

## Madhav Institute of Technology & Science, Gwalior

(A Govt. Aided UGC Autonomous & NAAC accredited Institute Affiliated to RGPV, Bhopal)

### Chemical Engineering

#### Course Outcome Attainment & Gap Analysis of Jan - June 2021 Semester

Semester	S. No.	Name of the Course & Code	Course Outcomes		CO Attainment						Corrective Actions	
					Direct attainment (%)	Attainment Level	Indirect attainment	Attainment Level	Overall	Target		Gap
<b>Semester IV</b>	<b>1</b>	<b>Heat Transfer (170402)</b>	CO1	<b>Explain</b> the mechanism of heat transfer by conduction, convection and radiation	74.5149	3	66.67	2.7	<b>2.94</b>	2.5	<b>-0.44</b>	Questions with more difficulty level to be included
			CO2	<b>Interpret</b> the dimensionless Numbers applicable in heat transfer and their physical significance	76.8855	3	75.00	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
			CO3	<b>Apply</b> the concept of the individual and overall heat transfer coefficient	74.8177	3	61.11	2.1	<b>2.82</b>	2.5	<b>-0.32</b>	Questions with more difficulty level to be included
			CO4	<b>Analyze</b> the design & operation of Heat Exchangers	71.9945	3	63.89	2.4	<b>2.88</b>	2.5	<b>-0.38</b>	Questions with more difficulty level to be included
			CO5	<b>Calculate</b> the temperature profile of the various types Heat exchangers	78.5651	3	69.44	2.9	<b>2.98</b>	2.5	<b>-0.48</b>	Questions with more difficulty level to be included
			CO6	<b>Solve</b> the problems of Evaporators and condensers	77.8496	3	66.67	2.7	<b>2.94</b>	2.5	<b>-0.44</b>	Questions with more difficulty level to be included
	<b>2</b>	<b>Heat Transfer Lab (170402)</b>	CO1	<b>Analyze</b> the various modes of heat transfer in chemical industries	76	3	93	3	<b>3</b>	2.5	<b>-0.5</b>	Application based viva to be conducted
			CO2	<b>Optimize</b> design of the heat exchangers for industrial chemical processes	70	3	87	3	<b>3</b>	2.5	<b>-0.5</b>	Application based viva to be conducted
			CO3	<b>Examine</b> the heat transfer coefficients in chemical industries.	76	3	93	3	<b>3</b>	2.5	<b>-0.5</b>	Application based viva to be conducted
			CO4	<b>Analyze</b> the application of advanced heat exchanging equipment in chemical industry	70	3	87	3	<b>3</b>	2.5	<b>-0.5</b>	Application based viva to be conducted

		CO5	<b>Analyze</b> the different laws of basic heat transfer used in chemical processes	85	3	87	3	3	2.5	-0.5	Application based viva to be conducted
3	<b>Mass Transfer - I (170403)</b>	CO1	<b>Apply</b> the basics of absorption, humidification, drying, crystallization & the principle of diffusion underlying them.	81	3	81.0	3	3	2.5	-0.5	Application based tutorial to be given
		CO2	<b>Choose</b> the necessary information useful in design of mass transfer equipment.	82	3	81.0	3	3	2.5	-0.5	More HOT questions to be included
		CO3	<b>Analyze</b> the different cases of diffusion phenomena.	81	3	78.6	3	3	2.5	-0.5	Application based tutorial to be given
		CO4	<b>Apply</b> the theoretical concepts for solving practical problems.	83	3	83.3	3	3	2.5	-0.5	Application based tutorial to be given
		CO5	<b>Interpret</b> psychometric charts & equilibrium data.	82	3	81.0	3	3	2.5	-0.5	Application based tutorial to be given
		CO6	<b>Propose</b> favorable conditions for a separation to be carried out.	80	3	71.4	3	3	2.5	-0.5	Application based tutorial to be given
		4	<b>Mass Transfer - I Lab (170403)</b>	CO1	<b>Analyze</b> the various applications of modern separation technique	80.5	3	70	3	3	3
CO2	<b>Design</b> novel drying equipments for intended application.			80.5	3	73	3	3	3	0	Practical oriented quizzes to be scheduled
CO3	<b>Evaluate</b> the diffusion application in chemical industries			82	3	77.8	3	3	3	0	Practical oriented quizzes to be scheduled
CO4	<b>Analyze</b> the ability to know the application of humidification operation in chemical industry			82.67	3	77.8	3	3	3	0	Practical oriented quizzes to be scheduled
CO5	<b>Evaluate</b> the appropriate application equipment in a process			79.67	3	72.2	3	3	3	0	Practical oriented quizzes to be scheduled
CO6	<b>Analyze</b> the design of the mass transfer equipments used in crystallization processes			82.67	3	83.3	3	3	3	0	Practical oriented quizzes to be scheduled
5	<b>Instrumentation &amp; Process Control (170404)</b>	CO1	<b>Explain</b> the basic principles & importance of process control in industrial process plants.	78.535	3	85	3	3	2.5	-0.5	More HOT questions to be included
		CO2	<b>Explain</b> the use of block diagrams & the mathematical basis for the design of control systems.	79.5185	3	79	3	3	2.5	-0.5	More HOT questions to be included
		CO3	<b>Identify</b> controller that can be used for specific problems in chemical industry.	81.552	3	67	2.7	2.94	2.5	-0.44	More HOT questions to be included

