RGPV (DIPLOMA WING) BHOPAL

OBE CURRICULUM FOR THE COURSE

FORMAT - 3

Sheet No.

Branch

CHEMICAL

Semester

6

Course Code

Course Name

Chemical Reaction Engineering

Course	Student will be able to Classify the various types of reaction	Teach	Marks
Outcome 1	and identify the variables affecting the rate of reaction.	Hrs	
Learning	Student will be able to Classify various types of reaction.	6	15
Outcome 1			
Contents	Kinetics of Reaction: Introduction, Chemical Kinetics, , theories to explain to chemical reactions: Collision Theory, and Activated complex Theory, Classification of reactions: Homogeneous and heterogeneous reactions with suitable examples, Chain Reactions: definitions and various steps of chain reactions, Catalytic Reactions: different types of catalytic reactions with suitable examples, Autocatalytic reactions , parallel and series reactions,		
Method of Assessment	Theory Exam(external)		
Learning	Student will be able to Identify variables affecting the	10	15
Outcome 2	reaction		
Contents	Kinetics of Homogeneous Reactions: Definition and units of reaction rate Variables affecting the rate of reaction, Kinetics of Homogeneous Reactions, Concentration dependent term of a Rate equation, Elementary and Non elementary reaction, Molecularity and Order of reaction, Rate constant K, Representation of a reaction rate, Effect of temperature on rate constant from Arrhenius theory, From Thermodynamic, From Collision theory, and From transition state theory, Comparison of theories, Calculation of Activation energy and frequency factor using Arhenious theory.		
Method of	Theory Exam(external)		
Assesment			
Course Outcome 2	Student will be able to Apply various methods to determine the rate expression of different simple reactions.		
Learning Outcome 1	Student will be able to Recognize order of reaction.	12	15
Contents	Reaction rate Mechanism: , Order of reaction: Zero order reaction, First order reaction, Second order reaction, nth order reaction,		

	Methods for determining rate expression: Differential rate		
Method of	Theory Exam(external)		
Assessment			
Course	Analyze data for Batch reactor with the help of different		
Outcome 3	methods.		
Learning	Calculate and analyze data by different methods under the	12	15
Outcome 1	constant volume condition.		
Contents	Analysis of Batch Reactor Data: Constant volume batch reactor. Differential method of analysis of data, Integral method of analysis data, determination of order of reaction and reaction rate constant for batch reactor data. Numerical problems.		
Method of	Theory Exam(external)		
Assessment			
Learning Outcome 2	Calculate and analysis data by different methods under the variable volume condition	11	20
Contents	Variable volume batch reactor: Differential method of analysis		
	data, Integral method of analysis data, Total Pressure Method		
	of analysis of reactor data, Partial Pressure Method of analysis		
Mothod of	of reactor data.	-	
Assessment	Theory Exam(external)		
Course	Develop skill for design and operation of reactors	-	
Outcome 4			
Learning	Determine the size for batch reactor, plug Flow reactor and CSTR	11	20
Outcome 1			
Contents	Introduction to Reactor Design: Ideal reactor, Concept of ideality, Types of chemical reactor, Configuration of reactor and design consideration, Comparison of batch and continuous operation, Concept of Space time Space velocity, holding time, residence time distribution and space volume of reactor Performance equation for batch reactor, Performance equation for CSTR, Performance equation for Plug Flow Reactor (PFR)s, Comparison of CSTR and PFR, Basic concept of Batch , CSTR and PFR for First order reaction, numerical problems on reactor design and comparison		
Method of	Theory Exam(external)		
Assessment			
Learning Outcome 2	Student will be able to understand concept of combined reactor system.	4	10
Contents	Combined reactor system: CSTR in series& parallel. PFR in		
	series& parallel, CSTR and PFR in series, CSTR and PFR in		
	parallel, numerical problems on combined reactor systems,		

