



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

COURSE PLAN – PART I			
<b>Name of the programme and specialization</b>	<b>B.TECH. METALLURGICAL AND MATERIALS ENGINEERING</b>		
<b>Course Title</b>	<b>Transport Phenomena</b>		
<b>Course Code</b>	<b>MTPC17</b>	<b>No. of Credits</b>	<b>3</b>
<b>Course Code of Pre-requisite subject(s)</b>	<b>Nil</b>		
<b>Session</b>	<b>Jan 2020</b>	<b>Section (if, applicable)</b>	<b>NA</b>
<b>Name of Faculty</b>	<b>Dr. V. Karthik</b>	<b>Department</b>	<b>MME</b>
<b>Email</b>	<b><u>karthikv@nitt.edu</u></b>	<b>Telephone No.</b>	<b>9788444987</b>
<b>Name of Course Coordinator(s) (if, applicable)</b>	<b>NA</b>		
<b>E-mail</b>		<b>Telephone No.</b>	
<b>Course Type</b>	<input checked="" type="checkbox"/> <b>Core course</b> <input type="checkbox"/> <b>Elective course</b>		
<b>Syllabus (approved in BoS)</b>			
Fluid Flow - Viscosity – differential mass and momentum balances –overall momentum balance – mechanical energy balance – applications  Heat Transfer – heat conduction equation – applications – convective heat transfer – concept of heat transfer coefficient – radiative heat transfer  Mass Transfer - Diffusion: Diffusivity in gases, liquids, solids – convective mass transfer –concept of mass transfer coefficient  Dimensionless analysis – Rayleigh’s method, Buckingham method – use of differential equations – similarity criteria – applications in physical modeling  Reaction Kinetics - Basic definitions & concepts – reaction mechanisms – reaction rate theories – slag–metal reaction			
<b>COURSE OBJECTIVES</b>			
To understand basic concepts related to heat flow, fluid flow, mass transfer, in the context of metallurgical processes; to become familiar with the mathematical treatment and equations related to above transport phenomena; to comprehend the science behind process modelling.			
<b>COURSE OUTCOMES (CO)</b>			
<b>Course Outcomes</b>			<b>Aligned Programme Outcomes (PO)</b>
At the end of the course student will be able to:			
1. Understand the scientific aspects related to heat flow, fluid flow and mass transfer			1,2

2. Learn about related equations, in the above context	1,2,8,10
3. Understand how transport concepts and equations are used in the modelling of metallurgical processes	1,2,11
4. Obtain the ability to convert actual (descriptive) processes into appropriate equations and then attempt to solve the same	1,5,8,9,10,11
5. Obtain the basic skills essential for process modeling	1,11
6. Obtain the ability to carry out complex process calculations	5,8

### COURSE PLAN – PART II

#### COURSE OVERVIEW

The course discuss in detail about the transport of momentum, heat and mass with relevance to the metallurgical and materials engineering. Importance of dimensional analysis of process modeling of metallurgical processes.

#### COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	I-III	Transport of momentum; mass, momentum and energy balance in fluid flow	Class room lecture with both chalk & talk and power point+ animated/real videos
2	IV-VI	Heat transport; modes of heat transfer; numerical problems on various modes of heat transfer	
3	VII-IX	Mass transport; Ficks laws; convective mass transfer, metallurgical examples	
4	X-XI	Dimensional analysis; different methods; applications	
5	XII-XIII	Reaction kinetics; slag-metal reaction; reaction rate theories	

#### COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assignment I	IV	--	10
2	Cycle Test I	V	60	20
3	Technical Presentation	IV-X	20	10
4	Cycle Test II	X	60	20
5	Assignment II	XI	--	10
CPA	Compensation Assessment	XIII	60	20
6	Final Assessment	XVI	150	30



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

The exit survey will be assessed based on the questionnaire prepared by the class teacher and expected attainment is 75% on 1-10 scale basis

**COURSE POLICY (preferred mode of correspondence with students, compensation assessment policy to be specified)**

**MODE OF CORRESPONDENCE (email/ phone etc)**

Email/Mobile/Whatsapp

**COMPENSATION ASSESSMENT POLICY**

It will be given during XIII week for those who are absent on genuine grounds for any one of the Cycle Tests.

**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.

**ADDITIONAL INFORMATION**

The Course faculty is available for consultation at any time. Students can also contact him at any time through whatsapp or phone call or by mail.

**FOR APPROVAL**

  
Course Faculty

(V. KARTHIK)

  
CC-Chairperson

(Dr. B. Ravikiran)

  
HOD

(Dr. S. Kumar)