RGPV (DIPLOMA WING) BHOPAL

OBE CURRICULUM FOR THE COURSE

FORMAT - 3

Sheet No.

Branch

CHEMICAL

Semester

5

Course Code

Course Name

SEPARATION PROCESSES I

Course	The students will be able to identify principles of	Teach	Marks
Outcome 1	mass transfer.	Hrs	
Learning	Student will be able to understand separation processes	4	10
Outcome 1			
Contents	Overview of chemical engineering separation process, Mechanism of separation: mechanical separations and mass transfer operations, Classification of Mass Transfer Operation, steady state operation ,unsteady state operation, stagewise operations, continuous contact (differential contact) operation, Direct contact of two immiscible phases Gas-gas, Gas-liquid, Gas-solid, Liquid- liquid, Liquid- solid and Solid- solid, Phase separated by membrane		
Method of Assessment	Pen paper test		
Learning	Student will be able to select appropriate mass transfer	4	10
Outcome 2	operation for a particular mixture		10
Contents	Choice of separation method, introduction to distillation absorption, humidification, drying, crystallization, leaching, extraction, and adsorption with driving force, mixtures for which they are suitable and areas of applications.		
Method of	Pen paper test		
Assesment			
Course	The students will be able to apply principles of		
Outcome 2	diffusion.		
Learning Outcome 1	Student will be able to explain basics of diffusion	4	10
Contents	 Introduction, Difference between diffusion and effusion, understanding diffusion through kinetic theory of gases, Mean free path, impact of pressure and temperature on rate of diffusion, Molecular and turbulent diffusion, Types of molecular diffusion, Difference between molecular and turbulent diffusion, Rate of diffusion, Diffusion of substance due to bulk and relative motion. Fick's law of diffusion. 		

	Diffusivity		
Method of Assessment	Theory exam		
Learning Outcome 2	Student will be able to calculate rate of diffusion in different phases under steady state conditions.	8	15
Contents	 Steady state molecular diffusion in fluids (gases and liquids) at rest and in laminar flow. Molecular diffusion in gases for equimolal counter diffusion, and for diffusion of a component in a non diffusing substance. Molecular diffusion in liquid for equimolal counter diffusion and diffusion of a component in a non diffusing substance. Steady state molecular diffusion in multi component mixture, effective mean diffusivity, simple numerical problems, 		
Method of Assessment	Theory Exam		
Learning Outcome 3	The students will be able to calculate diffusivity of gases and liquids.		
Contents	Calculation of diffusivity of gases and liquids applying fundamental principles and equipments based on them	9	20
Method of Assessment	Laboratory Test by observation		
Course Outcome 3	Student will be able to apply principles of distillation for the separation of binary liquid mixtures.		
Learning Outcome 1	Student will be able to explain laws related to distillation.	4	10
Contents	1 Definition, driving force and underlying principles of distillation. Binary and multi component distillation.More volatile and less volatile component, volatility and relative volatility. Dalton's and Roult's law with reference to distillation. Concept of partial pressure, vapor pressure & total pressure		
Method of	Paper Pen Test		
Learning Outcome 2	Student will be able to plot T-X-Y diagram and X-Y diagrams.	9	20
Contents	Phase equilibrium in distillation (practical determination of X-Y data), Vapor-liquid equilibrium diagram, boiling point composition diagram. Azeotrope,		
Method of Assessment	Laboratory Test by observation.		
Learning	Student will be able to calculate Distillation characteristics of	4	10

Outcome 3	volatile components.		
Contents	volatility and relative volatility . Calculation of equilibrium data		
	from relative volatility and from vapor pressure data of pure		
	components, Simple numerical problems on above topics		
Method of	Theory Exam		
Assessment		1.5	25
Learning	Students will be able to use different methods of distillation	15	25
Outcome 4			
Contents	 Methods of distillation : Differntial distillation, equilibrium distillation, steam distillation, azeotropic distillation, extractive distillation, and rectification. Differential distillation: Principle, Equipments and its operation fields of application, Rayleigh equation, Use of graphical integration for calculation based on Rayleigh equation Equilibrium distillation: Principle, Equipments and its operation fields of application, Calculation of residue and distillate composition, Difference between differential distillation & equilibrium distillation Steam distillation : Use of open steam in distillation Reason advantage, disadvantages, application and calculation of steam requirement. Azeotropic distillation : azeotproic mixture and and difficulty in its separation, principle, and Description of the method by suitable examples minimum and maximum boiling azeotrope. Extractive distillation: need to carry out extractive distillation Continuous Rectification: Principle of continuous distillation, Distillation column used for used for continuous rectification. Distillate and waste, Reboiler and condenser, Partial and total condensation. Down comer and weir, Use of multiple feed and side streams 		
Method of	Theory exam		
I oorning	Students will be able to operate different types of distillation	15	20
Outcome 5	apparatus.	15	20
Contents	operation of batch distillation, sieve tray, bubble cap tray		
Contents	column, vapour liquid equilibrium apparatus and glass		
	distillation column to generate data, and to calculate different		
	parameters		
Method of	Laboratory Test by observation.		
Assessment			
Course	Student will be able to calculate reflux ratio, number of plates,		
Outcome 4	water and steam requirements for the column		
Learning	Student will be able to number of plates, water and steam	11	25
Outcome 1	requirements for the column		
Contents	Overall and component balance, Reflux and reflux ratio,		
	Importance of reflux in purity of product,		

