

GATE Chemical Engineering

Marking Weightage & Topic Analysis

SUBJECT WISE ANALYSIS

Heat Transfer				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	0	1	10	Critical thickness, Fin effectiveness, evaporation, condensation, radiation shield
	5	2		
2021	4	1	10	Condensation, LMTD, Fouling factor, Fin efficiency, Unsteady state heat transfer in solid slab, Evaporator
	3	2		
2020	2	1	10	Thermal diffusivity, Boiling LMTD, view factor, rectangular fins, Evaporator
	4	2		
2019	3	1	9	Prandtl number, Pool Boiling, Heat exchanger Lumped heat capacity system, Energy balance in heat transfer
	3	2		
2018	2	1	10	Steam economy of evaporator, Baffles Unsteady state heat transfer, thermal insulation, Boiling, Heat Exchanger
	4	2		
2017	2	1	8	Unsteady state conduction, heat transfer coefficient Radiation intensity, heat transfer coefficient, Boiling
	3	2		
2016	3	1	9	Conduction, Film-wise condensation, Dimensionless number Shell and tube Heat exchanger, Conduction, radiation view factor
	3	2		

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Chemical Technology				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	3	1	5	oil and fats, Kraft process, petroleum refining
	1	2		manufacturing process of various chemicals
2021	1	1	3	Fertilizer industry
	1	2		Petrochemicals
2020	4	1	4	Polymer, Petroleum, Natural products, Inorganic products
	0	2		
2019	5	1	7	Industrial gases, kraft process, Petroleum refining, polymerization
	1	2		Manufacturing process
2018	4	1	4	Petroleum refining, polymer, sugar industry
	0	2		
2017	3	1	5	Sulfuric acid, polymerization, ammonia synthesis
	1	2		Miscellaneous
2016	3	1	3	Sulfur, pulp and paper, catalyst
	0	2		

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Thermodynamics				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	2	1	10	Entropy change of mixing, fundamental property relations
	4	2		Enthalpy change, isothermal compressibility, activity coefficient, latent heat
2021	1	1	7	Entropy Change
	3	2		Work done, Activity Coefficient, Standard molar energy
2020	2	1	8	Efficiency of heat engine, Excess Gibbs free energy
	3	2		Equilibrium constant, Residual Property, Non isothermal process
2019	3	1	11	Activity coefficient, phase equilibria, entropy change
	4	2		Raoult's law, Isobaric process, Volume of mixing, Gibb's free energy
2018	1	1	7	Intensive properties
	3	2		Gibbs free energy, isobaric process, Isothermal process
2017	3	1	9	Compressibility factor, Enthalpy change
	3	2		Henry law, fugacity, Gibbs free energy
2016	1	1	7	Partial molar enthalpy
	3	2		Irreversible adiabatic compression, Clausius-Clapeyron equation, Gibbs free energy

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Mass Transfer				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	1	1	5	Mass transfer coefficient
	2	2		Drying, distillation
2021	2	1	10	Liquid- Liquid Extraction LLE, adsorption
	4	2		NTU in absorption, Distillation, drying, Interphase mass transfer
2020	2	1	14	Interphase mass transfer, distillation
	6	2		Interphase mass transfer, film theory, Minimum reflux ratio, LLE, NTU in packed bed
2019	4	1	12	Dimensionless number, Drying, distillation, absorption
	4	2		LLE, Diffusion, absorption, distillation
2018	3	1	13	Interphase mass transfer, absorption, packed bed tower
	5	2		Liquid- Liquid Extraction, distillation, drying, azeotropic distillation, humidity
2017	3	1	11	LLE, interphase mass transfer, distillation
	4	2		Distillation, colburn analogy, adsorption, stripping
2016	3	1	9	Interphase mass transfer, Lewis number, Mccabe thiele method
	3	2		LLE, langmuir adsorption isotherm, diffusion

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Chemical Reaction Engineering				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	2	1	12	Pore diffusion in solid catalyst, enzyme reaction
	5	2		Multiple reaction system, recycle reactor, Exit age distribution,
2021	2	1	8	Heat of reaction, homogeneous reaction kinetics
	3	2		Autocatalytic reaction, Reaction kinetics, Plug flow reactor
2020	4	1	12	Activation Energy, Non Ideal reactor, Thiele Modulus, irreversible reaction
	4	2		Exothermic adiabatic CSTR reactor, First order CSTR, PFR reactor, CSTR reactor
2019	2	1	12	Product distribution, pore diffusion
	5	2		Segregated model, reactor combination, percentage yield, heat of reaction
2018	2	1	12	kinetic data interpretation
	5	2		Reactors combination, second order reaction, percentage conversion, pore diffusion, yield
2017	3	1	13	Reactors combination, Thiele modulus adsorption
	5	2		Heat of reaction, mean residence time, equilibrium conversion, conversion in batch reactor
2016	3	1	11	Reaction kinetics, multiple reaction system, activation energy
	4	2		reversible reaction, non-isothermal reactor, pore diffusion, non-ideal reactors

