

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.TECH. METALLURGICAL AND MATERIALS ENGINEERING		
Course Title	PHYSICAL METALLURGY		
Course Code	MTPC12	No. of Credits	4
Course Code of Pre-requisite subject(s)	Nil		
Session	Aug. 2020	Section (if, applicable)	NA
Name of Faculty	Dr. A. Muthuchamy	Department	MME
Email	muthuchamy@nitt.edu	Telephone No.	9445939319
Name of Course Coordinator(s) (if, applicable)			
E-mail		Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
<p>Crystallography - co-ordination number, effective number of atoms, packing factor, crystal system relevant to metals, indexing of crystal planes and directions in cubic and hexagonal system, linear and planar density, interplanar spacing.</p> <p>Crystal imperfections and its types; point defects, dislocations - unit dislocation, partial dislocation, motion of dislocations, slip and twin crystal orientation, concept of texture, grain and grain boundaries, methods of grain size determination.</p> <p>Self-diffusion, diffusion in alloy, diffusion mechanisms, activation energy, laws of diffusion- Fick's I law, II law, inter-diffusion and Kirkendall effect, types of diffusion and examples of diffusion; problems based on diffusion.</p> <p>Solid solutions and its types and intermediate phases - Hume Rothery's rule - solidification of metals and alloys, cooling curves, concepts of phase diagrams, coring and segregation as applied to various binary systems, ternary systems.</p> <p>Thermodynamic properties of binary metallurgical systems, free energy- composition curves and their relation to phase diagrams of different types; ternary phase diagram - Gibbs phase triangle.</p>			
COURSE OBJECTIVES			
To develop an understanding of the basic principles of physical metallurgy and apply those principles to engineering applications.			
COURSE OUTCOMES			
At the end of the course, students will be able to		PO Correlation	
		Low	Medium
CO1	Understand the geometry and crystallography of crystalline materials; Identify planes and directions in crystal systems.	5	2,4,12
			High
			1

CO2	Recognize the nature of the crystal defects; estimate the grain size	5	2,4	1
CO3	Apply the concept of diffusion in designing heat treatment	5	2,4	1
CO4	Understand the concept of phase diagram in recognizing the phase changes during heating/cooling	5	2,4	1
CO5	Apply thermodynamic concepts in the construction of phase diagrams	5	2,4	1

COURSE PLAN – PART II				
COURSE OVERVIEW				
The course discuss in detail about the basic principles of physical metallurgy and apply those principles to engineering applications				
COURSE TEACHING AND LEARNING ACTIVITIES				
S.No.	Week/Contact Hours	Topic	Mode of Delivery	
1	I-III	Basics of Crystallography	Online power point+ animated/real videos	
2	IV-VI	Defects and their importance on Physical Metallurgy		
3	VII-IX	Principles of Diffusion		
4	X-XI	Solid Solutions, Basics of Phase diagrams		
5	XII-XIII	Thermodynamics of Binary systems		
COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration (in Mins)	% Weightage
1	Cycle Test I	V	60	20
2	Technical Presentation	IV-X	30	20
3	Cycle Test II	X	60	20
4	Assignment	XI	--	10
CPA	Compensation Assessment*	XIII	60	20
5	Final Assessment *	XVI	120	30 (Max. 30 marks)
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)				
The exit survey will be assessed based on questionnaire prepared by the class teacher and expected attainment is 75% on 1-10 scale basis				
COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)				

MODE OF CORRESPONDENCE (email/ phone etc)

Email/Mobile : Email

COMPENSATION ASSESSMENT POLICY

It will be given during XIII week for those who are absent on genuine grounds for any one of the Cycle Tests.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- **At least 75% attendance in each course is mandatory.**
- Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.

ADDITIONAL INFORMATION

The Course faculty is available for consultation at any time. Students can also contact him at any time through phone call or by mail.

FOR APPROVAL



Course Faculty _____

CC-Chairperson _____



HOD _____

