	1.5	2.0	1.5	1.0

Semester – IV

18MA302 - Statistics And Numerical Methods

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Learn about statistical averages and fitting the curves by Least Square Method.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
2	Acquire the techniques of interpolation.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
3	Familiar with the numerical differentiation and integration	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
4	Solve the initial value problems for ordinary differential equations.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
5	Learn to find the numerical solution of partial differential equation by using Finite difference method.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
Average		3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-

Semester – IV

18CY301 - Biology for Engineers

		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Appreciate that all types of life have the identical structural units.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
2	Highlight the idea that without catalysis, living beings would not have existed on earth.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
3	Be familiar with the investigation of biological processes at the reduction level.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
4	Figure out that the primary principles of energy transactions are alike in physical and chemical	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
5	Appreciate that all types of life have the identical structural units.	3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-
Average		3	2	-	2	-	-	-	-	-	-	-	-	2	-	-	-

Semester – IV

18MT401 - Mechanical Behaviour of Materials

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Understand and explain the mechanical behaviour of materials.	2	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	Understand the various types of fractures and their mechanisms, fracture mechanics and various theories describing fracture mechanics.	1	1	1	-	1	-	-	-	-	-	-	2	-	-	1	-
3	Understand and explain the fatigue behaviour and the mechanism of fatigue, SN curve and fatigue testing machines.	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
4	Explain the creep behaviour and mechanism, factors affecting creep and creep testing machines.	1	1	2	1	2	-	-	-	-	-	-	2	-	2	-	1
Average		1.8	1.2	1	1.0	2.0	-	-	-	-	-	-	1.4	1.5	2.0	1.0	1.0

Semester – IV

18MT402 - Phase Transformation

Course Outcomes		Program Outcomes												Program Specific Outcomes				
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	
1	Understand mechanism of solidification and transformation	1	-	-	-	-	-	-	-	-	-	-	-	2	-	1	-	2
2	Understand and explain the concept of growth and nucleation of crystal structures and phases in different materials.	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
3	Describe the phase transformation that is controlled by diffusion.	-	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	1
4	Describe the particle coarsening, recovery recrystallization and grain growth, cold and hot working	2	1	-	-	-	-	-	-	-	-	-	-	1	-	1	-	2
5	Describe the various phase transformations that occur due to diffusionless transformation.	-	1	-	-	-	-	-	-	-	-	-	-	2	-	3	-	-
Average		1.6	1.3	-	-	-	-	-	-	-	-	-	-	1.7	-	1.7	-	1.6

Semester – IV

18MT403 - Iron Making

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Understand and define the feeding of raw materials that must be processed before loading into the blast furnace	3	3	2	-	1	1	-	-	-	-	-	1	-	-	-	-
2	Describe the various physical and chemical principles and study the different equilibria and establish the heat and mass balance	3	3	2	-	1	1	-	-	-	-	-	1	-	-	-	-
3	Design the blast furnace by describing the various parts of blast furnace and the reactions taking place in it	3	3	2	-	1	1	-	-	-	-	-	1	-	-	-	-
4	Describe the operational features of the blast furnace, the irregularities in operation	3	3	2	-	1	1	-	-	-	-	-	1	-	-	-	-
5	Alternate iron making process using different methods like low shaft and charcoal fired furnace, production of ferro alloys	3	3	2	-	1	1	-	-	-	-	-	1	-	-	-	-
Average		3	3	2	-	1	1	-	-	-	-	-	1	-	-	-	-

Semester – IV																	
18MT404 - Materials Testing Laboratory																	
		Program Outcomes												Program Specific Outcomes			
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Gain knowledge in practical aspects of sample preparation for testing.	2	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	Hands on experience in operation of Material testing equipment.	1	1	1	-	1	-	-	-	-	-	-	2	-	-	1	-
3	Gain knowledge in various mechanical tests of base materials and weldments	2	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
Average		1.7	1	1	-	1.0	-	-	-	-	-	-	1.3	1.5	2.0	1.0	-

