

GUJARAT TECHNOLOGICAL UNIVERSITY

CHEMICAL ENGINEERING (COMPUTER AIDED PROCESS DESIGN) (16)

ADVANCED TRANSPORT PHENOMENA (ATP)

SUBJECT CODE: 2741601

M.E. 4TH SEMESTER

Type of course: Major elective-IV (M.E.CAPD)

Prerequisite: Knowledge of types of flow & its behaviour according to isothermal & non isothermal system.

Rationale: Understand the Fundamental Transport Phenomena

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P	C	Theory Marks		Practical Marks				
				ESE (E)	PA (M)	ESE (V)		PA (I)		
						ESE	OEP	PA	RP	
3	2#	0	4	70	30	30	0	10	10	150

Content:

Sr. No.	Content	Total Hrs	% Weightage
1	Vector & tensor algebra	6	10
2	Momentum Transport: Equations of change for isothermal systems, Turbulent flow, Interphase transport in isothermal systems. Macroscopic balances for isothermal systems.	12	20
3	Energy Transport: Equations of change for non-isothermal systems. Turbulent flow. Energy transport by Radiation. Macroscopic balances for Non-isothermal systems.	12	20
4	Mass Transport: Equations of change for multicomponent systems. Turbulent flow. Interphase in multicomponent systems. Macroscopic balances for multicomponent systems.	12	20
5	Simultaneous heat, mass and momentum transfer.	4	10
6	Overview of computational fluid Dynamics (CFD).	4	10
7	Process design based on understanding of transport phenomena.	4	10

Reference Books:

1. Bird R., Stewart W. and Light Foot E., "Transport Phenomena", John Wiley, 1984.
2. Slattery J., "Momentum, Energy and Mass Transfer in continua", Friger Publication Co., NY, 1981.
3. Bennett C. Myers J., "Momentum Heat and Mass Transfer", McGraw Hill, 1985.
4. Ranade Vivek, "CFD in Reactor Design", Academic Press, 1999.
5. Slattery, J. C., "Advanced transport phenomena", Cambridge University Press (2001)

Course Outcome:

After completing this course the student must demonstrate the knowledge and ability to:

1. Learn about the Vector & tensor algebra.
2. Understand the Equations of change for isothermal & Non- isothermal systems.
3. Learn about Macroscopic balances for isothermal & Non- isothermal systems.
4. Study about the Simultaneous heat, mass and momentum transfer,
5. Learn the Overview of computational fluid Dynamics (CFD)..
6. Know about Process design based on understanding of transport phenomena.

List of Tutorials:

Tutorials/Presentation/Practicals based on above topics

List of Open Source Software/learning website:

- <http://www.eolss.net/>
- <http://www.wileyindia.com/>
- <http://chemeng.iisc.ernet.in/kumaran/courses/chap1.pdf>

Review Presentation (RP): The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website.