	alculation of No. of plates: Introduction to Mc Cabe Thiele Method, Lewis Sorrel Method, and Ponchon Sevrit method, Assumption inMcCabe and Lewis sorrel method: Assumptions of No heat losses, No heat of mixing and dilution, equimolal latent heat of vaporization and Equimolal counter diffusion, rectifying and stripping section and reason to naming so, nomenclature in rectifying and stripping section, Top and bottom operating line and their equations. Intersection of operating lines of rectifying and stripping sections. Equation of q line, slope of q line for various types of feed. Location of feed plate, Calculation of number of plates in rectifying and stripping section of the column and location of feed plate Mc Cabe Thiele method for different feed conditions, and calculation of water and steam requirement		
Method of Assessment	Theory exam		
Learning Outcome 2	The students will be able select appropriate reflux ration for a particular operation.	8	20
Contents	 Minimum reflux ratio : oearation of column at minimum reflux ratio, calculation of minimum reflux ratio by graphical method and Underwood and Fenske equation. Total reflux: Definition, what happens when the column is operated at total reflux, Calculation of no of plates at total reflux by Fenske equation Optimum reflux ratio: Factor affecting the selection of optimum reflux ratio, graphical selection of optimum reflux ratio. 		
Method of Assessment	Theory exam		
Learning Outcome 3	Student will be able to explain importance of optimum parameter selection for the smooth running of column.	5	10
Contents	Construction, merits and demerits of sieve tray, bubble cap tray and valve tray and their comparision. Problem encountered in the operation of tray columns: Entrainment, weeping, conning, dumping, priming, loading and flooding. Efficiency of distillation column: overall efficiency, Murphree plate efficiency and point efficiency.		
Method of	Theory Exam		
Course	Student will be able to control operation of absorption in packed		
Outcome 5	and plate towers.		10
Learning Outcome 1	Student will be able to correlate different types of mass transfer coefficients.	6	10

Contents	 Definition and driving force for absorption, Equilibrium solubility of a gas in a liquid and concept of highly soluble, moderately soluble and almost insoluble gas. Henry's law, Solubility curve and operating line, Mass transfer coefficients : definition and explanation, Concept of gas film, liquid film and overall mass transfer coefficient & their interrelations. nomenclature of different types of mass transfer coefficients based on driving force. Choice of solvent for absorption 		
Method of Assessment	Theory Exam		
Learning Outcome 2	Student will be able to explain construction and working of equipments for absorption.	6	15
Contents	Packed tower for absorption: Detailed study of construction and working of packed tower. Characteristics of tower packing. types of tower packing : random and regular packing. their characteristics merits and demerits. Different types of random packings : construction, and figure. Channelling in packed tower and methods to minimise it. Construction, working and main feature of venturi scrubber and wetted wall column.		
Method of Assessment	Theory Exam		
Learning Outcome 3	Student will be able to operate absorption equipments.	12	20
Contents	Operation of wetted wall column and packed bed absorption column and generation of data.		
Method of Assessment	Laboratory test by observation		
Learning Outcome 4	Student will be able to calculate height of packed tower required for desired separation.	6	15
Contents	Height of column for isothermal non reaction absorption, derivation of Equation for calculation of tower height based on HTU and NTU, Minimum liquid gas ratio, different types of NTU, HTU based on different driving force. absorption factor, HETP,Simple numerical problems		
Method of Assessment	Theory Exam		

RC	GPV (Diplom	a Wing) Bhopal		SCHEME FOR L OUTCOM	LEARNING ME	Br	anch C	ode	Cou	rse Code	CO Code	LO Code	Format No. 4
						C	0	2			1	1	-
COURS	E NAME	SEPARATION I	PROC	ESSES I		I		1		I			1
CO De	scription	The students w	vill be	e able to identify pr	rinciples of a	mass tran	sfer.						
LO Des	scription	Student will be	e able	to understand sepa	aration proc	esses							
				S	SCHEME OF	STUDY							
S. No.	Learni	ng Content		Teaching – Learning Method	Desc	ription of ' Process	Γ-L	T	'each Hrs.	Pract. /Tut Hi	cs. LRs	Require	ed Remarks
1	Overview of separation separation and mass t Classificati Operation, ,unsteady s operations (differentia Direct cont phases Gas Liquid- liqu solid, Phas	of chemical engineerin process, Mechanism : mechanical separati rransfer operations, on of Mass Transfer steady state operation state operation, stage continuous contact al contact) operation, tact of two immiscible s-gas, Gas-liquid, Gas- uid, Liquid- solid and S e separated by memb	ng of ions on ewise e- solid, Solid- orane	Traditional Lecture Method	Faculty will content. To identify assignment accordingly tutorials will	explain le students w will be giv remedial a ll be taken.	arning eakness en and nd	5	3	1	Sug boo pov	gested to k hando ver point	ext uts
				SCH	IEME OF AS	SESSMEN	T						
S. No.	Method	of Assessment		Description of Assess	sment	Maximu Marks	n		Reso	ources Req	uired		External / Internal
1	Pen paper te	st I	Theor learne test pa	y question related to d content will be asked per	the d in the	10			Test Pa	aper + Rati	ng Scale		Internal
			ADDI	TIONAL INSTRUC	TIONS FOR	THE HO	D/ FAC	CULTY	Y (IF A	NY)			
					Nil								

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Bra	nch Co	de	Course Code		ode	CO Code	LO Code	.O ode Format No. 4
		С	0	2				1	2	

COURS	E NAME	SEPARATION PR	OCESSES I						
CO Des	scription	The students wil	ll be able to identify pr	inciples o	f mass transfer.				
LO Des	cription	Student will be a	able to select appropria	ite mass ti	cansfer operation for	r a particul	lar mixture.		
			S	CHEME	OF STUDY				
S. No.	Learnir	ng Content	Teaching –Learning Method	D	escription of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Choice of introduction absorption, h crystallization extraction, a driving force they are su applications	separation method, to distillation umidification, drying, n, leaching , and adsorption with , mixtures for which itable and areas of	Traditional Lecture Method	Ing Description of T=1TeachTractLRs RequiMethodProcessHrs./Tut Hrs.LRs Requional LectureFaculty will explain learning content. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken.31Suggested text bhandouts power pointSCHEME OF ASSESSMENT		Suggested text book handouts power point			
			SCH	EME OF A	ASSESSMENT	!		- I	
S. No.	Method o	of Assessment	Description of Assess	ment	Maximum Marks	Reso	ources Requi	red	External / Internal
1	Paper Pen Tes	st	Theory question related the learned content will be a the test paper	to the sked in	10	Test Pa	per + Rating	Scale	Internal
	·	I	ADDITIONAL INSTRU	CTIONS F	OR THE HOD/ FACU	JLTY (IF A	NY)		
				N	il				

