

DEPARTMENT OF PRODUCTION ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. - PRODUCTION ENGINEERING		
Course Title	PRPC13 METALLURGY AND MATERIALS ENGINEERING		
Course Code	PRPC13	No. of Credits	03
Course Code of Pre-requisite subject(s)	Chemistry I and Chemistry II		
Session	July 2018	Section (if, applicable)	A & B
Name of Faculty	Dr.C.Sathiya Narayanan	Department	PRODUCTION ENGG
Email	csathiya@nitt.edu	Telephone No.	+91-: 80566 15876
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>Art and science of metallurgy-structure of metals and alloys-phase and structural constitutions-Equilibrium diagrams</p> <p>Ferrous metals and alloys-Fe-Fe₃C diagram-Effect of alloying elements in steel, Classification of ferrous alloys and their applications Heat treatment of steel-CCT diagram-Surface hardening process-</p> <p>Non Ferrous Metals Alloys- composition-properties and applications of copper, nickel, lead, tin, zinc, aluminium, Mg and Ti alloys-Heat treatment of Non Ferrous alloy-Non Metallic Metals and alloys-ceramic material- polymers-composite material – Nano-structured materials</p> <p>Testing of Materials-Non-Destructive Testing, Tensile testing, compression testing - Hardness Testing</p> <p>Testing of Materials-Impact testing, Fatigue testing, Creep, other related testing methods characterization of TEM, XRD, SEM</p> <p>Practice:</p> <p>Microstructural study of carbon steels, Cast Iron Jominy end quench test – Heat Treatments on steels – Hardening – Annealing – Normalizing – Tempering Demonstration on SEM/XRD</p>			
COURSE OBJECTIVES			
<ul style="list-style-type: none"> To test materials through various testing methods to evaluate their properties & understand the physical metallurgy. To understand and conduct heat treatment processes for metals 			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
1. Interpret microstructure of engineering materials and explain Equilibrium diagrams.	1,6,9,12		

2. Classify ferrous alloys and their applications with respect to foundry and welding processes	1,6,7,9,12
3. Understand heat treatment processes for alloys, non alloys & summarize testing methods like TEM, XRD, SEM	1,6,9,12

COURSE PLAN – PART II

COURSE OVERVIEW

- Studies regarding Engineering materials and microstructure
- Developing Equilibrium Diagram for Ferrous and Non Ferrous metals
- Testing of materials with different testing methods.
- Working with foundry and welding processes.
- Understanding heat treatment processes for alloys, non alloys
- Analysis of characterization using TEM, XRD, SEM

COURSE TEACHING AND LEARNING ACTIVITIES

S.No	Week	Topic	Mode of Delivery
1	1 st	Art of metallurgy	PPT, C&T VIDEO
2		Science of metallurgy	
3		Structure of metals	
4	2 nd	Structure of alloys-phase	PPT, C&T VIDEO
5		Phase constitutions	
6		Structural constitutions	
7	3 rd	Equilibrium diagrams	PPT, C&T VIDEO
8		Equilibrium diagrams	
9		Ferrous metals and alloys	
10	4 th	CCT diagram	PPT, C&T VIDEO
11		Surface hardening process	
12		Non Ferrous Metals Alloys - composition	
13	5 th	Non Ferrous Metals Alloys - properties	PPT, C&T VIDEO
14		Applications of copper, nickel, lead, tin,	
15		Applications of zinc, aluminium, Mg and Ti alloys	
16		Heat treatment of Non Ferrous alloy	PPT, C&T
17	CYCLE TEST 1		
18	6 th	Heat treatment of Non Metallic Metals and alloys	
19		Heat treatment of ceramic material	

20		Heat treatment of polymers	PPT, C&T VIDEO
21	7 th	Heat treatment of composite material	PPT, C&T VIDEO
22		Heat treatment of Nano structured materials	
23		Testing of Materials-Non-Destructive Testing	
24	8 th	Testing of Materials-Tensile testing, compression testing	PPT, C&T VIDEO
25		Testing of Materials-Hardness Testing	
26		Testing of Materials-Impact testing, Fatigue testing	
27		Testing of Materials- Creep, other related testing	
28	9 th	Characterization of TEM, XRD, SEM	PPT, C&T VIDEO
29		Microstructural study of carbon steels, Cast Iron	
30		Jominy end quench test –	
31	10 th	Heat Treatments on steels – Hardening – Annealing	PPT, C&T VIDEO
32		Heat Treatments on steels – Normalizing – Tempering	
33		Demonstration on SEM/XRD	
34	CYCLE TEST 2		

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle test -1	August 3 rd week	60 Minutes	20
2	Cycle test -2	September 3 rd week	60 Minutes	20
3	Assignment	Once in four weeks	-----	10
CPA	Compensation Assessment*	November 2 nd week	60 Minutes	20
4	Final Assessment *	November 3 rd week	180 Minutes	50

*mandatory; refer to guidelines on page 4

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

1. Feedback from the students during class committee meeting.
2. End semester feedback on course outcomes

COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)

MODE OF CORRESPONDENCE (email/ phone etc)

Phone and E-mail

COMPENSATION ASSESSMENT POLICY

60 minutes examination including all syllabus.

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

- **At least 75% attendance in each course is mandatory.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- Students with **less than 65% of attendance** shall be prevented from writing the final assessment and **shall be awarded 'V' grade.**

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- 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.

The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION

FOR APPROVAL

Course Faculty *C. S. B. N. L. C.* CC-Chairperson *C. S. B. N. L. C.* HOD *[Signature]*

Guidelines:

- a) The number of assessments for a course shall range from 4 to 6.
- b) Every course shall have a final assessment on the entire syllabus with at least 30% weightage.

- c) **One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered. Details of compensation assessment to be specified by faculty.**
- d) **The passing minimum shall be as per the regulations.**
- e) **Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.**
- f) **Absolute grading policy shall be incorporated if the number of students per course is less than 10.**
- g) **Necessary care shall be taken to ensure that the course plan is reasonable and is objective.**