

NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

Department of Mechanical Engineering

Course Outline Template			
Course Title	Production Technology 1		
Course Code	MEPC15	No. of credits	4
Department	Mechanical Engineering	Faculty	Dr.S.P.Sivapirakasam
Prerequisites Course Code	NIL		
E-mail ID	spshivam@nitt.edu		
Course Type	B.tech Mechanical Engineering – Compulsory subject		

Course Overview

This course is about manufacturing processes limited to casting, welding and forming. Manufacturing processes can be thought of as the methods by which we convert raw or unfinished materials into useful product for various applications. The course focusses on science underlying the different manufacturing processes. This is required as Mechanical Engineers are encountering more and more challenges which cannot be solved with the existing process technology. However, selection of right manufacturing process based on the essential properties and required material is utmost important for different applications. Therefore it became important to learn the subject by understanding various mechanical properties and its variation with respect to metallurgical aspects of materials.

Course Objectives

- Over view on metal making industry , various mechanical Properties and engineering material.
- Clear understanding on various manufacturing processes and its applications like Casting, welding, sheet metal, rolling, extraction processes, forging, drawing, forming etc
- Improve the capabilities for selection of right manufacturing process based on the essential properties and required material.

Course Outcomes(CO)

Course Outcomes	Aligned Programme Outcomes(PO)																																																																								
<p>On completing this course students will be able to,</p> <ol style="list-style-type: none"> 1. Recognize the different types of casting process and ability to select the apt one for a particular engineering problem. 2. Select suitable manufacturing process for typical components 3. Understand the various welding process 4. Explain the methods of forging, rolling process and drawing. 	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th rowspan="2"></th> <th>Cos/Pos</th> <th colspan="4">Course Outcomes (Cos)</th> </tr> <tr> <th></th> <th>CO1</th> <th>CO2</th> <th>CO3</th> <th>CO4</th> </tr> </thead> <tbody> <tr> <td rowspan="12" style="writing-mode: vertical-rl; transform: rotate(180deg);">Programme Outcomes (Pos)</td> <td>PO1</td> <td>H</td> <td>H</td> <td>H</td> <td>H</td> </tr> <tr> <td>PO2</td> <td>H</td> <td>H</td> <td>H</td> <td>H</td> </tr> <tr> <td>PO3</td> <td>H</td> <td>H</td> <td>H</td> <td>M</td> </tr> <tr> <td>PO4</td> <td>L</td> <td>L</td> <td>L</td> <td>L</td> </tr> <tr> <td>PO5</td> <td>M</td> <td>M</td> <td>M</td> <td>M</td> </tr> <tr> <td>PO6</td> <td>H</td> <td>M</td> <td>M</td> <td>M</td> </tr> <tr> <td>PO7</td> <td>M</td> <td>M</td> <td>M</td> <td>M</td> </tr> <tr> <td>PO8</td> <td>M</td> <td>M</td> <td>M</td> <td>M</td> </tr> <tr> <td>PO9</td> <td>M</td> <td>M</td> <td>M</td> <td>M</td> </tr> <tr> <td>PO10</td> <td>H</td> <td>H</td> <td>H</td> <td>H</td> </tr> <tr> <td>PO11</td> <td>H</td> <td>H</td> <td>H</td> <td>H</td> </tr> <tr> <td>PO12</td> <td>H</td> <td>H</td> <td>M</td> <td>H</td> </tr> </tbody> </table>		Cos/Pos	Course Outcomes (Cos)					CO1	CO2	CO3	CO4	Programme Outcomes (Pos)	PO1	H	H	H	H	PO2	H	H	H	H	PO3	H	H	H	M	PO4	L	L	L	L	PO5	M	M	M	M	PO6	H	M	M	M	PO7	M	M	M	M	PO8	M	M	M	M	PO9	M	M	M	M	PO10	H	H	H	H	PO11	H	H	H	H	PO12	H	H	M	H
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Course Teaching and Learning Activities

Theoretical sessions			
S.No	Week	Topic	Mode of Delivery
1	Week 1	Introduction to manufacturing Feed back Engineering material and properties	PPT & Video Chalk and talk

2	Week 2	Engineering material and properties Fundamental and design of casting process Fluid Flow – Sprue Design – pouring time-gating system design – Riser Design	PPT Chalk and talk Case Studies
3	Week 3	Different types of patterns and casting Pattern allowances and casting defects	PPT & Video Chalk and talk
4	Week 4	Feed back Introduction to welding- The Science	Chalk and talk
5	Week 5	Welding Arc characterisation Arc Physics Metallurgical aspects of welding	PPT & Video Chalk and talk
6	Week 6	Classification of welding process Principle of Gas welding Principle of Arc welding Resistance welding Process	PPT Chalk and talk
7	Week 7	Brazing and soldering Process Thermal cutting of metal/alloys Welding defects Feedback	PPT & Video Chalk and talk
8	Week 8	Classification and principles of forging processes. Forging defects and inspection.	PPT & Video Chalk and talk
9	Week 9	Classification of rolling processes. Rolling mill. Rolling of bars and shapes.	PPT & Video Chalk and talk
10	Week 10	Classification of extrusion processes. Extrusion equipments. Feed Back	PPT & Video Chalk and talk
11	Week 11	Drawing: Drawing of rods, wires and tubes. Sheet metal forming methods: Shearing, Blanking.	PPT & Video Chalk and talk

12	Week 12	Sheet metal forming methods, Spinning: Spinning processes. High Velocity Forming : Explosive forming	PPT & Video Chalk and talk
13	Week 13	Electro hydraulic forming. Magnetic pulse forming. Introduction to Pneumatics and Plastics working. General Discussion of all production processes. Feedback	PPT & Video Chalk and talk

