

DEPARTMENT OF METALLURGICAL AND MATERIALS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN – PART I			
Course Title	Testing and Characterization of Materials		
Course Code	MTPC29	No. of Credits	3
Course Code of Pre-requisite subject(s)	Nil		
Session	July/ Dec. 2021	Section (if, applicable)	NA
Name of Faculty	K. SIVAPRASAD	Department	MME
Email	ksp@nitt.edu	Telephone No.	0431-2503466
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)			
Refer https://www.nitt.edu/home/academics/curriculum/B.Tech-MME-2018.pdf Page No.69			
COURSE OBJECTIVES			
On completion of the course the students are expected to be knowledgeable in microstructure evaluation, crystal structure analysis, electron microscopy, chemical/thermal Analysis, static and dynamic mechanical testing methods.			
COURSE OUTCOMES (CO)			
Course Outcomes	Aligned Programme Outcomes (PO)		
At the end of the course student will be able to perform various mechanical testing of materials and follow relevant standards.	[1, 2]		
Know the principles of metallurgical microscope, X-ray Diffractometer (XRD), Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM) and Thermal analysis.	[1, 11]		
Describe the various sample/specimen preparation techniques for XRD, SEM, TEM and thermal analysis and quantitative metallography. Determine crystal structure, lattice parameter, phase identification, solvus line estimation and residual stress analysis using XRD.	[1, 2, 11]		
Describe the modes of SEM operation, study the surface topography using different modes, elemental compositional analysis and spectroscopy studies.	[1, 11]		
Select the appropriate tool to characterize the material by knowing its merits and demerits. Analyze the material in atomic level by using different modes of TEM like bright and dark field, imaging, selected area diffraction.	[1, 2, 5, 11]		
Evaluate the specimen by thermal, calorimetric and gravimetric analysis.	[11]		

COURSE PLAN – PART II

COURSE OVERVIEW

COURSE TEACHING AND LEARNING ACTIVITIES

Sl. No.	Week/Contact Hours	Topic	Mode of Delivery
1.	1 st week	Introduction to hardness testing and other indentation testing – principle, practice, precautions and uses	Online
2.	2 nd week	Introduction to tensile and compression testing methods – sample types, dimensions, stress-strain diagrams	Online
3.	3 rd week	Interpretation of tensile properties; Shear, bend and torsion testing methods by following standards	Online
4.	4 th week	Dynamic testing methods – Izod and Charpy;	Online
5.	5 th week	Fatigue and Creep studies on materials	Online
6.	6 th week	Optical microscopy – Bright field, Dark field; Polarized and interference microscopy	Online
7.	7 th week	Estimation of grain size; specimen preparation techniques and quantitative microscopy	Online
8.	8 th week	Thermogravimetric analysis, Differential scanning calorimetry, Differential thermal analysis	Online
9.	9 th week	Scanning electron microscopy – modes of operation; imaging principles; applications.	Online
10.	10 th week	Special techniques in SEM like EBSD, EDS, WDS and EPMA	Online
11.	11 th week	Transmission electron microscopy – working principles, imaging mode and diffraction modes – pattern analysis	Online
12.	12 th week	X-ray diffraction analysis – introduction, basics & theory	Online
13.	13 th week	XRD pattern indexing and potential applications	Online
14.	14 th week	Identification of crystal structure, quantification of phases, order-disorder transformations, solvus line determination, residual stress analysis etc.	Online

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Written test 1 (Objective type)	6 th week	1hr	20
2	Written test 2 (Objective type)	10 th week	1hr	20
3	Assignment	12 th week	10 days time	30
4	Final Assessment	15 th or 16 th week	3hrs	30
CP A	Compensation Assessment*	13 th week	1hr	20

*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: (1 to 10; 1 is poor and 10 is excellent) – Administration should create provision for students to enter their feedback in MIS.

1. Whether class schedule is as per schedule
2. Whether assessment of candidates is impartial
3. Whether prescribed syllabus is completed
4. Whether sufficient/suitable study material is provided

COURSE POLICY (preferred mode of correspondence with students, policy on attendance, compensation assessment, , academic honesty and plagiarism etc.)

MODE OF CORRESPONDENCE (email/ phone etc)

Through email or mobile

ATTENDANCE

Minimum 75%attendance is compulsory

COMPENSATION ASSESSMENT

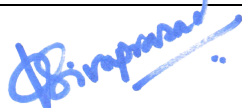
There is only one compensation assessment for 20 marks only for those students, who miss the written test 1 and written test 2. End semester examination is on complete syllabus.

ACADEMIC HONESTY & PLAGIARISM

Students are expected to maintain academic honesty.

ADDITIONAL INFORMATION

FOR APPROVAL



Dr. K. Sivaprasad
Course Faculty _____



CC-Chairperson _____



HOD _____

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. This is not applicable for project work/industrial lectures/internship.**
- d) The policy for attendance for the course should be clearly specified.
- e) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.