Method of	Pen Paper test(internal)		
Assessment			
Learning	student will be able to operate different types of reactors.	4	10
Outcome 3			
Contents	Basic concept of thermal characteristics of reactors,		
	isothermal operations, adiabatic and non adiabatic		
	operations, temperature control in reactors, elementary		
	concept of homogeneous and heterogeneous fixed bed,		
	moving bed and fluidized bed reactors, catalytic and		
	non catalytic reactors.		
Method of	Pen Paper test(internal)		
Assessment			
Course	student will be able to Identify different types of Catalyst as		
Outcome 5	per need of the reaction processes.		
Learning	student will be able to Identify different types of Catalyst as	8	15
Outcome 1	per need of the reaction processes.		
Contents	Concept of Homogenous and Heterogeneous reaction, Nature , type and mechanism of catalytic reactions, Properties of solid catalyst, Surface Area . Void Volume , Density, Pore Volume Distribution, characteristics of catalysed reation, Catalyst Preparation, determination of catalyst properties, Catalyst ingredients: Catalyst promoter, accelerator, inhibitor and catalyst support, Catalyst deactivation, catalyst poisoning and regeneration		
Method of	Theory Exam(external)		
Assessment			
Course	student will be able to Identify different types of Catalyst as		
Outcome 5	per need of the reaction processes.		
Learning	student will be able to Identify different types of Catalyst as	4	10
Outcome 1	per need of the reaction processes.		
Content	Theories of catalysis-Adsorption, Intermediate compound formation theory, different steps of solid catalysed reaction and rate controlling step.		
Method of	Pen Paper test(internal)		
Assessment			

RO	GPV (Diploma W	ving) Bhopal	SCHEM	E FOR LEARNING OUTCOME	; Br	anch Co	ode	Cou	rse Code	CO Code	CO CodeLO CodeFormat No. 4				
					C	0	2			1	1				
COURS	E NAME	CHEMICAL R	EACTION ENGINI	EERING	I				i	1					
CO De	scription ^S	Student will be a	ble to Classify the var	ious types of reaction a	and identify th	e variab	es affe	cting th	e rate of rea	action.					
LO De	scription	Student will be a	ble to Classify variou	s types of reaction.											
				SCHEME (OF STUDY										
S. No.	Learning	Content		Teaching – Learning Method	Descriptio Proc	n of T-l ess	L T I	each Hrs.	Pract. /Tut Hrs	s. LRs	Require	d Remarks			
1	Kinetics of Reacti theories to explain Theory, and Active of reactions: Hom reactions with sui definitions and va Catalytic Reaction reactions with sui reactions , paralle	on: Introduction n to chemical re ated complex TI ogeneous and H table examples, rious steps of cl s: different type table examples, I and series rea	n, Chemical Kinetics, , eactions: Collision heory, Classification neterogeneous , Chain Reactions: hain reactions, es of catalytic , Autocatalytic ctions	Traditional Lecture Method	Faculty will learning cor To identify weakness assignment given and accordingly remedial and tutorials will taken.	explain atent. students will be d l be		5	1	Sug boo pow	gested te k handou /er point	ext its			
				SCHEME OF A	ASSESSME	NT									
S. No.	Method of A	Assessment	Description	of Assessment	Maximu Marks	m		Reso	ources Requ	uired		External / Internal			
1	Theory Exam		Theory question r learned content wil exam	elated to the l be asked in the	15			Q	uestion Par	ber		External			
			ADDITIONAL IN	NSTRUCTIONS FO	R THE HO	D/ FAC	ULTY	(IF A	NY)						
				N	il										