Practical sessions

1	Month 1	Industrial Visit – foundry shop Mould preparation by split pattern method	Industrial Exposure and Experiments
2	Month 2	Industrial Visit Welding demonstration and hands on practice on various welding	Demonstration
3	Month 3	Industrial Visit Forming – Seamless tube Manufacturing	Industrial Exposure
4	Month 4	Industrial Visit Plastic Moulding Process	Industrial Exposure

Course Assessment Methods

S.No	Mode of Assessment	Week/Date	Duration	% Weightage
1.	Cycle test – I (1 ½ chapter)	6 th Week	1 Hour	20 %
2.	Cycle test – II (1 ½ chapter)	11 th Week	1 Hour	20 %
3.	End Exam (Remaining 2 chapter)	16th or 17th Week	2 Hours	30 %
4.	Attendance and participation in class		-	10 %

5.	Lab Assessment a. Report on Industrial visit/ Lab experiments b. Lab exam			10 % 10 %
Total Assessment				100%

Essential Readings: Textbooks, reference books Website addresses, journals, etc.

1. Manufacturing Engineering and Technology, by S Kalpakjian and S.R. Schmid.
2. Jain R.K., Production Technology, Khanna Publishers, 2001
3. Hajra Choudhry, Elements of Workshop Technology, Vol II Dhanpat Rai & Sons, 1992.
4. Roy A Lindberg, Processes and Materials of Manufacture Second Edition, Prntice Hall of India Pvt Ltd.
5. Chapman, W.A.J., Workshop Technology, Vol - II, Oxford & IBH Publishing Co. Ltd., 1986.
6. Amitabha Ghosh and Asok Kumar Mallik, Manufacturing Seince

Course Exit Survey (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

Students can meet the faculty at any stage in the course duration in case he/she finds difficult in understanding the concept.

1. Initial feedback on first week: To finalize the expectation about the course from the students – Based on the feedback the course plan and teaching methodology is finalized.
2. Informal technical discussion about the subject by creating exclusive class students group in social media
3. Second and third feedbacks will be collected from students to express their comments about the course, teaching methodology during 6th week and 11th week respectively, i.e before cycle test I & II - Based on the feedback necessary action will be initiated
4. Final feedback will be collected after completion of the course

Course Policy (including plagiarism, academic honesty, attendance, etc.)

1. Examination:

- a) Students who have missed the first or second cycle test or both can register the Re-Test examination, which shall be conducted soon after the completion of the second cycle test and before the regular semester examination.
- b) The Re- Test examination shall be conducted for 20 marks comprising the syllabus of both first and second cycle tests.

2. Attendance:

- a) The minimum attendance for appearing for the semester examination is 75%.
- b) Those students, whose attendance falls below 75% but above 50% in a subject, shall attend mandatory classes before the semester examinations to qualify to write semester exam.
- c) The students who are having attendance less than 50% has to redo the course in next semester.

3. The Institute follows relative grading with flexibility given to teachers to decide the mark ranges for grades. All assessment of a course will be done on the basis of marks.

4. The passing minimum should be $\frac{\bar{X}}{2}$ or $X_{\max} / 3$, whichever is less Where \bar{X} is the mean of the class and X_{\max} is the maximum mark in the class.

5. The Performance Analysis Committee, which shall meet within seven days after the completion of all examinations, shall analyze the relative cumulative performance of students in all examinations (continuous and end-semester) of a course and finalize the letter grade ranges for the course.

6. The letter grades and the corresponding grade points are as follows,

Letter	S	A	B	C	D	E, R	F, I	V	FF	X
Grade(GP)	10	9	8	7	6	5	0	-	2	-

- a) Students scoring less than the passing minimum marks in the assessments defined in the course plan shall be deemed to have not successfully completed the course and be given an 'F' grade.
- b) Students awarded F grade may REDO the course or opt for formative assessment.
- c) 'Y' indicates lack of required attendance. Students awarded


- 'Y' grade must compulsorily redo the course.
- d) 'I' grade indicates incompleteness of formative assessment.
 - e) A student who gets an 'I' grade must necessarily convert it to a 'R' grade by completing the formative assessment.
 - f) An 'FF' grade is awarded for not completing the formative assessment in the prescribed maximum period of study due to gross negligence. An 'FF' grade will have a grade point of 2 and it will remain on the grade card permanently. This will be used in the CGPA calculations.
 - g) A student who earns a minimum of 5 grade points (a 'E' grade or a 'R' grade) in a course is declared to have successfully completed the course.
 - h) If the student fails to appear for semester examination due to genuine/medical reason, can register for special end semester examination after approval from course teacher & Head of department of Mechanical/Dean(academic). The special end semester examination will be conducted within ten days from reopening of institute for next semester. Students should register their names with course teacher to appear for special end semester examination within three days from reopening of institute for next semester. Grade issued as per the guidelines followed for his/her batch students.
 - i) There will be one reassessment (for 90 marks) for the students who have secured "F" in this course and will be conducted within ten days from reopening of institute for next semester. Students should register their names with course teacher to appear for reassessment within three days from reopening of institute for next semester. If the student satisfies the criteria fixed by the faculty to promote E grade will be given E grade and others given 'F' grade.


Additional Course Information

Students can reach course faculty by fixing appointment through E-mail (spshivam@nitt.edu) or phone (or intercom: 3408).

For Senate's Consideration


Dr.S.P.Sivapirakasam
(Course Faculty)


PAC Chairman
(Dr. F. RAMESH)


Head,
Dept of Mechanical Engineering