RG	GPV (Diploma	Wing) Bhopal	SCHEME FOR L OUTCOM	EARNING ME	Bra	anch Co	ode	Cou	ırse Code	CO Code	LO Code	Format No. 4
					С	0	2			2	1	_
COURS	E NAME	SEPARATION PR	OCESSES I									
CO Des	scription	The students wi	ll be able to apply princ	ciples of diff	usion.							
LO Des	scription	Student will be a	able to explain basics o	of diffusion								
			S	SCHEME OF	STUDY							
S. No.	Learnin	ng Content	Teaching –Learning Method	Desci	ription of Process	T-L]	Гeach Hrs.	Pract. /Tut Hr	s. LRs	Requi	red Remarks
	troduction, Dif diffusion an understand kinetic theo Mean free pressure and of diffusion turbulent d molecular di between mol diffusion, F Diffusion of s and relative diffusion.	d effusion, ing diffusion through ry of gases, path, impact of temperature on rate Molecular and iffusion, Types of ffusion, Difference ecular and turbulent Rate of diffusion, ubstance due to bulk motion, Fick's law of	Method	Faculty will content. To identify s assignment v accordingly tutorials will	explain lea tudents we vill be give remedial a be taken.	eakness en and nd		4		Sug text han pow	gested bo douts ver poin	pok tt
			SCH	EME OF AS	SESSMEN	NT I						
S. No.	Method o	of Assessment	Description of Assess	sment	Maximu Marks	n		Res	ources Req	uired		External / Internal
	Theory Exam		Theory questions related learned content will be a the university question p	to the sked in paper	10			Q	uestion pap	er		External
			ADDITIONAL INSTRU	CTIONS FOR	R THE HO)D/ FA	CULT	Y (IF A	NY)			
				Nil								

RGPV (Diploma Wing) Bhopal SCHEME FOR LEARNING Bra OUTCOME	anch Co	de	Course C	Code	Code	Code	Format No. 4
C	0	2			2	2	

COURS	E NAME	SEPARATION PROCESSES I							
CO Des	scription	The students will be able to	apply principles	s of diffu	sion.				
LO Des	cription	Student will be able to calculate rate	te of diffusion in diff	erent phase	s under steady state c	onditions			
			SCHE	ME OF S	ГUDY				
S. No.	Learnin	g Content	Teaching – Learning Method	Desc	ription of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	eady state mole liquids) at re diffusion in g diffusion, an non diffusing liquid for eq diffusion of a substance. Steady stat component m simple numeri	ecular diffusion in fluids (gases and est and in laminar flow. Molecular gases for equimolal counter ad for diffusion of a component in a g substance. Molecular diffusion in juimolal counter diffusion and a component in a non diffusing the molecular diffusion in multi hixture, effective mean diffusivity, ical problems	Traditional Lecture Method	Faculty v learning To identi weakness be given remedial be taken.	vill explain content. fy students s assignment will and accordingly and tutorials will	6	2 Suggested text b handouts power poi		
			SCHEME	OF ASSE	SSMENT				
S. No.	Method of Assessmen	f Description of Ant	Assessment		Maximum Marks		Resources 2	Required	External / Internal
	Theory exam	Theory question (i problem) related to be asked in the test	ncluding simple nu the learned conter t paper	merical nt will	15		question pap	ber	External
		ADDITION	AL INSTRUCTIO	ONS FOR	THE HOD/ FACU	JLTY (IF .	ANY)	I	
				Nil					

RG	RGPV (Diploma Wing) Bhopal		SCHEME FOR L OUTCOM	EARNING ME	Br	anch Co	ode	Cou	rse Code	CO Code	LO Code	Format No. 4
					С	0	2			2	3	-
COURS	E NAME	SEPARATION P	ROCESSES I						· · ·			·
CO Des	scription	The students w	ill be able to apply prine	ciples of dif	fusion.							
LO Des	cription	The students will b	e able to calculate diffusivity of	of gases and lic	quids.							
			S	SCHEME OF	F STUDY							
S. No.	Learnin	g Content	Teaching –Learning Method	Desc	cription of Process	T-L	1	leach Hrs.	Pract. /Tut Hrs	s. LRs	Requir	ed Remarks
1	Calculation of and liquids a principles and on them	^E diffusivity of gase pplying fundamenta E equipments base	s Lab - demonstration	Faculty will in lab and d take reading	l explain th lemonstrate g	ıt	9		Exp Setu Lab	berimen up Manua	t 1	
			SCH	EME OF AS	SESSME	NT						
S. No.	Method o	f Assessment	Description of Assess	sment	Maximu Marks	n		Reso	ources Requ	uired		External / Internal
	Laboratory Te	st by observation	Examiner will ask to stud take reading and then cal in front of him and will a correctness of result	dents to lculate asses	20]	Rating Scale	e		External
			ADDITIONAL INSTRU	JCTIONS FO	OR THE H	OD/ FA	CULT	CY (IF	ANY)			
				Nil								

RO	RGPV (Diploma Wing) Bhopal		SCHEME FOR L OUTCOM	LEARNING ME	Branch Code			de Course C		CO Code	LO Code	Format No. 4
					С	0	2	_		3	1	
COURS	E NAME	SEPARATION	PROCESSES I		I				<u> </u>			
CO Des	scription	Student will be ab	le to apply principles of distilla	ation for the sep	aration of b	inary liq	uid mix	tures.				
LO Des	scription	. Student will be a	ble to explain laws related to d	istillation								
			S	SCHEME OF	STUDY							
S. No.	Learnir	ng Content	Teaching –Learning Method	Desc	ription of Process	T-L	[Feach Hrs.	Pract. /Tut Hrs.	LRs	Requir	ed Remarks
1	Definition, dri underlying pri Binary and mu distillation. M volatile compo relative volati Roult's law wi distillation. C pressure, vapo pressure	nciples of distillatio ulti component ore volatile and less onent, volatility and lity . Dalton's and th reference to oncept of partial or pressure & total	n . Method	Faculty will content. To identify s assignment accordingly tutorials will		5 1		Sug text hand pow	gested bo douts /er poin	ok t		
			SCH	IEME OF AS	SESSME	NT						
S. No.	Method o	of Assessment	Description of Assess	sment	Maximu Marks	n		Reso	ources Requ	ired		External / Internal
	Paper Pen Te	st	Theory question related to t learned content will be asked test paper	he d in the	10			Test Pa	per + Rating	Scale		Internal
	·		ADDITIONAL INSTRU	UCTIONS FO	OR THE H	OD/ FA	ACULI	TY (IF	ANY)			
				Nil								