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Mechanical Operations				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	0	1	2	
	1	2		Filtration
2021	1	1	3	Terminal velocity
	1	2		Fluidization
2020	2	1	4	Filtration, Terminal velocity
	1	2		Fluidization
2019	1	1	3	Sphericity
	1	2		Power requirement in mixing
2018	2	1	6	Terminal Velocity, Critical speed
	2	2		Power requirement in mixing
2017	2	1	6	Size reduction equipment, Terminal velocity
	2	2		Agitation and mixing, Mean diameter
2016	1	1	5	Separation factor in cyclone separator
	2	2		Agitation and mixing, Mean diameter

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SUBJECT WISE ANALYSIS

Process Design & Control				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	5	1	11	Control strategy, Types of controller, Feed forward controller, Characteristic equations, Measuring devices
	3	2		Stability Criteria, PI controller, Transfer function
2021	3	1	13	Transmission of control signals, Feed forward Controller, Valve characteristics
	5	2		Symbol in instrumentation, Feedback control, stability for closed loop control, Final value theorem, Overshoot
2020	2	1	6	Measuring devices, Servo problem response,
	2	2		Valve Characteristics, Gain Margin
2019	2	1	8	Measuring Devices, Valve characteristics
	3	2		Non interacting system, Graph for transfer function, Phase Margin
2018	1	1	9	P and PI controller.
	4	2		Decay ratio, Miscellaneous, Amplitude ratio, Offset
2017	2	1	10	Measuring devices, LVDT device,
	4	2		Laplace transform, Overshoot, Bode criteria, Stability criteria
2016	3	1	9	Measuring devices, Response for U tube manometer, Inverse response
	3	2		Valve Characteristics, Critical stability for PI, Overshoot.

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Instrumentation and Process Control

Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	5	1	11	Control strategy, Types of controller, Feed forward controller, Characteristic equations, Measuring devices
	3	2		Stability Criteria, PI controller, Transfer function
2021	3	1	13	Transmission of control signals, Feed forward Controller, Valve characteristics
	5	2		Symbol in instrumentation, Feedback control, stability for closed loop control, Final value theorem, Overshoot
2020	2	1	6	Measuring devices, Servo problem response,
	2	2		Valve Characteristics, Gain Margin
2019	2	1	8	Measuring Devices, Valve characteristics
	3	2		Non interacting system, Graph for transfer function, Phase Margin
2018	1	1	9	P and PI controller.
	4	2		Decay ratio, Miscellaneous, Amplitude ratio, Offset
2017	2	1	10	Measuring devices, LVDT device,
	4	2		Laplace transform, Overshoot, Bode criteria, Stability criteria
2016	3	1	9	Measuring devices, Response for U tube manometer, Inverse response
	3	2		Valve Characteristics, Critical stability for PI, Overshoot.

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Fluid Mechanics				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	1	1	9	Momentum balance in water jet
	4	2		Momentum balance, mechanical energy balance, venturimeter
2021	2	1	8	Continuity equation, Fanning friction factor,
	3	2		Hydrostatic pressure, shear stress, kinetic energy correction factor
2020	1	1	9	Flow characteristics
	4	2		U tube manometer, mechanical energy balance, shear stress
2019	2	1	6	Boundary layer thickness, hydrostatic pressure
	2	2		Transition length in pipe, centrifugal pump
2018	3	1	5	Pitot tube, venturimeter, hydrostatic balance
	1	2		Non-Newtonian fluid flow
2017	2	1	6	Venturimeter, boundary layer
	2	2		Momentum balance in pipe, fanning friction factor
2016	2	1	8	Fanning friction factor, Hydrostatic pressure
	3	2		Mechanical energy balance, pump head, fanning friction factor

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Plant Design and economics				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	2	1	4	Capitalized cost, optimum reflux ratio
	1	2		Discounted cash flow
2021	3	1	7	Turnover ratio, continuous interest, rate of return
	2	2		Optimum diameter calculation, optimize cost
2020	1	1	1	Profitability
	0	2		
2019	0	1	4	
	2	2		Capitalized cost method, payback period
2018	1	1	5	Optimization cost
	2	2		Cost index, Capitalized cost method
2017	1	1	5	Straight line method
	2	2		Present worth, optimal cost value
2016	3	1	5	Capitalized cost method, Schedule number of pipe, miscellaneous
	1	2		Optimum diameter of cylinder

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Process calculations				
Year	Analysis of Questions			Topics
	No.	Marks	Total Marks	
2022	0	1	2	
	1	2		Humidity
2021	0	1	2	
	1	2		Oxygen required in combustion
2020	0	1	4	
	2	2		Mass balance in mixing, Recycle process
2019	0	1	2	
	1	2		Recycle process
2018	2	1	2	Excess oxygen, Recycle process
	0	2		
2017	0	1	2	
	1	2		Mass balance in crystallizer
2016	1	1	5	Mass balance
	2	2		Energy balance in mixing, stream analysis in reforming





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