रसायन अभियन्त्रण विभाग में आज दिनांक 24/01/2020 को पूर्वाह्न 11.00 बजे, विभागाध्यक्ष कक्ष में बोर्ड ऑफ स्टडिज (BOS) की बैठक सम्पन्न हुई।
बैठक मे उपस्थिति निम्न रही।

1) डा० विट्ठल एल गोले - अध्यक्ष
2) डा० रवि शंकर - सदस्य
3) डा० प्रतीक खरे - सदस्य
4) डा० ज्योति - सदस्य
5) श्री० शंकरशन शुक्ला - सदस्य

बैठक में निम्नलिखित निर्णय लिए गये।

1) विभाग के सत्र 2019-20 के Even Semester के लिये द्वितीय, तृतीय एवं चतुर्थ वर्ष के छात्र/छात्राओं के लिए Examination Pannel के गठन की संस्तुति प्रदान की गई।
2) विभाग के सत्र 2019-20 के Even Semester के PhD के छात्रों के Comprehensive Examination के लिए Examination Pannel के गठन की संस्तुति प्रदान की गई।
3.) विषय BCT-28 और BCT-34 के Syllabus का आंशिक संशोधन करते हुए नये विषय BCT-28A और BCT-34A की संस्तुति प्रदान की गई।

Dr. Jyoti
Member - Internal

Dr. Prateek Khare
24/01/2020
Member - Internal

Dr. Ravi Shankar
24/01/2020
Member - Internal

Mr. Shankarshan Shukla
24/01/2020
Member - External

Dr. Vitthal L. Gole
24/1/2020
Chairman

(233) U/L

DEPARTMENT OF CHEMICAL ENGINEERING
MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY
GORAKHPUR

Letter No. MUT/CHED/BOS/584/2020 Date: 24.01.2020

Dean (UGS &E)

Please find enclosed herewith the minutes of the meeting of the BOS of Department of Chemical Engineering held on 24/01/2020 for needful at your end.

24/01/2020
Dr. Vitthal L. Gole
Head, ChED

Copy forwarded for information & necessary action to: -

1. Controller of Examination

24/01/2020
Dr. Vitthal L. Gole
Head, ChED

file NO. 6

DEPARTMENT OF CHEMICAL ENGINEERING

MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY

GORAKHPUR – 273010, UTTAR PRADESH

Minutes of Board of Studies of Department of Chemical Engineering, M.M.M. University of Technology, Gorakhpur held on 24.01.2020 at 10:30 am.

The Following were present:

1.	Dr. Vitthal L Gole	Chairman
2.	Dr. Ravi Shankar	Member
3.	Dr. Prateek Khare	Member
4.	Dr. Jyoti	Member
5.	Mr. Shankarshan Shukla	Member

The Following decisions were taken

1. The list of Examiners for Theory & Practical Examination of Transport Phenomena (BCT-15), Sugar Technology (BCT-16), Heat Transfer Operation (BCT-17), Chemical Engineering Thermodynamics-I, (BCT-18), Alcohol Technology (BCT-31), Mass Transfer-II (BCT-32), Process Dynamics, Control & Instrumentation (BCT-33), Chemical Reaction Eng neering (BCT-34), Process Integration (BCT-34), Chemical Engineering Design (BCT-46), Heterogeneous Catalysis & Multiphase Reactor Design (BCT-71), Petroleum Engineering (BCT-72) and Project Part-II (BCT-50) for Even Semester 2019-20 sessions was finalized.
2. The list of examiners for Ph.D. comprehensive examination was finalized.
3. The syllabus of B. Tech. Chemical Engineering III, V, VI and VII Semester (effective from session 2019-20) was discussed and finalized.
4. Syllabus of subjects BCT-28 and BCT-34 discuss and modified. New codes for these subjects are BCT-28A and BCT-34A.

The meeting ended with thanks to the chairman.