RC	RGPV (Diploma Wing) Bhopal		SCHEME FOR L OUTCON	LEARNING ME	Branch Code			e Course Code		CO Code	LO Code	Format No. 4	
						С	0	2			3	2	
COURS	E NAME	SEPARATION	J PRO	CESSES -I		I				I			
CO De	scription	Student will be a	able to	apply principles of distilla	ation for the se	paration of t	inary liq	uid mix	tures.				
LO Des	scription	Student will be	able to	plot T-X-Y diagram and	X-Y diagrams								
				S	SCHEME O	F STUDY							
S. No.	Learnir	ng Content		Teaching –Learning Method	Des	cription of Process	T-L	I	leach Hrs.	Pract. /Tut Hrs	LRs	Requir	ed Remarks
1	Phase equili (practical de data), Vap diagram, boil diagram .Azeo	brium in distilla etermination of or-liquid equilibr ing point composi otrope,	tion] X-Y ium tion	Lab - demonstration	Faculty will in lab and d take reading	explain the emonstrate	content		0	9	Exp Setu Lab	periment 1p Manual	
				SCH	IEME OF A	SSESSME	T						
S. No.	Method o	of Assessment		Description of Assess	sment	Maximu Marks	n		Reso	ources Requ	lired		External / Internal
	Laboratory T observation	est by	Stud read resul be as	dents will be asked to ta ing and then calculate th lt. The correctness of res ssessed	ıke ne sult will	20			Ι	Rating Scale			Internal
			А	DDITIONAL INSTRU	JCTIONS F	OR THE H	OD/ FA	CULT	Y (IF	ANY)			
					Nil								

RC	RGPV (Diploma Wing) Bhopal	a Wing) Bhopal	SCHEME FOR L OUTCOM	EARNING ME	Branch Code			le Course Co		CO Code	LO Code	Format No. 4
					С	0	2			3	3	
COURS	E NAME	SEPARATION PR	OCESSES I						I			
CO De	scription	Student will be able	to apply principles of distilla	tion for the se	paration of b	inary liq	uid mixt	tures.				
LO Des	scription	Student will be able	to calculate Distillation chara	acteristics of v	olatile comp	onents.						
			S	SCHEME O	F STUDY							
S. No.	Learnii	ng Content	Teaching –Learning Method	Des	cription of Process	T-L	T]	`each Hrs.	Pract. /Tut Hrs	LRs	Requir	ed Remarks
1	Calculation of relative volatil pressure data Simple numeri topics	equilibrium data from ity and from vapor of pure components, ical problems on above	Method	To identify assignment accordingly tutorials with	y students w t will be giv y remedial a ill be taken.	eakness en and nd		text hand powe			douts douts	ok
			SCH	IEME OF A	SSESSME Maximu	n I						External /
S. No.	Method	of Assessment	Description of Assess	sment	Marks			Reso	ources Requ	iired		Internal
	Theory Exam	l	Theory questions related learned content will be a the university question p	to the sked in aper	10			Q	uestion pap	er		External
		I	ADDITIONAL INSTRU	JCTIONS F	OR THE H	OD/ FA	ACULT	Y (IF	ANY)			
				Nil								

RG	PV (Diploma	Wing) Bhopal	SCHEME FO	OR LEARNING COME	Bra	anch Co	de	Cour	se Code	CO Code	LO Code	Format No. 4
					С	0	2			3	4	
COURS	E NAME	SEPARATION PRO	SCHEME FOR LEARNING OUTCOME Branch Code Could C 0 Could PROCESSES - I Dele to apply principles of distillation for the separation of binary liquid mixtures. able to use different methods of distillation according to need. SCHEME OF STUDY Teaching – Learning Method Description of T-L Process Teach Hrs. Idistillation, according to need. SCHEME OF STUDY Teaching – Learning Method Description of T-L Process Teach Hrs. Ital distillation, according to need. SCHEME OF STUDY Traditional Lecture Method Faculty will explain learning content. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken. 11 Equipments and its lequipments and its leulation of residue and between differential ad tutorials will be taken. ad tutorials will be taken.									
CO Des	scription	Student will be able to		istillation for the sep	paration of b	inary liqu	iid mix	tures.				
LO Des	cription	Students will be able t		ed.								
	•											
S. No.	Learnin	g Content		Teaching – Learning Method	Descrip Pr	tion of 7 ocess	Zode Course Code CO Code LO Code Format No 2 3 4 iquid mixtures. 3 4 f T-L Teach Hrs. Pract. /Tut Hrs. LRs Required Rem plain 11 4 Suggested text book handouts power point	red Remarks				
1	Methods of di equilibrium di distillation, e Differential dist operation field graphical inte equation Equilibrium dis operation fields distillate compo distillation & eq Steam distillation advanta calcula Azeotropic dist in its se method maximu Extractive distill distillation by suita Difference betw ntinuous Rectif Distillation colu rectification. Distillate and w total condensa feed and side s	istillation : Differntial d stillation, steam distillati ctractive distillation, and tillation: Principle, Equip ds of application, Rayle or application, Rayle of application, Calculation bitillation: Principle, Equip of application, Calculation of application, Calculation on : Use of open steam age, disadvantages, app tion of steam requireme tillation : azeotproic mixt eparation, principle, and by suitable examples num boiling azeotrope. lation: need to carry out ion,principle and Descrip able examples ween azeotropic and ext ication: Principle of cor umn used for used for c vaste, Reboiler and cond treams	istillation, on, azeotropic rectification. oments and its igh equation, Use of ased on Rayleigh oments and its tion of residue and een differential in distillation Reason olication and nt. ure and and difficulty Description of the ninimum and extractive otion of the method tractive distillation ntinuous distillation, ontinuous denser, Partial and weir, Use of multiple	Traditional Lecture Method	Faculty v learning c To identif weakness will be giv according and tutori taken.	vill expla ontent. Ty studen assignm ven and ly remec als will l	ain hts hent dial be	11	4	Sug text hand pow	gested bo douts 'er poin	ook t