RG	RGPV (Diploma Wing) Bhopal			CHEME FOR LEAR OUTCOME	NING	Bra	anch Co	ode	de Course Code CO LO Code				Format No. 4
						С	0	2			1	2	-
COURSE	E NAME	CHEMICAL RE	ACTION H	ENGINEERING						<u> </u>	1		1
CO Des	cription	Student will b	e able to (Classify the various	types of	f reaction	n and io	dentif	y the v	ariables a	ffectin	g the ra	ate of reaction.
LO Dese	cription	Student will be	able to Ic	lentify variables aff	fecting t	the react	ion.						
				SCHE	ME OF S	STUDY							
S. No.	Learn	ing Content		Teaching – Learning Method	De	escription Proces	of T-L s		Teach Hrs.	Pract. /Tut Hrs	s. LRs	Requir	ed Remarks
	Kinetics of H Definition an affecting the Homogeneou dependent te Elementary a Molecularity constant K, R Effect of tem Arrhenius the From Collisio state theory, Calculation o frequency fac	omogeneous Reaction d units of reaction ra- rate of reaction, Kine is Reactions, Concent erm of a Rate equation nd Non elementary re and Order of reaction epresentation of a rea perature on rate con- eory, From Thermody on theory, and From t Comparison of theori f Activation energy ar ctor using Arhenious	Traditional Lecture Method	Faculty learnin To iden weakne be give remedi be take	y will expl ag content. ntify stude ess assign en and acco tal and tuto en.	ain nts nent wi ordingly orials wi	11 7 111	7	3	Sug tex han pov	ggested t bo douts ver poin	ook t	
				SCHEME	OF ASS	ESSMEN	Т						
S. No.	Method	of Assessment	Desc	cription of Assessment	t	Maximu Marks	n		Reso	ources Requ	uired		External / Internal
1	Theory Ex	am	Theory learned the test	question related to the content will be asked paper	in	15			Q	uestion Pap	er		External
			ADDITIC	ONAL INSTRUCTIO	NS FOR	THE HO	D/ FAC	CULT	Y (IF Al	NY)			
					Nil								

RGPV (Diploma Wing) Bhopal	SCHEME FOR LEARNING OUTCOME	Bra	anch Co	de	Cours	e Code	CO Code	LO Code	Format No. 4
		С	0	2			2	1	

COURS	E NAME	CHEMIC	AL REACTION ENGINEE	RING					
CO De	scription	Student	will be able to Apply various	methods to determ	ine the rate expression of	different sir	mple reactions.		
LO Des	scription	Student will	be able to Recognize order of	reaction.					
				SCHEME (DF STUDY				
S. No.	Learnin	ng Content		Teaching – Learning Method	Description of T-L Process	Teach Hrs.	Pract. /Tut Hrs.	LRs Required	Remarks
1	Reaction rate order reaction, reaction, nth o rate expression expression	e Mechanism: First order re rder reaction, n: Differential Half life peri	, Order of reaction: Zero eaction, Second order Methods for determining rate expression, Integral rate iod.	Traditional Lecture Method	Faculty will explain learning content. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken.	9	3	Suggested text book handouts power point	
				SCHEME OF A	SSESSMENT				
S. No.	Method o Assessme	of ent	Description of Assess	ment	Maximum Marks		Resources	Required	External / Internal
	Theory exan	1	Theory question (includir problem) related to the le be asked in the test paper	ng simple numerica arned content will	ıl 15		question pap	per	External
			ADDITIONAL IN	ISTRUCTIONS I	FOR THE HOD/ FACU	LTY (IF	ANY)		
				Ni	1				