Dr. Jyoti
Member- Internal

Dr. Prateek Khare
Member - Internal

Dr. Ravi Shankar
Member - Internal

Mr. Shankarshan Shukla
Member- External

Dr. Vitthal L. Gole
Chairman

BOARD OF STUDIES
DEPARTMENT OF CHEMICAL ENGINEERING
MADAN MOHAN MALAVIYA UNIVERSITY OF TECHNOLOGY
GORAKHPUR - 273010

List of Examiners for the Session 2019-20 (Even Semester)

S.N.	Subject	Internal Examiner	External Examiner
1.	Transport Phenomena, BCT-15	Dr. Vitthal L Gole	1. Dr. S. K. Sundar Assistant Professor Dept. of Chemical Engineering SVNIT, Surat, Surat 395007 Contact: +91-9869607692 2. Dr. Shabih-Ul-Hasan Assistant Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-8090803400 3. Dr. R. P. Ram Assistant Professor Dept. of Chemical Engineering IET Lucknow, Lucknow-226021 Contact: +91-9415511324
2.	Sugar Technology, BCT-16	Dr. Jyoti	1. Dr. Sushil Kumar Assistant Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-9455421398 2. Dr. S.K. Gupta Associate Professor Dept. of Chemical Engineering HBTU Kanpur Kanpur-208002 Contact: +91-9721456009 3. Dr Dhananjay Singh Associate Professor Dept. of Chemical Engineering IET Lucknow Lucknow-226021 Contact: +91-9415660718
3.	Heat Transfer Operation, BCT-17	Dr. Ravi Shankar	1. Dr. A. K. Jana Associate Professor, Dept. of Chemical Engineering, SVNIT Surat, Surat 395007 Contact: +91- 9574000192 2. Dr. Ankur Gaur Assistant Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-9910068765 3. Dr. A.D. Hiwarkar Associate Professor Dept. of Chemical Engineering BIET Jhansi, Jhansi-284128 Contact: +91-9450077707

4.	Chemical Engineering Thermodynamics-I, BCT-18	Dr. Prateek Khare	1. Dr. S. R. Patel Associate Professor, Dept. of Chemical Engineering, SVNIT Surat, Surat 395007 Contact: 0261-2201710 2. Dr. Pradip B. Dhamole Assistant Professor Dept. of Chemical Engineering VNIT Nagpur 440010 Contact: +91-9922458202 3. Dr. Sushil Kumar Associate Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-8795291646
5.	Alcohol Technology, BCT-31	Dr. Ravi Shankar	1. Dr. Suantak Kamsolian Assistant Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-7376539875 2. Dr. Rajesh Katiyar Associate Professor Dept. of Chemical Engineering HBTU Kanpur Kanpur-208002 Contact: +91-7408435801 3. Ms Siva Ramaya Sanam Sr. Principal Scientist CSIR-NEERI Zonal Lab IICT Campus, Tarnaka Hyderabad-500007 Contact: 040-27160441
6.	Mass Transfer-II, BCT-32	Dr. Prateek Khare	1. Prof. Sadhna Sachan Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-532-2271522 2. Dr. Jogendar Singh Assistant Professor Chemical Engineering, SVNIT Surat, Surat 395007 Contact: +91- 8284505262 3. Dr. Ravi Methekar Dept. of Chemical Engineering VNIT Nagpur - 440010 Contact: 0712-280-1789
7.	Process Dynamics, Control & Instrumentation BCT-33	Dr. Jyoti	1. Dr. J. V. Gohel Associate Professor Dept. of Chemical Engineering SVNIT Surat, Surat 395007 Contact: 0261-2201686 2. Dr. Dipesh Sikchand Patle Assistant Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-9003670402