SCHEME OF ASSESSMENT

S. No.	Method of Assessment	Description of Assessment	Maximum Marks	Resources Required	External / Internal
	Theory Exam	Theory questions related to the learned content will be asked in the university question paper	25	Question paper	External
		ADDITIONAL INSTRUCTIONS I	FOR THE HOD/	FACULTY (IF ANY)	
		Ni	il		

RG	RGPV (Diploma Wing) Bhopal	ing) Bhopal	SCHEME FOR I OUTCO	LEARNING ME	NING Branch Code			ode Course Code		CO Code	LO Code	Format No. 4
					С	0	2			3	5	
COURS	E NAME S	EPARATION P	ROCESSES I		I							
CO Des	scription S	tudent will be able	to apply principles of distilla	ation for the se	eparation of b	inary liq	uid mix	tures.				
LO Des	scription S	tudents will be abl	e to operate different types of	f distillation a	pparatus							
			ç	SCHEME O	F STUDY							
S. No.	Learning (Content	Teaching –Learning Method	Des	scription of Process	T-L	I	'each Hrs.	Pract. /Tut Hrs	. LRs	Requir	ed Remarks
1	operation of batcl tray ,bubble ca vapour liquid equ and glass distil generate data, different paramet	h distillation, sieve ap tray column illibrium apparatus lation column to and to calculate ers	Lab - demonstration	Faculty will in lab and d take reading	l explain the emonstrate]	content now to		0	15	Exj Setu Lab	perimen 1p Manual	t
			SCH	IEME OF A	SSESSME	NT						
S. No.	Method of A	Assessment	Description of Assess	sment	Maximu Marks	n		Reso	ources Requ	ired		External / Internal
	Laboratory Test I	by observation	Examiner will ask to stu take reading and then ca in front of him and will correctness of result	idents to ilculate asses	20]	Rating Scale	;		External
			ADDITIONAL INSTRU	UCTIONS F	OR THE H	OD/ FA	CULT	Y (IF	ANY)			
				Ni	1							

RO	RGPV (Diploma Wing) Bhopal		CHEME FOR LEARNING OUTCOME	G Br	Branch Code			rse Code	CO Code	LO Code	Format No. 4	
					С	0	2			4	1	
COURS	E NAME	SEPARATION P	ROCESSE	S I	I			L	I	1		
CO De	scription	Student will be abl	e to calculate	e reflux ratio, number of plate	es, water and st	eam requi	rement	s for the	e column			
LO Des	scription	Student will be abl	e to calculate	e number of plates, water and	l steam require	ments for	the colu	umn.				
		·		SCHEME	OF STUDY							
S. No.	Learnin	g Content		Teaching –Learning Method	Descripti Pro	on of T-l cess	L T	'each Hrs.	Pract. /Tut Hrs	. LRs	Requir	ed Remarks
1	verall and com reflux ratio, Ir product, calculation of Cabe Thiele M and Ponchon S Assumption ir method: Assur heat of mixing heat of vapori diffusion, rect reason to nam rectifying and bottom opera Intersection of and stripping s of q line for va feed plate, Ca rectifying and and location of method for dir calculation of	ponent balance, Ref nportance of reflux in No. of plates: Introdu Method, Lewis Sorrel Sevrit method, McCabe and Lewis s mptions of No heat lo and dilution, equimo ation and Equimolal ifying and stripping se ting so, nomenclature stripping section, To ting line and their eq f operating lines of r sections. Equation of prious types of feed. L clulation of number stripping section of t f feed plate Mc Cabe fferent feed condition water and steam req	lux and n purity of uction to Mc Method, orrel osses, No olal latent counter ection and e in o and uations. rectifying q line, slope ocation of of plates in he column Thiele ns, and uirement	Traditional Lecture Method	Faculty wil learning co To identify weakness assignment given and accordingly and tutorial taken.	l explain ntent. students will be remedia s will be	1	11	4	Sug text hand pow	gested bo douts er poin	ok
				SCHEME OF	ASSESSME	NT m						Fyternal /
S. No.	Method	of Assessment	Descr	ription of Assessment	Marks			Reso	urces Requ	uired		Internal

Theory Exam	Theory questions related to the learned content will be asked in the university question paper	25	Question paper	External								
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)												
Nil												