Semester – IV																	
18MTE405 – Machine shop Practice																	
Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Understand the machining concepts and also do the machining operations like facing and turning for the given components.	1	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	Explain the different methods of taper turning and do the taper turning operation using methods like tailstock set over and taper turning attachment.	1	1	1	-	1	-	-	-	-	-	-	2	-	-	1	-
3	Recognize performance and principle of basic drilling operation and also various successful machining of drilling, tapping, reaming and counter Sink by using radial drilling machine.	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
4	Understand the fundamentals of casting and molding principles and its emerging applications and explain the steps for making green sand molding and also build the core by using different types of pattern like split pattern and loose piece pattern.	1	1	2	1	2	-	-	-	-	-	-	2	-	2	-	1
5	Explain the fundamentals of welding process and to make the	1	1	2	2	3	-	-	-	-	-	-	2	-	-	2	-

	joints like butt joint, lap joints and tee joints by using arc welding equipment for industrial applications.																
Average		1	1	1.4	1.5	2.0	-	-	-	-	-	-	1.6	1.5	2.0	1.5	1.0

Semester – V																	
18MT501 - Heat Treatment and Surface Engineering																	
Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Classify the different transformation processes that are taking place in steels with respect to parameter changes.	3	3	2	3	3	1	3	-	-	-	-	2	3	2	2	2
2	Describe the different process of heat treatment that influences the materials properties and also the combination of heat and mechanical properties.	3	3	2	2	3	1	2	-	-	-	-	2	3	2	2	2
3	Define the hardening property and hardenability of steels by applying various diffusion dependent laws and explain the process of carburizing, nitriding, nitro-carburizing etc.	3	2	2	2	3	1	2	-	-	-	-	2	3	2	2	-
4	Explain and analyze the various heat treatment equipments, heat treating medium, temperature for various heat treatment processes and also describe the heat treating furnaces.	3	2	2	1	3	1	3	-	-	2	-	2	3	2	2	-
5	Describe and discuss the heat treatment processes for specific alloys like tool steels, high speed steel and different varieties of cast iron.	3	2	2	2	3	2	-	-	-	2	-	2	3	2	2	-
Average		3	2.4	2	2	3	1.2	2.5	-	-	2.0	-	2	3	2	2	2.0

Semester – V

18MT502 - Steel Making

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	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	-
2	Review the older steel making process and modern electric steel making processes	3	3	2	2	3	1	2	-	-	-	-	2	3	2	2	2
3	Discuss and describe the conventional steel making processes viz. oxygen steel making processes	3	2	2	2	3	1	2	-	-	-	-	2	3	2	2	-
4	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	2
5	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	-	-	2.0	-	2	3	2	2	2.0

Semester – V

18MT503 - Corrosion Engineering

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Explain the electro chemical and thermodynamic principles and to discuss the pourbaix diagram.	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3	-
2	Understand the different forms of corrosion and their causes and remedies.	2	3	3	2	1	-	-	-	-	-	1	1	2	3	3	-
3	Describe the processes of ASTM testing methods and polarization methods.	2	2	3	1	1	-	-	-	-	-	1	2	2	2	2	1
4	Understand the corrosion preventive methods such as mechanical and chemical methods.	1	3	3	3	3	1	2	-	-	-	-	1	1	2	2	-
5	Explain the corrosion in petroleum industries and pipe lines.	1	3	2	2	2	-	-	-	-	-	1	2	3	2	2	3
Average		1.6	2.6	2.6	2	2	1.0	2.0	-	-	-	1.0	1.4	2.2	2.2	2.4	2.0

Semester – V

18MT504 - 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	4
1	Understanding the general characterization of a measurement system	1	1	1	1	2	-	-	-	-	-	1	1	3	2	1	1
2	Select Tools suitable for linear, angular and surface measurements	2	1	1	1	3	-	-	-	-	-	1	2	2	2	2	1
3	Understanding force, torque and strain measurements	1	1	1	2	2	-	-	-	-	-	1	1	3	3	3	1
4	Familiarize the various flow, level and vibration measuring instruments	1	1	1	1	2	-	-	-	-	-	1	1	2	2	1	2
5	Choose instruments for different temperature and pressure conditions	2	1	1	1	-	-	-	-	-	-	1	2	3	2	1	2
Average		1.4	1	1	1.2	2.2	-	-	-	-	-	1	1.4	2.6	2.2	1.6	1.4