			3. Ms. M. Sumathi CSIR-NEERI Zonal Lab IICT Campus, Tarnaka Hyderabad-500007 Contact: 040-27160441
8.	Chemical Reaction Engineering, BCT-34	Dr. Vitthal L Gole	1. Dr. S. K. Sundar Assistant Professor Dept. of Chemical Engineering SVNIT, Surat, Surat 395007 Contact: +91-9869607692 2. Dr. Siraj Alam Associate Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-532-2271584 3. Dr. Dharampal Singh Assistant Professor Dept of Chemical Engg NIT Raipur, Raipur
9	Process Integration, BCT-34	Dr. Prateek Khare	1. Dr Pradeep Kumar Assistant Professor Dept. of Chemical Engineering IET Lucknow Lucknow-226021 Contact: +91-9453577189 2. Dr. Sweta Assistant Professor Department of Chemical Engineering IIT BHU. Varanasi-221005 Contact: +91-8808633089 3. Dr. Anoop Kumar Gupta Assistant Professor Department of Chemical Engineering, IIT Patna. Patna- 801106 Contact: +91- 612-302 8762
10.	Chemical Engineering Design, BCT-46	Dr. Ravi Shankar	1. Dr. Harinder Singh Assistant Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-9936393111 2. Dr. Shailesh G. Agrawal Dept. of Chemical Engineering VNIT Nagpur - 440010 Contact: 0712-280-1787 3. Dr. Jyoti Prasad Chakraborty Assistant Professor Department of Chemical Engineering IIT BHU. Varanasi-221005 Contact: +91-9795396580
11.	Heterogeneous Catalysis & Multiphase Reactor Design, BCT-71	Dr. Vitthal L. Gole	1. Dr. Manju Verma Assistant Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004

			2. Dr. Shyam M. Kodape Assistant Professor Dept. of Chemical Engineering VNIT Nagpur - 440010 Contact: 0712-280-1789 3. Dr. Ravi P. Jaiswal Assistant Professor Department of Chemical Engineering IIT BHU. Varanasi-221005 Contact: +91-8953945010
12.	Petroleum Engineering, BCT-72	Dr. Jyoti	1. Dr. Ashish N. Sawarkar Assistant Professor Dept. of Chemical Engineering MNNIT Allahabad Allahabad-211004 Contact: +91-8795291646 2. Dr. Ashish S. Chaurasia Associate Professor Dept. of Chemical Engineering VNIT Nagpur - 440010 Contact: 0712-280-1789 3. Dr. Vijay Shinde Assistant Professor Department of Chemical Engineering IIT BHU. Varanasi-221005

Panel of Examiners for final year B. Tech. Project Part -II Examination (2019-20: Even Semester)

Subject	Internal Examiners	External Examiners
Project Part-II, BCT-50	Dr. Vitthal L. Gole Dr. Ravi Shankar Dr. Prateek Khare Dr. Jyoti	1. Dr Dhananjay Singh Associate Professor Dept. of Chemical Engineering IET Lucknow Lucknow-226021 Contact: +91-9415660718 2. Dr. Sweta Assistant Professor Department of Chemical Engineering IIT BHU. Varanasi-221005 Contact: +91-8808633089 3. Dr. Shaik Basha Sr. Principal Scientist CSIR-NEERI Zonal Laboratory IICT Campus, Tarnaka Hyderabad-500007 Contact: +91-8978986431

List of Practical Examiners for theory based practical subject for the session of 2019-20 (Even Semester)

S. No.	Subject	Internal Examiner	External Examiner	Department
1.	Heat Transfer Operation, BCT-17	Dr. Ravi Shankar	Mr Prashant Saini Mr. Dheerandra Singh Mr Sunil Kumar Yadav	MED
2.	Alcohol Technology, BCT-31	Dr. Ravi Shankar	Dr P P Pande Dr Krishna Kumar Dr R K Yadav	ASD
3.	Mass Transfer-II, BCT-32	Dr. Prateek Khare	Dr. Jeeoot Singh Dr. Sanjay Mishra Prof. S.C. Jaiswal	MED
4.	Process Dynamics, Control & Instrumentation BCT-33	Dr. Jyoti	Dr Shekhar Yadav Dr LB Prasad Dr Awadhesh Kumar	EED
5.	Chemical Reaction Engineering, BCT-34	Dr. Vitthal L Gole	Dr Rajesh K Yadav Dr Rajesh Kr Verma Prof S K Srivastava	ASD MED MED
6.	Chemical Engineering Design, BCT-46	Dr. Ravi Shankar	Dr Pradeep Muley Mr Vinay Kumar Singh Mr Madan Chandra Mourya	CED

Panel of Examiners for Comprehensive Examination (Subject Code: DCH0201) Written for Ph. D. Students Session 2019-2020 (Even Semester)