COURSE NAME SEPARATION PROCESSES I COURSE visual will be able to calculate reflux ratio, number of plates, water and steam requirements for the column Just and the column LO Description The students will be able select appropriate reflux ration for a particular operation Fract. Pract. LRS Required It Required LRS Required It Result and the column LRS Required Suggested 1 nimum reflux ratio : cearation of column at minimum reflux ratio, duitonal Lecture Faculty will explain learning content. 6 2 Suggested Suggested Suggested text book handoots power point Suggested Suggested text book handoots power point Suggested text boo	RG	RGPV (Diploma Wing) Bhopal	SCHEME FOR L OUTCOM	LEARNING Branch Coo ME		de	de Course		CO Code	LO Code	Format No. 4			
COURSE NAME SEPARATION PROCESSES I CO Description Student will be able to calculate reflux ratio , number of plates, water and steam requirements for the column LO Description The students will be able select appropriate reflux ratio for a particular operation S.No. Learning Content Teaching -Learning Method Description Teach Pract. Hrs. LRs Required I I Required text book handouts power point I 1 inimum reflux ratio calculation of minimum reflux ratio calculation of minimum reflux ratio by graphical method and Underwood and Fenske equation. Total reflux. Definition, what happens when the column is operated at total reflux. Calculation of no of plates at total reflux by Fenske equation Optimum reflux ratio. Factor affecting the selection of optimum reflux ratio. Description of Assessment Maximum Marks Resources Required Exp I S.No. Method of Assessment Description of assessment Maximum Marks Resources Required Exp I Iheory Exam Theory questions related to the learned content will be asked in the university question paper 20 Question paper E						С	0	2			4	2		
Student will be able to calculate reflux ratio , number of plates, water and steam requirements for the column Student will be able to calculate reflux ratio , number of plates, water and steam requirements for the column Student will be able select appropriate reflux ratio for a particular operation SCHEME OF STUDY S. No. Teaching -Learning Method Teaching -Learning Poescription of T-L Process Teach /Tut Hrs. LR Required I Inimum reflux ratio, calculation of minimum reflux ratio, calculation of minimum reflux ratio, calculation of minimum reflux ratio, paphical method and Underwood and Fenske equation. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken. Vertical selection of optimum reflux ratio. SCHEME OF SSESSMENT Scheme to Jense Scheme to Jense Sugested to the learning content. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken. Sugested text book handouts power point Scheme to Jense Sugested to reflux by Fenske equation Sotium reflux ratio. Sotium reflux ratio. Sotium reflux ratio. Method of Assessment Maximum Marks <th co<="" td=""><td>COURS</td><td>E NAME</td><td>SEPARATION PR</td><td>OCESSES I</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th>	<td>COURS</td> <td>E NAME</td> <td>SEPARATION PR</td> <td>OCESSES I</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	COURS	E NAME	SEPARATION PR	OCESSES I									
The students will be able select appropriate reflux ration for a particular operation SCHEME OF STUDY S. No. Learning Content Teaching -Learning Method Description of T-L Process Frach. /Tut Hrs. LRs Required 1 1 nimum reflux ratio : oearation of column at minimum reflux ratio, calculation of minimum reflux ratio, calculation of minimum reflux ratio, calculation of minimum reflux ratio, ratio to paphical method and Underwood and Fenske equation. Total reflux, Calculation of no of plates at total reflux, Calculation of no of plates at total reflux, Calculation of no of optimum reflux ratio: Factor affecting the selection of optimum reflux ratio. SCHEME OF ASSESSMENT Maximum Marks Resources Required I Scheme of Assessment Description of Assessment Maximum Marks Resources Required I 1 Interve Example of the university question paper To identify students weakness S </td <td>CO Des</td> <td>scription</td> <td>Student will be able t</td> <td>o calculate reflux ratio, nur</td> <td>nber of plates, v</td> <td>water and st</td> <td>eam requ</td> <td>irement</td> <td>s for the</td> <td>e column</td> <td></td> <td></td> <td></td>	CO Des	scription	Student will be able t	o calculate reflux ratio, nur	nber of plates, v	water and st	eam requ	irement	s for the	e column				
SCHEME OF STUDY S. No. Learning Content Teaching -Learning Method Description of T-L Process Teach Hrs. Pract. /Tut Hrs. LRs Required 1 1 inimum reflux ratio : oearation of column at minimum reflux ratio, calculation of minimum reflux ratio, calculation of minimum reflux ratio, calculation of minimum reflux ratio, calculation of most reflux; Definition, what happens when the column is operated at total reflux; Calculation of no of plates at total reflux calculation of no of optimum reflux ratio. Faculty will be given and accordingly students weakness assignment will be given and accordingly students weakness assignment will be taken. 6 2 Suggested text book handouts power point 0 ptimum reflux ratio: Factor affecting the selection of optimum reflux ratio, graphical selection of optimum reflux ratio. Description of Assessment Maximum Marks Resources Required Ex In S. No. Method of Assessment Description of Assessment the university questions related to the leared content will be asked in the university question paper 20 Question paper Ex In	LO Des	scription	The students will be	able select appropriate reflux	x ration for a pa	rticular ope	ration							
S. No. Learning Content Teaching –Learning Method Description of T-L Process Teach Hrs. Pract. (Tut Hrs. LRs Require 1 1 inimum reflux ratio : oearation of column at minimum reflux ratio, calculation of minimum reflux ratio, calculation of minimum reflux ratio, calculation of minimum reflux ratio, ratio dand Fenske equation Total reflux: Definition, what happens, when the column is operated at total reflux, calculation of no of plates at total reflux presse equation Optimum reflux ratio. Method feasesement Method sessesment Method feasesement Maximum Marks Resources Required Face toral reflux: Calculation of no of plates at total reflux presse equation optimum reflux ratio. Description of Assessment Maximum Marks Resources Required Ex In 5. No. Method of Assessment Description of Assessment Maximum the university questions related to the university question paper 20 Question paper Ex In		I • •		S	SCHEME OF	STUDY								
1 inimum reflux ratio : oearation of column at minimum reflux ratio, calculation of minimum reflux ratio, rotal reflux: Definition, what happens, when the column is operated at total reflux, Calculation of no of plates at total reflux pressee equation. Optimum reflux ratio, graphical selection of optimum reflux ratio, graphical selection of optimum reflux ratio. Traditional Lecture is to take number of total reflux: Definition, what happens. We calculation of no of plates at total reflux, Calculation of no of plates at total reflux pressee equation. Optimum reflux ratio, graphical selection of optimum reflux ratio. State is total reflux is total reflux is total reflux is total reflux ratio. Total reflux ratio. Total reflux ratio. Maximum Marks Resources Require Faculation of the reflux ratio. S. No. Method of Assessment Description of Assessment Maximum Marks Resources Require Faculation paper It heory Exam Theory questions related to the learned content will be asked in the university question paper 20 Question paper Example to the learned content will be asked in the university question paper 20 Question paper Example to the learned content will be asked in the university question paper 20 Question paper Example to the learned content will be asked in the university question paper 20 Question paper Example to the learned content will be asked in the university question paper 20 Quest	S. No.	Learnin	ng Content	Teaching –Learning Method	Desc	ription of Process	T-L	T I	each Hrs.	Pract. /Tut Hrs	_{5.} LRs	Require	ed Remarks	
SCHEME OF ASSESSMENT S. No. Method of Assessment Description of Assessment Maximum Marks Resources Required Ex In Theory Exam Theory questions related to the learned content will be asked in the university question paper 20 Question paper E Vertication Exam Exam Exam Exam Exam Exam Marks Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam Exam	1	 inimum reflux ratio : oearation of column at minimum reflux ratio, calculation of minimum reflux ratio by graphical method and Underwood and Fenske equation. Total reflux: Definition, what happer when the column is operated at total reflux, Calculation of no of plates at total reflux by Fenske equation Optimum reflux ratio: Factor affecting the selection of optimum reflux ratio, graphical selection of optimum reflux ratio. 		Traditional Lecture Method	Faculty will explain learning content. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken.				6	2	Sug text han pow	gested boo douts ver point	ok	
S. No.Method of AssessmentDescription of AssessmentMaximum MarksResources RequiredEx InImage: Section paperTheory ExamTheory questions related to the learned content will be asked in the university question paper20Question paperEImage: Section paperESection paper20Section paperEADDITIONAL INSTRUCTIONS FOR THE HOD/ FUCULTY (IF ANY)				SCH	IEME OF AS	SESSME	NT							
Theory Exam Theory questions related to the learned content will be asked in the university question paper 20 Question paper E ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)	S. No.	Method of	of Assessment	Description of Assess	sment	Maximu Marks	n		Reso	urces Req	uired		External / Internal	
ADDITIONAL INSTRUCTIONS FOR THE HOD/ FACULTY (IF ANY)		Theory Exam		Theory questions related learned content will be a the university question p	l to the usked in paper	20			Qu	estion pap	er		External	
				ADDITIONAL INSTRU	UCTIONS FO	R THE H	OD/ FA	CULT	Y (IF	ANY)				
Nil					Nil									