Semester – V

18MT505 - Heat Treatment Laboratory

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Conduct and explain the process of annealing and normalizing process on Carbon steels.	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3	1
2	Determine the effect of Quenching and Tempering process of Hardened steel.	2	1	3	2	1	-	-	-	-	-	1	1	2	3	3	2
3	Conduct the process of carburizing of steels.	2	2	1	1	1	-	-	-	-	-	1	2	2	2	2	1
4	Observe and determine the defects in Heat treated steels	1	3	3	3	3	1	1	-	-	-	-	1	1	2	2	1
5	Determine the Age hardening of aluminium alloys	1	3	2	2	2	-	-	-	-	-	1	2	3	2	2	1
Average		1.6	2.2	2.2	2	2	1.0	1.0	-	-	-	1.0	1.4	2.2	2.2	2.4	1.2

Semester – V

18MT506 - Corrosion Science Laboratory

		Program Outcomes												Program Specific Outcomes			
Course Outcomes		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Determine the corrosion rate by weight loss method.	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3	-
2	Analyze the effect of inhibitor on corrosion rate.	2	3	3	2	1	-	-	-	-	-	1	1	2	3	3	-
3	Investigate galvanic corrosion and pitting corrosion.	2	2	3	1	1	-	-	-	-	-	1	2	2	2	2	-
4	Perform electroplating of copper and nickel.	1	3	3	3	3	1	2	-	-	-	-	1	1	2	2	-
Average		1.8	2.5	2.8	2	2	1.0	2.0	-	-	-	1.0	1.3	2	2.3	2.5	-

Semester – V

18EN501 - Communication Skills Laboratory

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Write error free letters and prepare reports	-	-	-	1	-	-	-	-	2	3	-	1	-	-	1	-
2	Deliver welcome address and vote of thanks	-	-	-	2	-	-	-	-	2	3	-	1	-	-	2	-
3	Speak coherently with proper pronunciation and accent	-	-	-	2	-	-	-	-	1	3	-	1	-	-	1	-
4	Avoid common Indianisms and grammatical errors	-	-	-	1	-	-	-	-	2	3	-	1	-	-	2	-
5	Improve repertoire of passive vocabulary	-	-	-	1	-	-	-	-	1	1	-	1	-	-	1	-
6	Answer questions posed by interviewers confidently	-	-	-	2	-	-	-	-	2	3	-	1	-	-	2	-
7	Participate in group discussion effectively	-	-	-	2	-	-	-	-	2	3	-	1	-	-	2	-
8	Undertake online psychometric and IQ test to understand their strengths and weaknesses	-	-	-	2	-	-	-	-	2	3	-	1	-	-	2	-
Average		-	-	-	1.6	-	-	-	-	1.8	2.8	-	1	-	-	1.6	-

Semester – VI

18MT601 - Non-Ferrous Extractive Metallurgy

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	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	1
2	Understand the process principles of hydrometallurgical extraction.	3	3	2	2	3	1	2	-	-	-	-	2	3	2	1	-
3	Explain the process principles of electrometallurgical extraction and refining of metals.	3	2	2	2	3	1	2	-	-	-	-	2	3	2	1	-
4	Explain the extraction of metals from sulphide and oxide ores.	3	2	2	1	3	1	2	-	-	2	-	2	3	2	1	1
5	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	1
Average		2.8	2.4	2	2	3	1.2	2	-	-	2.0	-	2	3	2	1	1.0

Semester – VI

18MT602 - Forming Processes

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Understand and describe the fundamentals of metal forming – Yielding, workability	1	-	-	2	2	-	-	-	-	-	1	2	3	2	2	2
2	Exhibit the knowledge in Rolling and forging processes	1	1	1	2	1	-	-	-	-	-	2	1	3	3	3	3
3	Explain the Extrusion and Drawing processes, their defects and remedies	1	2	2	2	3	-	-	-	-	-	1	2	2	2	3	3
4	Understand the fundamentals of various sheet metal forming	1	2	3	2	3	-	-	1	1	-	2	1	3	2	3	3
5	Understand and describe the fundamentals of Powder metallurgy processes	1	1	2	1	-	-	-	-	-	2	1	3	3	3	1	1
Average		1	1.2	1.6	1.8	2.2	-	-	1.0	1.0	2.0	1.4	1.8	2.8	2.4	2.4	2.4

