Madhav Institute of Technology & Science, Gwalior

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

Chemical Engineering

Course Outcomes (COs) of theory & lab courses under Flexible Curriculum of 2020 admitted batch:

II Semester

After the completion of this course, Students will be able to

Chemical Process Calculations (170211)	CO1	**Explain** different unit system, basic mass volume relationship, conversion of units
	CO2	**Classify** ideal and non –ideal gases
	CO3	**Solve** energy balance problems
	CO4	**Analyze** the recycle, bypass, and purge calculations
	CO5	**Estimate** the raw material requirement for synthesis of a chemical product based on stoichiometry
	CO6	**Estimate** the performance of chemical equipment using material and energy balance

Chemical Process Calculations Lab (170211)	CO1	**Explain** the boiling point variation with concentration of solute
	CO2	**Infer** the relation of dry and wet bulb Thermometer with humidity
	CO3	**Interpret** the humidity charts to find the psychrometric properties and energy balance
	CO4	**Apply** the material balance of urea solution
	CO5	**Apply** the material balance in the Crystallization of copper sulphate solution
	CO6	**Perform** the material balance by Combustion analysis coal

Energy, Environment, Ecology & Society (100015)	CO1	**Describe** various energy resources, their conversion to electrical power and role in technological & economic development.
	CO2	**Update** with national/international power status and renewable power development targets & missions.
	CO3	**Recognize** the impact of pollution on the ecosystem and control policies adopted at national/international levels.
	CO4	**Illustrate** the concepts of ecosystems and their conservation.
	CO5	**Solve** practical problems of society in a sustainable and ethical manner.
	CO6	**Fulfill** professional duties keeping in mind the environmental safety, health, and welfare of public.

III Semester

After the completion of this course, Students will be able to

170312 (Organic Process Technology)	**CO1**	**Explain the processing of natural products**
	CO2	**Describe about microbial processes and edible oil refining process**
	CO3	**Elaborate the processes for producing petrochemicals**
	CO4	**Characterize polymers and elaborate its production processes.**
	CO5	**Describe the production processes of fibers**
	CO6	**Evaluate the different processes from economical aspects**

170311 (Fluid Mechanics)	**CO1**	**Explain the basic fundamentals of fluid statics & fluid flow.**
	CO2	**Estimate pressure drops, forces acting on bodies & power and head requirements of pumps.**
	CO3	**Apply equations of change to various fluid flow systems.**

	CO4	**Formulate the inter-dependency of various parameters using dimensional analysis.**
	CO5	**Determine the flow rate through different flow measuring devices.**
	CO6	**Examine the losses due to friction in pipes and other fluid machinery.**

170311 (Fluid Mechanics Lab)	**CO1**	**Analyze the effects of flow measurement by flow measuring devices.**
	CO2	**Calculate the degree of error in discharge rate of rotameter.**
	CO3	**Calculate the coefficient of discharge for venturimeter and orifice meter.**
	CO4	**Calculate the coefficient of discharge for rectangular notch.**
	CO5	**Calculate the coefficient of discharge for triangular notch.**
	CO6	**Calibrate the flow measuring instruments.**

Chemical Engineering Thermodynamics (170313)	CO1	**Infer** the fundamental concepts of thermodynamics to chemical engineering applications.
	CO2	**Explain** the first and second laws of thermodynamics with their practical implications.
	CO3	**Analyze** the processes involving refrigeration and compression.
	CO4	**Classify** the thermodynamic properties of solutions with their relationships.
	CO5	**Infer** the detail of vapour liquid equilibria and its use in practical situations.
	CO6	**Analyze** the chemical equilibrium with thermodynamics for predicting behavior of reacting systems.

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Fluid Particle Mechanics (170314)	CO1	**Rephrase** the application of Screen Analysis in Industry.
	CO2	**Describe** the various methods of size reduction and to list the various principles.
	CO3	**Explain** the separation techniques and equipments.
	CO4	**Illustrate** the various process like sedimentation, filtration etc.
	CO5	**Compare** the various conveying devices.
	CO6	**Illustrate** the fluidization and fluid catalytic process.

Fluid Particle Mechanics Lab (170314)	CO1	**Analyse** the effectiveness of a given screen.
	CO2	**Apply** separation technique (sedimentation) to separate a mixture.
	CO3	**Design** size reduction ratio, grindability index using ball mill and jaw crusher.
	CO4	**Compute** Bond crushing laws using hammer mill.
	CO5	**Design** the plate and frame filter press, and thickener.
	CO6	**Solve** mathematical descriptions of mixing processes.