RG	PV (Diploma	Wing) Bhopal	SCHEME FOR L OUTCOM	EARNING /IE	Branch	Code	Cou	rse Code	CO Code	LO Code	Format No. 4
COURS	P W (Pipt oma	Wing) Bhopal CHEMICAL REAC	SCHEME FOR L	EARNING /IE	C () 2			3	1	Format No. 4
CO Des	cription	Analyze data for Batc	h reactor with the help of d	ifferent methods	5						
LO Des	cription	Calculate and analyze	data by different methods	under the consta	int volume con	dition.					
			S	SCHEME OF S	STUDY						
S. No.	Learnin	g Content	Teaching –Learning Method	Descri I	ption of T-L Process		Teach Hrs.	Pract. /Tut Hr	s. LRs	Requir	ed Remarks
1	Analysis of F Constant vol Differential m data, Integral data, determi reaction and n for batch reac problems	ume batch reactor Data: ume batch reactor. nethod of analysis of method of analysis nation of order of reaction rate constant ctor data. Numerical	Method	Faculty will e content. To identify str assignment w accordingly re tutorials will h	udents weakne ill be given ar emedial and be taken.	g ess id	9	3	text han pov	ggested t boo douts ver point	ok
			SCH	EME OF ASS	ESSMENT						
S. No.	Method o	f Assessment	Description of Assess	ment	Maximum Marks		Reso	ources Req	uired		External / Internal
	Theory exam		Theory question (includi simple numerical problem related to the learned con will be asked in the test p	ng m) ntent paper	20		q	uestion pap	er		External
			ADDITIONAL INSTRU	CTIONS FOR	R THE HOD/	FACUI	LTY (IF	ANY)			
				Nil							

RG	SPV (Diploma	a Wing) Bhopal	SC	HEME FOR LEARN OUTCOME	ING	Bra	nch Co	ode	Co	urse Code	•	CO Code	LO Code	Format No. 4
						С	0	2			3		2	
COURS	E NAME	CHEMICAL RE	EACTION EN	GINEERING			-							
CO Des	scription	Analyze data for E	Batch reactor w	vith the help of different	methods									
LO Des	cription	Calculate and ana	lysis data by d	fferent methods under t	the variabl	e volume	e conditi	on						
				SCHEM	IE OF ST	ΓUDY								
S. No.	Learni	ng Content		Teaching – Learning Method	Des	cription Proces	of T-L ss]	feach Hrs.	Prac /Tut H	et. Irs.	LRs]	Requir	ed Remarks
1	Variable volu method of a analysis data analysis of r Method of a	ume batch reactor: D nalysis data, Integra a, Total Pressure Me eactor data, Partial P nalysis of reactor da	oifferential al method of thod of Pressure ta.	Traditional Lecture Method	Faculty learning To iden weakne will be accordin and tuto taken.	will exp g content tify stud ss assign given an ngly rem prials wi	olain t. ents nment id nedial II be		8	3		Sugg text hand powe	gested boo louts er point	ok
				SCHEME (OF ASSE	SSMEN	T							·
S. No.	Method	of Assessment	Descri	ption of Assessment	Μ	laximun Marks	n		Res	ources Re	equir	ed		External / Internal
	Theory exar	n	Theory q simple nu related to will be as	uestion (including imerical problem) the learned content sked in the test paper		20			Ç	uestion pa	aper			External
			ADDITIC	ONAL INSTRUCTIO	NS FOR	THE H	OD/ FA	CULI	TY (IF	ANY)				
					Nil									