Seme ster VI		CO4	Analyze the Dynamic behavior of first and second order control system.	76.6745	3	73	3	3	2.5	-0.5	More HOT questions to be included	
		CO5	Compare the Linear open loop and Closed loop system.	78.2425	3	70	3	3	2.5	-0.5	More HOT questions to be included	
		CO6	Test the stability of a given system & Analyze the transient and frequency response of systems.	81.125	3	73	3	3	2.5	-0.5	More HOT questions to be included	
	6	Mechanical Design of Process Equipment (170405)	CO1	Recall basics of Mechanical Design in the industrial problems	63.59	2.4	73	3	2.52	3	0.48	More lectures to be engaged
			CO2	Experiment with different heads, closures and other accessories involved during design.	67.901	2.8	82.5	3	2.84	3	0.16	tutorial sessions to be scheduled
			CO3	Decide on general design considerations	65.545	2.5	65	2.5	2.5	3	0.5	tutorial sessions to be scheduled
			CO4	Make use of IS Codes in design of Pressure vessel	66.091	2.6	72	3	2.68	3	0.32	tutorial sessions to be scheduled
			CO5	Distinguish between design procedures for Tall Vertical & Horizontal Vessels	64.94	2.5	73.5	3	2.6	3	0.4	More lectures to be engaged along with mini project
			CO6	Outline the design of bolted flanges for determining suitable material of construction for specific service.	65.706	2.6	69	2.9	2.66	3	0.34	Detailed notes to be provided
	7	Process Control Lab (170407)	CO1	Tell the importance of process control in industrial process plants	73	3	75	3	3	3	0	Application based viva to be conducted
			CO2	Explain the working of a flow control trainer and its applications	82	3	75	3	3	3	0	Application based viva to be conducted
			CO3	Explain the working of a level control trainer and its applications	76	3	71	3	3	3	0	Application based viva to be conducted
			CO4	Identify controller that can be used for specific problems in chemical industry	70	3	71	3	3	3	0	Application based viva to be conducted
			CO5	Analyze the Dynamic behavior of first and second order control system	71	3	83	3	3	3	0	Application based viva to be conducted
			CO6	Differentiate between interaction and non-interacting systems	72	3	75	3	3	3	0	Application based tutorial to be given
	1	Process Modeling & Simulation (170602)	CO1	Explain the basic concepts involved in process analysis & simulation.	65.944	2.6	80.56	3	2.68	3	0.32	Explanation should be given with illustration

		CO2	<b>Formulate</b> a chemical engineering problem as a mathematical model from basic engineering principles.	66.6335	2.7	77.78		3	2.76	3	0.24	Tutorial to be given along with practice problems
		CO3	<b>Apply</b> the conservation equations in various physio – chemical systems.	75.9785	3	75		3	3	3	0	More HOT questions to be included
		CO4	<b>Examine</b> the experimental data for further processing.	76.4645	3	77.78		3	3	3	0	More HOT questions to be included
		CO5	<b>Compare</b> various iterative convergence methods and numerical solution of ODEs.	78.8215	3	81.94		3	3	3	0	More HOT questions to be included
		CO6	<b>Analyze</b> different approaches involved in dynamic modelling of process systems.	63.161	2.3	73.61		3	2.44	3	0.56	Tutorial to be given along with practice problems
2	<b>Process Modeling &amp; Simulation Lab (170602)</b>	CO1	<b>Develop</b> fundamental understanding of chemical engineering problems	85	3	76		3	3	3	0	Practical oriented quizzes to be scheduled
		CO2	<b>Develop</b> dynamic model equations of chemical engineering systems	79	3	69.33	2.9		2.98	3	0.02	More lab sessions to be conducted
		CO3	<b>Solve</b> the differential equations by using different convergence methods	83	3	73.33	3		3	3	0	More HOT questions to be included
		CO4	<b>Develop</b> MATLAB code to solve dynamic model equations	84	3	73.33	3		3	3	0	More HOT questions to be included
		CO5	<b>Analyze</b> the plotted data generated by MATLAB code	84	3	74.67	3		3	3	0	More HOT questions to be included
		CO6	<b>Analyze</b> the variation of state variable with respect to time	86	3	74.67	3		3	3	0	More HOT questions to be included
3	<b>DE 1: Process Equipment Design (170611)</b>	CO1	<b>Explain</b> the basics of process equipment design and important parameters of equipment design	77.1825	3	83.33		3	3	2.5	-0.5	More HOT questions to be included
		CO2	<b>Describe</b> the scale up criteria	78.5535	3	77.78		3	3	2.5	-0.5	More HOT questions to be included
		CO3	<b>Explain</b> the various supports and closures and their appropriate selections for given process equipment	74.3345	3	81.48		3	3	2.5	-0.5	More HOT questions to be included
		CO4	<b>Analyze</b> the concept of internal and external pressure conditions (Tube and Shell side)	80.2235	3	75.93		3	3	2.5	-0.5	More HOT questions to be included