Chemical Synthesis Lab (170315)	CO1	**Research** a specific compound, or a family of compounds, to propose a synthetic route for isolation of this compound.
	CO2	**Perform** advanced manipulations of apparatus relevant to a synthetic chemistry laboratory, use a Schlenk line to synthesize oxygen- and moisture-sensitive products.
	CO3	**Characterize** chemical compounds using modern spectroscopic techniques.
	CO4	**Maintain** a laboratory notebook following scientific best practices.
	CO5	**Communicate** findings in a format consistent with the scholarly standards of the chemical sciences.
	CO6	**Articulate** and follow ethical principles in a

		scientific context, including professional standards of laboratory practice, the communication of literature research without plagiarism,and the crediting of collaborators

170316 (SWAYAM/NPTEL/ MOOC)	**CO1**	**Refer various technical resources available from multiple fields**
	CO2	**Adhere to deadlines and commitment to complete the assignment**
	CO3	**Improve his/her performance in the self learning domain**
	CO4	**Acquire additional knowledge helpful for competitive examinations**
	CO5	**Demonstrate understanding of various interdisciplinary & allied areas.**

IV Semester

After the completion of this course, Students will be able to

170411(Heat Transfer)	**CO1**	**Apply the principles of different modes of heat transfer and heat transfer equipments.**
	CO2	**Analyze the heat transfer problems involving phase change.**
	CO3	**Illustrate the use of dimensionless numbers and various theoretical concepts.**
	CO4	**Interpret the physical systems involving heat transfer.**
	CO5	**Solve practical heat transfer problems.**
	CO6	**Estimate the design parameters of various heat transfer equipments.**

1 (Heat Trans fer	**CO1**	**Analyze the various modes of heat transfer in chemical industries**

	CO2	**Analyze the application of various experimental heat transfer correlations in engineering applications**
	CO3	**Evaluate the thermal analysis and sizing of heat exchanger**
	CO4	**Evaluate the emissivity of materials**
	CO5	**Study the thermal conduction in metal rod**
	CO6	**Analyze the application of heat exchanging equipment in chemical process industries**

170414 (Mass Transfer - I)	**CO1**	**Explain the basics of absorption, humidification, drying, crystallization & the principle of diffusion underlying them.**
	CO2	**Infer the necessary information useful in design of mass transfer equipment.**
	CO3	**Analyze the different cases of diffusion phenomena.**
	CO4	**Apply the theoretical concepts for solving practical problems.**
	CO5	**Interpret psychometric charts & equilibrium data.**
	CO6	**Propose favorable conditions for a separation to be carried out.**

170414 (Mass Transfer - I Lab)	**CO1**	**Analyze the various applications of modern separation technique**
	CO2	**Design novel drying equipments for intended application.**
	CO3	**Evaluate the diffusion application in chemical industries**
	CO4	**Analyze the ability to know the application of humidification operation in chemical industry**
	CO5	**Evaluate the appropriate application equipment in a process**
	CO6	**Analyze the design of the mass transfer equipments used in crystallization processes**

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170412(Instrumentation & Process Control)	**CO1**	**Explain the basic principles & importance of process control in industrial process plants.**
	CO2	**Explain the use of block diagrams & the mathematical basis for the design of control systems.**
	CO3	**Identify controller that can be used for specific problems in chemical industry.**
	CO4	**Analyze the Dynamic behavior of first and second order control system.**
	CO5	**Compare the Linear open loop and Closed loop system.**
	CO6	**Analyze the stability of a given system & the transient and frequency response of systems.**

170415 (Process Control Lab)	**CO1**	**Tell the importance of process control in industrial process plants**
	CO2	**Explain the working of a flow control trainer and its applications**
	CO3	**Explain the working of a level control trainer and its applications**
	CO4	**Identify controller that can be used for specific problems in chemical industry**
	CO5	**Analyze the Dynamic behavior of first and second order control system**
	CO6	**Differentiate between interaction and non-interacting systems**

(Mechanical Design of Process	**CO1**	**Relate basics of Mechanical Design to industrial problems.**
	CO2	**Experiment with different heads, closures and other accessories involved doing design.**

	CO3	**Decide on general design considerations.**
	CO4	**Make use of IS Codes in design of Pressure vessel.**
	CO5	**Distinguish between design procedures for Tall Vertical & Horizontal Vessels.**
	CO6	**Outline the design of bolted flanges**