RC	GPV (Diplom	a Wing) Bhopal	SCHEME I	FOR LEARNIN JTCOME	NG I	Bran	ch Co	ode	Cou	ırse Code	Co Co	O ode	LO Code	Format No. 4
					C		0	2			4	1	1	
COURS	E NAME	CHEMICAL RE	ACTION ENGINEE	RING	I	I				<u> </u>	_			1
CO De	scription	Develop skill for	design and operation o	f reactors										
LO De	scription	Determine the size	for batch reactor, plug	Flow reactor and	CSTR									
				SCHEM	E OF STUD	Y								
S. No.	Learni	ng Content		Teaching – Learning Method	Descrip Pr	tion (ocess	of T-I s	,	Гeach Hrs.	Pract /Tut Hi	s.	LRs I	Requir	red Remarks
	Introduction of ideality, Ty reactor and d and continuouvelocity, hold space volume Performance equation for (Reactor (PFR) concept of Ba numerical pro	to Reactor Design: 1 pes of chemical react esign consideration, 6 us operation, Concep ing time, residence ti of reactor equation for batch re CSTR, Performance ed s, Comparison of CST tch, CSTR and PFR fo oblems on reactor des	deal reactor, Concept or, Configuration of Comparison of batch ot of Space time Space me distribution and eactor, Performance quation for Plug Flow R and PFR, Basic or First order reaction, sign and comparison	Traditional Lecture Method	Faculty will learning co To identify weakness a will be giv according and tutoria taken.	ll exp ntent stud ssigr en an y rem ls wil	olain t. lents hment id hedial ll be		8	3		Sugg text hand powe	ested bo outs erpoint	ok
				SCHEME O	F ASSESSM	ENT	•							1
S. No.	Method	of Assessment	Description of	Assessment	Maxin Mar	um KS			Reso	ources Req	uired	1		External / Internal
	Theory Exar	n	Theory questions learned content w the university que	related to the vill be asked in estion paper	20)			Q	uestion pap	ber			External
			ADDITIONAL IN	NSTRUCTION	S FOR THE	HO	D/ FA	CUL	ГY (IF	ANY)				
					Nil									

RO	RGPV (Diploma Wing) Bhopal	a Wing) Bhopal	SCHEME FOR L OUTCOM	LEARNING ME	Br	anch Co	ode	Cou	rse Code	CO Code	LO Code	Format No. 4
					С	0	2			4	2	-
COURS	E NAME	CHEMICAL REAG	CTION ENGINEERING		I							1
CO Des	scription	Develop skill for dea	sign and operation of reacto	ors								
LO Des	scription	Student will be able	to understand concept of cc	ombined react	or system							
			S	SCHEME O	F STUDY							
S. No.	Learni	ng Content	Teaching –Learning Method	Des	cription of Process	T-L]	leach Hrs.	Pract. /Tut Hrs	LRs	Requir	ed Remarks
1	Combined rea series& para parallel, CS ⁻ CSTR and PF problems or systems	actor system: CSTR in allel, PFR in series& IR and PFR in series, R in parallel, numerical combined reactor	Traditional Lecture Method	Faculty will content. To identify assignment accordingly tutorials wi	Il explain le students w t will be giv y remedial <i>a</i> ill be taken.	arning eakness en and nd		3	1	Sug text han pov	gested bo douts ver poin	ok t
			SCH	IEME OF A	SSESSME	NT						
S. No.	Method	of Assessment	Description of Assess	sment	Maximu Marks	n		Reso	ources Requ	ired		External / Internal
	Paper Pen Te	st	Theory question related learned content will be a the test paper	to the asked in	10		,	Test Pa	per + Rating	g Scale		Internal
		· · ·	ADDITIONAL INSTRU	UCTIONS F	OR THE H	OD/ FA	CULT	TY (IF	ANY)			
				Nil								

R	RGPV (Diploma Wing) Bhopal			CHEME FOR LEARNING OUTCOME	; Br	anch Co	ode	Cou	rse Code	CO Code	LO Code	Format No. 4
					С	0	2			4	3	
COURS	SE NAME	CHEMICAL RE	ACTION E	NGINEERING	I				I I	1		
CO De	scription	Develop skill for	design and o	operation of reactors								
LO De	scription	student will be ab	le to operate	different types of reactors								
				SCHEME (OF STUDY							
S. No.	Learnir	ng Content		Teaching –Learning Method	Descript Pro	on of T- cess	·L	Гeach Hrs.	Pract. /Tut Hrs	LRs	Require	d Remarks
1	Basic conc characterist operations, adiabatic op control in re concept of h heterogeneo and fluidize and non cat	ept of thermal ics of reactors, is adiabatic and no perations, temper eactors, elementa nomogeneous an ous fixed bed, mo d bed reactors, c alytic reactors.	sothermal n cature ary d oving bed catalytic	Traditional Lecture Method	Faculty will learning co To identify weakness assignment given and accordingly and tutoria taken.	l explair ntent. students will be remedi s will be	al	3	1	Sug text hand pow	gested boo douts /er point	k
				SCHEME OF A	ASSESSME	NT	I			I		I
S. No.	Method	of Assessment	Desc	ription of Assessment	Maximu Marks	m		Reso	ources Requ	iired		External / Internal
	Paper Pen Te	st	Theory learned the test	question related to the content will be asked in paper	10			Test Pa	per + Ratin	g Scale		Internal
			ADDITI	ONAL INSTRUCTIONS	FOR THE H	IOD/ FA	CUL	ГY (IF	ANY)			
				N	il							

