



NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech MME V Sem		
Course Title	Metal Forming Technology		
Course Code	MTPC21	No. of Credits	3
Course Code of Pre-requisite subject(s)	MTPC17		
Session	July 2022	Section (if, applicable)	Not Applicable
Name of Faculty	Dr. D. Nagarajan	Department	MME
Official Email	nagarajand@nitt.edu	Telephone No.	0431-250 3712
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>Classification of metal forming processes, hot, cold and warm working, flow curve for materials, effect of temperature, strain rate and microstructural variables; residual stresses, experimental techniques, yielding theories, processing maps</p> <p>Classification of forging processes, forging equipment, forging defects, plane strain forging analysis, open die forging and close die forging operations, force calculations</p> <p>Classification of rolling processes, rolling mills, cold rolling, hot rolling, rolling of bars, billets and shapes, defects in rolled products, gauge control systems, process variables in rolling</p> <p>Types of extrusion, process variables, extrusion defects, force calculation, wire, rod, and tube drawing, lubrication processes</p> <p>Shearing, blanking, bending, stretch forming, deep drawing, defects in formed products, explosive forming, electro-hydraulic and magnetic forming processes, formability diagrams.</p> <p>Severe Plastic Deformation techniques – Brief introduction</p> <p>Powder Consolidation: Cold compaction – die compaction, powder rolling & extrusion, Powder injection moulding, high velocity compaction, Sintering methods</p> <p>Hot Compaction – Vacuum hot pressing, spark plasma sintering, high velocity compaction.</p>			
COURSE OBJECTIVES			
<ul style="list-style-type: none"> ➤ To know the concepts of metal forming and associated technologies ➤ To apply them to the conventional and advanced materials manufacturing for various structural applications 			
MAPPING OF COs with POs			
Course Outcomes	Programme Outcomes (PO)		



	(Enter Numbers only)
1. Apply the concept of plastic deformation for metals and alloys to convert them in to useful shapes for intended engineering applications	[1]
2. Differentiate the various bulk metal forming technology and choose the appropriate one for required engineering applications	[1, 5, 2]
3. Analyze various operational and materials parameters influencing the metal forming quality	[3, 1]
4. Differentiate the various sheet metal forming technology and choose the appropriate one for required engineering applications	[1, 5, 2]
5. Acquire knowledge about powder consolidation techniques	[1, 2, 3, 4]

COURSE PLAN – PART II			
COURSE OVERVIEW			
This course gives an insight of different types of manufacturing/forming processes that are employed in engineering for shaping the metals into useful components. It also describes the design aspects of the forming processes for better productivity.			
COURSE TEACHING AND LEARNING ACTIVITIES			(Add more rows)
S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	1 st week	Classification of metal forming processes, hot, cold and warm working.	Chalk & Talk and PowerPoint presentation (when required)
2.	2 nd week	Flow curve for materials, effect of temperature, strain rate and microstructural variables.	
3.	3 rd week	Residual stresses, experimental techniques, yielding theories, processing maps.	
4.	4 th week	Classification of forging processes, forging equipment. Forging defects, plane strain forging analysis.	
5.	5 th week	Open die forging and close die forging operations, force calculations.	
6.	6 th week	Classification of rolling processes, rolling mills. Cold rolling, hot rolling, rolling of bars, billets and shapes.	
7.	7 th week	Defects in rolled products, gauge control systems, process variables in rolling. Types of extrusion, process variables.	



8.	8 th week	Extrusion defects, force calculation. Wire, rod, and tube drawing, lubrication processes.
9.	9 th week	Shearing, blanking, bending. Stretch forming, deep drawing, defects in formed products.
10.	10 th week	Explosive forming, electro-hydraulic and magnetic forming processes, formability diagrams.
11.	11 th week	Severe Plastic Deformation techniques – Brief introduction.
12.	12 th week	Powder Consolidation: Cold compaction – die compaction, powder rolling & extrusion.
13.	13 th week	Powder injection moulding, high velocity compaction, Sintering methods.
14.	14 th week	Hot Compaction – Vacuum hot pressing.
15.	15 th week	Spark plasma sintering, high velocity compaction.

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Continuous Assessment – 1	6 th week	1 hr	15%
2	Continuous Assessment – 2	10 th week	1 hr	15%
3	Continuous Assessment – 3	15 th week	1 hr	15%
4	Mini Project	13 th week	2 weeks' time for submission	15%
CPA	Compensation Assessment*	16 th week	1 ½ hrs	15%
6	Final Assessment *	14 th December 2022	2 Hours	40%

*mandatory; refer to guidelines on page 4



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

With a questionnaire covering the following aspects: (1 to 10; 1 is poor and 10 is excellent) – Either with the faculty through the questionnaire or through MIS.

1. Whether class was conducted as per schedule and in regular manner.
2. Whether prescribed syllabus was completed
3. Whether sufficient/suitable study material was given to the students on-time.
4. Whether assessment of the students was carried out properly and is satisfactory.

COURSE POLICY (including compensation assessment to be specified)

No compensation examination is conducted, unless prior approval is obtained from the Course Faculty and HoD. For genuine medical reasons, a letter from the Institute Medical Officer is required.

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, IF ANY

NIL

FOR APPROVAL


Course Faculty _____

CC- Chairperson  _____

HOD  _____



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.