RC	RGPV (Diploma Wing) Bhopal		SCHEME FOR L OUTCOM	EARNING ME	Branch Code			de Course Code		CO Code	LO Code	Format No. 4
					C	0	2			4	3	
COURS	E NAME	SEPARATION PR	OCESSES I							·		
CO De	scription	Student will be able t	o calculate reflux ratio, nun	nber of plates,	water and st	eam requ	uirement	s for th	e column			
LO De	scription	. Student will be able	to explain importance of op	timum param	eter selectior	for the	smooth 1	running	of column.			
			S	SCHEME O	F STUDY							
S. No.	Learnir	ng Content	Teaching –Learning Method	Des	cription of Process	T-L	T	`each Hrs.	Pract. /Tut Hrs	s. LRs	s Requir	ed Remarks
1	onstruction, m sieve tray, bul tray and their encountered i columns: Entr conning, dum and flooding. Efficiency of overall efficien efficiency and	erits and demerits of oble cap tray and valve comparision. Problem in the operation of tray ainment, weeping, ping, priming, loading distillation column: ncy, Murphree plate point efficiency.	Traditional Lecture Method	Faculty will content. To identify assignment accordingly tutorials wi	Il explain le students w will be giv y remedial <i>a</i> ill be taken.	arning eakness en and nd		4 1			ggested t bo ndouts wer point	ok
			SCH	EME OF A	SSESSME	NT						
S. No.	Method o	of Assessment	Description of Assess	sment	Maximu Marks	n		Reso	ources Req	uired		External / Internal
	Theory Exan	1	Theory questions related learned content will be a the university question p	to the sked in aper	10			Q	uestion pap	er		External
		· ·	ADDITIONAL INSTRU	JCTIONS F	OR THE H	OD/ FA	ACULT	Y (IF	ANY)			
				Nil								

RG	RGPV (Diploma Wing) Bhopal		SCH	EME FOR LE OUTCOM	EARNING E	Branch Code			Cou	rse Code	CO Code	LO Code	Format No. 4
						С	0	2			5	1	-
COURS NAME	E	SEPARATION	PROCESSES	[I		1			1		1
CO Des	scription	Student will be a	ble to control ope	eration of absorpt	tion in packed	and plate to	owers.						
LO Des	scription	Student will be a	ble to correlate d	ifferent types of	mass transfer	coefficients	•						
				S	CHEME OF	STUDY							
S. No.	Learnin	ig Content		Teaching – Learning Method	Desc	cription of Process	T-L		Feach Hrs.	Pract. /Tut Hrs	s. LRs	Requir	ed Remarks
1	efinition and driving force for absorption, Equilibrium solubility of a gas in a liquid concept of highly soluble, moderately soluble and almost insoluble gas. Henri law, solubility curve and operating line transfer coefficients : definition and explanation, Concept of gas film, liquid and overall mass transfer coefficient & interrelations. nomenclature of differe types of mass transfer coefficients base driving force. Choice of solvent for absorption			Traditional Lecture Method	Faculty wi content. To identify assignmen accordingl tutorials w Students w reading and result. The will be ass	Faculty will explain learning content. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken. Students will be asked to take reading and then calculate the result. The correctness of result will be assessed				4 2		gested bo douts /er poin	ook t
				SCHE	EME OF AS	SESSME	T						
S. No.	Method o Assessme	of ent	Description o	f Assessment		Maximu Marks	n		Reso	ources Req	uired		External / Internal
	Theory Exam	n The conte quest	ory questions re ent will be asked ion paper	elated to the lea l in the universi	rned ity	10		Questi	on pape	r			External
			ADDITIO	NAL INSTRU	CTIONS FO	R THE H	OD/ FA	CUL	ΓY (IF	ANY)			·
					Nil								