RGPV (Diploma Wing) Bhopal			SCHEME FOR LEARNING OUTCOME		Bra	Branch Code		Course Code		e C	CO Code	LO Code	Format No. 4	
				C	0	2				5	1			
COURS	SE NAME	CHEMICAL REAG	CTION ENGINEERING		I	_				1		· I		
CO De	scription	student will be able t	to Identify different types o	f Catalyst as pe	r need of th	e reactio	on proce	esses.						
LO De	scription	The students will be a	ble Identify the nature and	properties of ca	atalytic reac	tions.								
			S	SCHEME OF	STUDY									
S. No.	Learnii	ng Content	Teaching –Learning Method	ription of Process	ption of T-L			Pract. /Tut Hrs.		LRs Requi		ed Remarks		
1 Extraction: Definition, Difference between leaching & extraction, Comparison with distillation as a separation operation, Fields of application of extraction, Desirable characteristics of solvent for extraction, Selectivity and distribution coefficient with respect to extraction, Representation of ternary system on triangular diagram			Method	ethod ethod ethod Faculty will end content. To identify stu assignment wi accordingly re tutorials will b				5			Sugg text hand powe	gested boo outs er point	ok	
			SCH	IEME OF AS	SESSMEN	T								
S. No.	S. No. Method of Assessme		Description of Assessment		Maximur Marks	aximum Marks			ources R		External / Internal			
Theory Exam			Theory questions related to the learned content will be asked in the university question paper		10	10 Question pape				aper			External	
		·	ADDITIONAL INSTRU	JCTIONS FO	R THE H	OD/ FA	CULI	TY (IF	ANY)					
				Nil										

RGPV (Diploma Wing) Bhopal			SCI	SCHEME FOR LEARNING OUTCOME		Bra	Branch Code			rse Code	CO Code	LO Code	Format No. 4
						С	0	2			5	2	
COURS NAME	Ε	CHEMICAL RE	ACTION EN	GINEERING		I			I				I
CO De	scription	student will be ab	le to Identify d	lifferent types of (Catalyst as p	er need of th	e reactic	on proc	æsses.				
LO De	scription	The students will	be able apply th	ne mechanism of	catalytic rea	ction for max	imum pr	roducti	on.				
				SC	CHEME O	F STUDY							
S. No.	Learnir	Learning Content			Description of T-L Process				Teach Hrs.	Pract. /Tut Hrs.	LRs Required		ed Remarks
1	Theories of catalysis-Adsorption, Intermediate ompound formation theory, different steps of olid catalysed reaction and rate controlling step			Traditional Lecture Method	Faculty will explain learning content. To identify students weakness assignment will be given and accordingly remedial and tutorials will be taken.				3	1	Sug text hand pow	gested bo louts er point	ok t
	1			SCHE	EME OF A	SSESSMEN	T	I			1		
S. No.	Method of Description Assessment			of Assessment	Maximur Marks	n		Reso	ources Requi	External / Internal			
	Pen Paper te	st Theo conter	ry questions r at will be aske	elated to the lease d in the test pape	rned er	10	,	Test p	aper+ ra	ting scale			internal
			ADDITIO	NAL INSTRU	CTIONS F	OR THE H	OD/ FA	CUL	TY (IF	ANY)			
					Nil								