



**NATIONAL INSTITUTE OF TECHNOLOGY,
TIRUCHIRAPPALLI**

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGG

COURSE PLAN – PART I			
Name of the programme and specialization	BTech Metallurgical and Materials Engg.		
Course Title	Particulate Technology		
Course Code	MTPE08	No. of Credits	03
Course Code of Pre-requisite subject(s)	Nil		
Session	July 2023	Section (if, applicable)	Nil
Name of Faculty	Dr S KUMARAN	Department	MME
Official Email	kumara@nitt.edu	Telephone No.	9944434705
Name of Course Coordinator(s) (if, applicable)	Nil		
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input type="checkbox"/> Core course <input checked="" type="checkbox"/> Elective course		
Syllabus (approved in BoS)			
<p>Introduction – Historical background, important steps in powder metallurgy (P/M) process – Advantage and Limitations of powder metallurgy process and Applications</p> <p>Methods – Production of ceramic powders - powder production by newer methods such as electron beam rotating electrode, rotating electrode process, electron beam rotating disc and the rotating rod process, automation, rapid solidification technique.</p> <p>Characteristics: sampling – chemical composition, particleshape and size analysis, Surface area, packing and flow characteristics, Porosity and density, compressibility, Strength properties. Blending and mixing of metal powders; Compaction of powders, pressure less and pressure compaction techniques - single action and double action compaction, Cold Isostatic compaction, powder rolling, continuous compaction, explosive compaction, Hot temperature compaction – Uni axial hot pressing, Hot extrusion, Spark sintering, Hot isostatic pressing, Injection moulding</p> <p>Sintering – Types – Theory of sintering – process variables, Effects of sintering – Sintering atmospheres – metallographic technique for sintered products. Post sintering operations – Sizing, coining, repressing and resintering, impregnation, infiltration, Heat treatment, steam treatment,</p>			



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machining, joining, plating and other coatings. Products: Porous parts, sintered carbides, cermets, dispersion strengthened materials, electrical applications, sintered friction materials, Atomisation, Mechanical alloying, Metal Injection moulding, Microwave sintering and self-propagating high temperature synthesis.

COURSE OBJECTIVES

To introduce the importance non-conventional processing routes for different materials and its importance for advanced materials manufacturing.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)
1. Describe the basic mechanism of powder production for variety of materials to meet the demand of the research and industrial needs	5L 4M 1&2 H
2. Characterize the various powders (materials) based on the engineering applications	5M 1&3 H
3. Differentiate the processing routes for various powders (materials) and associated technology	1,2 & 5 H
4. Apply the powder metallurgy concepts to design new materials for advanced engineering materials	1 & 3 H
5. Apply the concepts of particulate processing to produce nonconventional materials which are difficult to produce other techniques	1H

COURSE PLAN – PART II

COURSE OVERVIEW

- Introduction to powder metallurgy (P/M) process – Advantage and Limitations of powder metallurgy process and Applications Methods –
- Production of powders – Different methods
- Powder Characterisation and their standard procedure
- Cold Compaction of powders - Techniques and Mechanisms
- Hot compaction – Uni axial hot pressing, Hot extrusion, Spark sintering, Hot isostatic pressing,
- Injection moulding
- Sintering – Theory of sintering
- Post sintering operations – types and their importance
- Products: Porous parts, sintered carbides, cermets, dispersion strengthened materials, electrical applications, sintered friction materials
- Atomisation,
- Mechanical alloying, Microwave sintering and self-propagating high temperature synthesis.



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COURSE TEACHING AND LEARNING ACTIVITIES					(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery		
1	1 st week, August	Introduction to Powder Technology -	Chalk and Board		
2	2 nd week August to 2 nd week September	Powder Manufacturing & Characterization			
3	3 rd week Sept., to 2 nd week October	Compaction Methods			
4	3 rd week October to 2 nd week November	Sintering, Post Sintering and Applications			
COURSE ASSESSMENT METHODS (shall range from 4 to 6)					
S.No.	Mode of Assessment	Week/Date	Duration	% Weightage	
1	Assignment - I	4 th week August	1 hr	10	
2	Written Assessment	4 th Week September	1hr 30 Min	25	
3	Quiz / Viva /Presentation	3rd /4th week October	1 hr	5	
4	Mini Project & Presentation		1hr	10	
CPA	Compensation Assessment	4 th week October	1hr 30 Min	25	
5	Final Assessment	Nov. / Dec	3hrs	50	
COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)					
Student's Feedback					
COURSE POLICY (including compensation assessment to be specified)					
If any students miss the test in genuine ground (production of certificate or letter from the authorized personnel), She / he will be permitted for compensation assessment					
<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. 					



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- 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, IF ANY

Nil

FOR APPROVAL

Course Faculty
Dr S Kumaran

CC- Chairperson
B.Ravisankar

HOD



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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.