COURSE NAME CO Descr LO Descr S. No.	SEPARATION ription Student will be at ription Student will be at Learning Content	PROCESSES le to control o le to explain c	S I peration of absorption construction and v S Teaching –	ption in packed vorking of equij SCHEME OF	C and plate pments for STUDY	0 owers. absorptio	2			5	2	
COURSE NAME CO Descr LO Descr S. No.	SEPARATION ription Student will be at ription Student will be at Learning Content Dasked tower for absorption:	PROCESSES le to control o le to explain c	S I peration of absorption construction and v S Teaching –	ption in packed vorking of equij SCHEME OF	and plate pments for STUDY	owers. absorptio					· · ·	
CO Descr LO Descr S. No.	ciption Student will be all ciption Student will be all Learning Content Dasked tower for absorption:	le to control o le to explain c	peration of absorption construction and v S Teaching –	ption in packed vorking of equij SCHEME OF	and plate	owers. absorptio						
LO Descr S. No.	Student will be at Learning Content	le to explain c	construction and v S Teaching –	vorking of equij SCHEME OF	pments for STUDY	absorptio						
S. No.	Learning Content		S Teaching –	SCHEME OF	STUDY		on.					
S. No.	Learning Content		Teaching –	1								
1	Backed tower for absorption:		Learning Method	Desci	ription of Process	T-L	Γ	'each Hrs.	Pract. /Tut Hrs.	LRs	Requir	ed Remarks
si p a m ra fi m si	Packed tower for absorption: Detailed study of construction and working of packed tower. Characteristics of tower packing. types of tower packing : random and regular packing. their characteristics merits and demerits. Different types of random packings : construction, and figure. Channelling in packed tower and methods to minimise it. Construction, working and main feature of venturi scrubber and wetted wall columnTraditional Lecture MethodFaculty will expl content. To identify stude assignment will be accordingly reme tutorials will be to SCHEME OF ASSESS					eakness ren and and		4	2	Sug text hand pow	gested bo douts er point)k
S No	Mothod of Assossment	Docori	intion of Assass	mont	Maximu	m		Doco	uroos Dogu	irad		External /
5. INU.	Methou of Assessment	Descri	iption of Assess	ment	Marks			Keso	urces kequ	irea		Internal
T	'heory Exam	Theory q learned c the unive	uestions related content will be a ersity question p	to the sked in aper	15			Q	uestion pap	er		External
		ADDITIC	ONAL INSTRU	JCTIONS FO	R THE I	IOD/ FA	ACULI	CY (IF A	ANY)		1	
				Nil								

RGPV (Diploma Wing) Bhopal			SCHEME FOR LEARNING OUTCOME		Br	Branch Code		Course Code		CO Code	LO Code	Format No. 4
					С	0	2			5	3	
COURS	E NAME	SEPARATION P	ROCESSES I			-					<u> </u>	
CO Des	CO Description Student will		e to control operation of absor	ption in packe	d and plate t	owers.						
LO Des	scription	Student will be abl	e to operate absorption equipn	nents.								
			S	SCHEME O	F STUDY							
S. No.	Learnir	ng Content	Teaching –Learning Method	Des	cription of Process	otion of T-L rocess		each Pract. Hrs. /Tut Hr		LRs Required		ed Remarks
1	Operation column an absorption generation of	of wetted wal d packed be column and data.	1 Lab - demonstration 1 1	Faculty will explain the content in lab and demonstrate how to take reading.			t		12	Exp Setu Lab	eriment p Manual	
			SCH	LEME OF AS	DSESSIVIEI							Estern al /
S. No.	Method o	of Assessment	Description of Assess	sment	Marks			Resources Required In				External / Internal
	Laboratory Test by observation		Examiner will ask to students to take reading and then calculate in front of him and will asses correctness of result		20]	Rating Scale			Internal
			ADDITIONAL INSTRU	UCTIONS FO	OR THE H	OD/ FA	CULT	TY (IF	ANY)			
				Nil								

RGPV (Diploma Wing) Bhopal			SCHEME FOR LEARNING OUTCOME		Br	Branch Code		Course Code		CO Code	LO Code	Format No. 4	
					С	0	2			5	4		
COURSE SEPARATION P		I PROCESSES I											
CO Description		Student will be able to control operation of absorption in packed and plate towers.											
LO Des	scription	Student will be able	to calculate height of packed	l tower require	ed for desired	separati	on.						
			S	SCHEME O	F STUDY								
S. No.	Learning Content		Teaching –Learning Method	Description of T-L Process			ן	leach Hrs.	Pract. /Tut Hrs. LRs Requir		red Remarks		
	Height of colum reaction a 3 derivation calculation of on HTU and M gas ratio, dif HTU based force. ab HETP,Simple r	on for isothermal non bsorption, of Equation for tower height based NTU, Minimum liquid ferent types of NTU, on different driving psorption factor, numerical problems	Method	Faculty will explain learning content. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken				4	2	2 Suggested text bo handouts power poin		ook t	
			SCH	IEME OF A	SSESSME	NT							
S. No.	o. Method of Assessment		Description of Assessment		Maximu Marks	Maximum Marks			Resources Required			External / Internal	
	Theory Exam		Theory questions related to the learned content will be asked in the university question paper		15			Question paper				External	
			ADDITIONAL INSTRU	UCTIONS F	OR THE H	IOD/ FA	CULI	TY (IF	ANY)				
				Nil									

SUBJECT – SEPARATION PROCESSES I

V SEMESTER CHEMICAL ENGINEERING

LIST OF EXPERIMENTS

S.No.	Name of experiments
1.	Determination of distillation characteristics of a binary mixture
2.	Determination of relative volatility of a binary mixture
3.	Verification of Rayleigh equation of a binary mixture
4.	Study and live demonstration of sieve tray column
5.	Study and live demonstration of bubble cap column
6.	Differential distillation of binary mixture
7.	Calculation of vaporization efficiency for steam distillation
8.	To find out rate of diffusion
9.	To find out diffusion coefficient for liquid-liquid diffusion
10.	To find out diffusion coefficient of vapor in air diffusion
11	Study of differential types of packing and packed tower
12	To find out rate of absorption of a gas in a liquid in a packed column