Semester – VI

18MT603 - Foundry Processes and Metallurgy

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Explain the solidification of casting, effect of solidification range, fluidity and factors affecting fluidity	1	1	1	-	-	-	-	-	-	-	-	1	2	2	-	-
2	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	1	1	1	-	1	-	-	-	-	-	-	2	-	-	1	-
3	Discuss the alloying element effect on the steels and mention the precaution to be taken in moulding and melting of steels	1	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-
4	Describe the casting methods employed for fabrication of non-ferrous alloys	1	1	2	1	2	-	-	-	-	-	-	2	-	2	-	1
5	Mention the melting procedure that is adopted for the various alloys like steels, stainless steels, discuss the slag-metal reactions	1	1	2	2	3	-	-	-	-	-	-	2	-	-	2	-
Average		1	1	1.4	1.5	2.0	-	-	-	-	-	-	1.6	1.2	2.0	1.5	1.0

Semester – VI

18MT604 - Welding Processes and Metallurgy

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Understand the working principle, merits and demerits of different conventional welding processes.	1	2	2	3	2	-	-	-	-	-	2	3	2	3	3	-
2	Understand the working principle, merits and demerits of different solid state welding processes.	1	2	3	1	2	-	-	-	1	-	2	2	2	2	2	-
3	Understand the working principle, merits and demerits of different special welding processes.	1	2	2	1	1	-	-	-	-	-	2	2	3	2	3	-
4	Understand the working principle and importance of allied processes in metals joining.	1	2	2	1	2	1	-	-	1	-	1	2	2	2	3	-
5	Solve welding heat flow related problems. Learn weldability and welding related problems of different materials.	3	1	1	1	2	-	-	-	-	-	1	1	2	2	2	-
Average		1.4	1.8	2	1.4	1.8	1.0	-	-	1.0	-	1.6	2	2.2	2.2	2.6	-

Semester – VI

18MT605 - Welding and Non-Destructive Testing Laboratory

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Prepare square butt joints	1	2	2	3	2	-	-	-	-	-	2	3	2	3	3	-
2	Analyze the weld bead characteristics using profile projector	1	2	3	1	2	-	-	-	1	-	2	2	2	2	2	-
3	Understand the basics of GTA and GMA processes	1	2	2	1	1	-	-	-	-	-	2	2	3	2	3	-
4	Perform liquid penetrant, magnetic particle and eddy current inspection	1	2	2	1	2	1	-	-	1	-	1	2	2	2	3	-
5	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	1.0	-	-	1.0	-	1.6	2	2.2	2.2	2.6	-

Semester – VI

18MT606 - Foundry & Forming Processes Laboratory

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Determine the strength, collapsibility of the moulding sand	1	2	2	3	2	-	-	-	-	-	2	3	2	3	3	-
2	Roll the different sheets to obtain a reduced thickness of given sheets	1	2	3	1	2	-	-	-	1	-	2	2	2	2	2	-
3	Vary the material properties of cold worked alloys by changing the recrystallisation annealing temperature and time	1	2	2	1	1	-	-	-	-	-	2	2	3	2	3	-
4	Understanding the effect of Recrystallisation annealing temperature & time on cold worked alloys	1	2	2	1	2	1	-	-	1	-	1	2	2	2	3	-
5	Simulating metal flow using a model material	3	1	1	1	2	-	-	-	-	-	1	1	2	2	2	-
Average		1.4	1.8	2	1.4	1.8	1.0	-	-	1.0	-	1.6	2	2.2	2.2	2.6	-