		CO5	<b>Develop</b> the designing concept and flow-sheeting (for given process)	77.0655	3	83.33	3	<b>3</b>	2.5	<b>-0.5</b>	More HOT questions to be included
		CO6	<b>Design</b> the various process equipments	73.3285	3	77.78	3	<b>3</b>	2.5	<b>-0.5</b>	More HOT questions to be included
<b>4</b>	<b>DE 1: Polymer Technology (170614)</b>	CO1	<b>Check</b> processing technique for the given polymer for a particular application	80.552	3	82.67	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO2	<b>Describe</b> different types of processing techniques of polymers	77.812	3	79.67	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO3	<b>Explain</b> the structure and properties of polymers	78.292	3	82.67	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO4	<b>Explain</b> the forming techniques for plastics (compression molding, injection molding.... )	80.2755	3	64.25	2.4	<b>2.88</b>	2.5	<b>-0.38</b>	Questions with more difficulty level to be included
		CO5	<b>Test</b> the synthesis of polymers and their commercial applications.	76.896	3	68.5	2.8	<b>2.96</b>	2.5	<b>-0.46</b>	Questions with more difficulty level to be included
		CO6	<b>Explain</b> the properties that these materials posses, including their molecular, physical, chemical, thermal, mechanical and electrical properties.	75.8005	3	79.33	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
<b>5</b>	<b>OC 1: Fuels &amp; Combustion (900109)</b>	CO1	<b>Explain</b> the origin of fossil fuels	77.1835	3	82.05	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO2	<b>Classify</b> fossil fuels	77.8545	3	82.91	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO3	<b>Analyze</b> the various alternate energy options available in earth	71.027	3	83.76	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO4	<b>Explain</b> various fuel-processing techniques used in solid, liquid and gaseous fuels	77.048	3	84.61	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO5	<b>Explain</b> the characterization techniques of fuels	73.0705	3	82.91	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included

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		CO6	<b>Examine</b> quality of fuels based on its properties and possible utilization	74.523	3	82.91	3	3	2.5	-0.5	Questions with more difficulty level to be included	
6	<b>OC 1: Nanotechnology (900110)</b>	CO1	<b>Analyze</b> the nanostructures and their properties	80.0175	3	75	3	3	2.5	-0.5	Target to be increased	
		CO2	<b>Examine</b> the principles of processing, manufacturing of nanomaterials.	83.3105	3	75	3	3	2.5	-0.5	Target to be increased	
		CO3	<b>Examine</b> the nanomaterials and nanostructures characterization techniques.	69.958	3	71	3	3	2.5	-0.5	Target to be increased	
		CO4	<b>Examine</b> the mechanical properties of bulk nanostructured metals, alloys, nanocomposites and carbon nanotubes.	73.333	3	71	3	3	2.5	-0.5	Target to be increased	
		CO5	<b>Analyze</b> the structure of materials down to the nanometer (atomic) level, with particular emphasis on crystal structure, nano-defects and their kinetics	80.43	3	83	3	3	2.5	-0.5	Target to be increased	
		CO6	<b>Analyze</b> the application of nanomaterial and nanostructure.	78.367	3	75	3	3	2.5	-0.5	Target to be increased	
7	<b>Minor Project - II (170607)</b>	CO1	<b>Explain</b> the basics of various unit operations & unit processes.	86	3	80.5	3	3	3	0	Practical oriented topics should be encouraged	
		CO2	<b>Outline</b> the necessary features to be utilized in undergoing any project work.	85	3	80.5	3	3	3	0	Practical oriented topics should be encouraged	
		CO3	<b>Choose</b> among experimental work, modeling & a combination of both for any problem statement.	80.67	3	82	3	3	3	0	Practical oriented topics should be encouraged	
		CO4	<b>Examine</b> the literature for useful information regarding the project.	76.25	3	82.67	3	3	3	0	Practical oriented topics should be encouraged	
		CO5	<b>Justify</b> the background for selecting a suitable project title.	75	3	79.67	3	3	3	0	Practical oriented topics should be encouraged	
		CO6	<b>Plan</b> the work in phases for accomplishment of the project objective.	73	3	82.67	3	3	3	0	Practical oriented topics should be encouraged	

8	Disaster Management (100007)	CO1	<b>Identify</b> disaster prevention and mitigation approaches.	79.967	3	82.72	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO2	<b>Classify</b> global and national disasters, their trends and profiles.	81.4275	3	81.48	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO3	<b>Determine</b> the impacts of various disasters	79.8525	3	80.25	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO4	<b>Apply</b> Disaster Risk Reduction in management	81.3525	3	81.48	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included
		CO5	<b>Infer</b> the linkage between disasters, environment and development	69.421	2.9	79.01	3	<b>2.92</b>	2.5	<b>-0.42</b>	Questions with more difficulty level to be included
		CO6	<b>Identify</b> Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders	70.4875	3	76.54	3	<b>3</b>	2.5	<b>-0.5</b>	Questions with more difficulty level to be included