



DEPARTMENT OF PRODUCTION ENGINEERING

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	3
Course Code of Pre-requisite subject(s)	CHEMISTRY I & II		
Session	JULY 2019	Section (if, applicable)	A
Name of Faculty	Dr.C.Sathiya Narayanan	Department	PRODUCTION ENGG
Official Email	csathiya@nitt.edu	Telephone No.	+91-: 80566 15876
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<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</p> <p>Heat treatment of steel-CCT diagram-Surface hardening process-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</p> <p>- Hardness Testing</p> <p>Testing of Materials-Impact testing, Fatigue testing, Creep, other related testing methods</p> <p>characterization of TEM, XRD, SEM</p>			



Practice:

Microstructural study of carbon steels, Cast Iron Jominy end quench test – Heat Treatments on steels – Hardening – Annealing – Normalizing – Tempering , Demonstration on SEM/XRD

COURSE OBJECTIVES

- To test materials through various testing methods to evaluate their properties.
- To conduct heat treatment processes for metals.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. To interpret microstructures of engineering materials and explain equilibrium diagrams	1,3
2. To understand the classification of ferrous alloys and their applications with respect to foundry and welding processes	1,3,4
3. Understand the heat treatment processes for alloys and non alloys	1,3,6
4. To summarize the testing methods like TEM,XRD,SEM	1,3,6

COURSE PLAN – PART II

COURSE OVERVIEW

- Studies regarding structure of metals and alloys-phase.
- Fundamentals of equilibrium diagrams.
- Ferrous and non-ferrous metals and alloys classification and applications.
- Testing of materials-NDT and hardness testing.
- Understanding the characterization of TEM,XRD,SEM
- Analysis of micro structure of carbon.

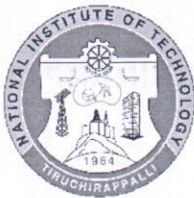
COURSE TEACHING AND LEARNING ACTIVITIES

(Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	1 st	Art and science of metallurgy	PPT, C&T VIDEO
2		Structure of metals and alloys	
3		Phase and structural constitutions- Equilibrium diagrams	
4	2 nd	Ferrous metals and alloys	
5		Fe-Fe ₃ C diagram	



6		Effect of alloying elements in steel	PPT, C&T VIDEO
7	3 rd	Classification of ferrous alloys	PPT, C&T VIDEO
8		Applications of ferrous alloys	
9		Heat treatment of steel	
10	4 th	CCT diagram	PPT, C&T VIDEO
11		Surface hardening process	
12		Non Ferrous Metals Alloys- composition	
13	5 th	Properties and applications of copper, nickel	PPT, C&T VIDEO
14		Properties and applications of lead, tin	
15	CYCLE TEST 1		
16	6 th	Properties and applications of zinc, aluminium	PPT, C&T VIDEO
17		Properties and applications of Mg and Ti alloys	
18		Heat treatment of Non-Ferrous alloy	
19	7 th	Non Metallic Metals and alloys	PPT, C&T VIDEO
20		Ceramic material- polymers	
21		Composite material – Nano-structured materials	
22	8 th	Testing of Materials-Non-Destructive Testing,	PPT, C&T VIDEO
23		Testing of Materials - Tensile testing,	
24		Testing of Materials compression testing - Hardness Testing	
25		Testing of Materials-Impact testing, Fatigue testing	
26	9 th	Fatigue testing, Creep, other related testing methods	PPT, C&T VIDEO
27		Characterization of TEM	
28		Characterization of XRD, SEM	
29	CYCLE TEST 2		
30	10 th	Microstructural study of carbon steels and Cast Iron	PPT, C&T VIDEO
31		Study of Jominy end quench test	
32		Heat Treatments on steels – Hardening	
33	11 th	Heat Treatments on steels- Annealing – Normalizing	PPT, C&T VIDEO
34		Heat Treatments on steels Tempering	
35		Demonstration on SEM/XRD	



COURSE ASSESSMENT METHODS (shall range from 4 to 6)				
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle test -1	August 2 nd 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*	October 2 nd week	60 Minutes	20
4	Final Assessment *	November 1 st 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 (including compensation assessment to be specified)				
<u>COMPENSATION ASSESSMENT POLICY</u>				
60 minutes examination including all syllabus.				
<u>ATTENDANCE POLICY</u> (A uniform attendance policy as specified below shall be followed)				
<ul style="list-style-type: none"> ➤ 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. 				
<u>ACADEMIC DISHONESTY & PLAGIARISM</u>				
<ul style="list-style-type: none"> ➤ Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty. 				



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- 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, IF ANY

FOR APPROVAL

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



Guidelines

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory 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.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- 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.