Semester – VII

18MT701 - 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	4
1	Describe the principle of various optical metallographic techniques.	3	1	1	1	2	-	-	-	-	-	1	1	2	2	2	-
2	Demonstrate the Bragg's law of diffraction and the principle of XRD.	2	1	1	1	-	-	-	-	-	-	1	2	3	2	2	1
3	Describe the principle of various electron optical techniques.	3	1	1	2	2	-	-	-	-	-	1	1	3	3	2	1
4	Describe the various surface analyzing techniques.	3	1	1	1	2	-	-	-	-	-	1	1	2	2	2	1
5	State the thermal analysis technique and apply them to determine various thermal events in materials.	3	1	1	1	2	-	-	-	-	-	1	1	2	2	2	1
Average		2.8	1	1	1.2	2.0	-	-	-	-	-	1	1.2	2.4	2.2	2	1.0

Semester – VII																	
18MT702 - 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	4
1	Gain knowledge in Basics of the industrial management and the outline of industrial factors.	2	3	2	3	-	3	2	3	2	2	1	2	1	2	3	-
2	Gain knowledge on management functions and to apply it for different situations.	3	2	1	2	1	2	3	2	1	1	2	3	2	3	2	-
3	Develop their learning behaviour in an industrial set up.	1	3	1	1	3	1	1	1	-	-	3	1	3	1	1	-
4	Improve Personality skills, Major determination in profession in group behavior.	-	1	3	1	2	-	-	-	2	2	-	2	-	-	-	-
5	Gain knowledge on modern concepts for better industrial management.	1	2	-	-	-	2	1	2	-	3	2	-	1	1	1	-
Average		1.7	2.2	1.7	1.7	2.0	2.0	1.6	1.6	1.6	2.0	1.6	1.6	1.7	1.7	1.7	-

Semester – VII

18MT703 - Material Characterization Laboratory

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Determine the volume fraction of phases, nodule count and nodularity	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3	-
2	Index the XRD patterns	2	1	3	2	1	-	-	-	-	-	1	1	2	3	3	-
3	Analyze SEM and TEM images	2	2	1	1	1	-	-	-	-	-	1	2	2	2	2	-
4	Interpret DSC curves	1	3	3	3	3	1	1	-	-	-	-	1	1	2	2	-
Average		1.6	2	1.8	1.6	1.6	1.0	1.0	-	-	-	1	1	1.8	2	2.2	-

Semester – VII

18MT704 - Computer Application in Metallurgy Laboratory

Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Calculate the adiabatic flame temperatures of shaft furnace through programming and exhibit the results in graphical representation.	2	1	-	3	3	1	2	-	3	1	-	1	2	3	1	-
2	Demonstrate the usage of various control charts	3	2	-	1	2	2	1	1	1	-	-	-	2	2	2	-
3	Create the concept of enthalpy and free energy change of reaction.	1	3	3	3	3	1	1	-	-	-	-	1	1	2	2	-
4	Predict the scrap requirement of oxygen steel making process	2	2	2	2	3	1	-	-	-	-	1	1	3	2	3	-
Average		2	2	2.5	2.2	2.8	1.2	1.3	1.0	2.0	1.0	1.0	1.0	2	2.2	2	-

Semester - VIII																	
18MT801 - Total Quality Management																	
Course Outcomes		Program Outcomes												Program Specific Outcomes			
		1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
1	Students will be able to gain basic knowledge in total quality management relevant to both manufacturing and service industry including IT sector.	3	2	-	2	1	2	3	2	1	3	2	1	-	1	2	-
2	Students will be able to implement the basic principles of TQM in manufacturing and service based organization.	2	1	1	1	-	3	-	3	3	2	1	2	1	2	3	1
3	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes	1	3	1	1	2	-	1	1	2	1	3	-	1	3	1	1
4	The students will be able to gain the knowledge on various ISO standards and quality systems	1	-	2	3	3	1	2	2	-	-	-	3	2	1	-	2
5	Students will be able to gain basic knowledge in total quality management relevant to both manufacturing and service industry including IT sector.	3	2	-	2	1	2	3	2	1	3	2	1	-	1	2	-
Average		2	2.0	1.3	1.8	1.7	2.0	2.2	2	1.7	2.2	2.0	1.7	1.3	1.6	2.0	1.3