S. No.	Name of Ph.D. Student	Status	Specific Subject/ Board Area	Internal Examiner	External Examiner
1.	Mr. Shambhoo Sharan	Full-Time	Wastewater treatment using Electrochemical methods	Dr. Vitthal L. Gole	1. Dr. Pradeep Kumar Mishra, Prof. ChED, IIT BHU, Varanasi- 221005 2. Dr. Prasenjit Mondal, Prof., ChED, IIT, Roorkee, UK-247667 3. Dr. A. K. Jana Associate Professor, Dept. of Chemical Engineering, SVNIT Surat, Surat 395007 Contact: 9574000192
2.	Mr. Sarvesh Kumar Patel	Full-Time	Treatment of endocrine substance	Dr. Ravi Shankar	1. Dr. Bikash Mohanty, Prof. ChED, IIT, Roorkee, UK - 247667 2. Dr. Sushil Kumar, Asso. Prof. ChED, Sitapur Road, MNNIT Allahabad, UP-211004. 3. Dr. Shaik Basha Sr. Principal Scientist CSIR-NEERI Zonal Lab IICT Campus, Tarnaka Hyderabad-500007 Contact: +91-8978986431

CHEMICAL ENGINEERING DEPARTMENT
M. M. M. UNIVERSITY OF TECHNOLOGY
GORAKHPUR

Overall Credit Structure for B.Tech. Programme

Credit Courses			
Undergraduate Core (UC)		**Undergraduate Electives (UE)**	
Category	**Min. credits**	**Category**	**Min. credits**
Basic Sciences &Maths (BSM)	36	Program Electives (PE)	16
Engineering Fundamentals (EF)	24	Open Electives (OE) (Other Departments)	3
Department Core (DC)	78	Humanities & Social Science Electives (HSSE)	3
Management (M)	6		
Humanities & Social Science Core (HSSC)	4		
Project (P)	10		
Total	**158**	**Total**	**22**
		Grand Total	**180 (min.)**
Audit Courses			
Audit Courses (Other Departments)			16 (min.)
Seminar			3
Industrial/Practical Training (IT)			1
		Grand Total	**20 (min.)**

Credit Structure of B. Tech. Chemical Engineering with Specialization in Sugar and Alcohol Technology

Category / Semesters	I	II	III	IV	V	VI	VII	VIII	Total
Basic Sciences & Maths (BSM)	14	14	9	-	-	-	-	-	**37**
Engineering Fundamentals (EF)	7	7	6	6	-	-	-	-	**26**
Department Core (DC)	-	-	9	13	18	20	13	5	**78**
Management (M)	-	-	-	3	3	-	-	-	**6**
Humanities & Social Science Core (HSSC)	4	-	-	-	-	-	-	-	**4**
Project (P)	-	-	-	-	-	-	5	5	**10**
Program Electives (PE)	-	-	-	-	-	4	4	8	**16**
Open Electives (OE)	-	-	-	-	-	-	-	4	**4**
Humanities & Social Science Electives (HSSE)	-	3	-	-	-	-	-	-	**3**
	25	**23**	**24**	**22**	**21**	**24**	**22**	**22**	**184**

Freshman Year, Semester-I

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BAS-01	Engineering Mathematics-I	3	1	0	4
2.	BSM	BAS-02	Engineering Physics-I	3	1	2	5
3.	BSM	BAS-15	Applied Engineering Chemistry	3	1	2	5
4.	EF	BEE-01	Principles of Electrical Engineering	3	1	2	5
5.	HSSC	BAS-03	Professional Communication	3	1	0	4
6.	EF	BCE-10	Engineering Graphics	0	0	4	2
7.	AC		Audit Subject				
			Total	**15**	**5**	**10**	**25**

Freshman Year, Semester-II

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BAS-07	Engineering Mathematics-II	3	1	0	4
2.	BSM	BAS-08	Engineering Physics-II	3	1	2	5
3.	BSM	BAS-09	Engineering Chemistry	3	1	2	5
4.	EF	BCS-01	Introduction to Computer Programming	3	1	2	5
5.	HSSE	BAS-**	Humanities and Social Science Electives	2	1	0	3
6.	EF	BME-10	Workshop Technology	0	0	4	2
7.	AC		Audit Subject				
			Total	**13**	**5**	**10**	**24**

Sophomore Year, Semester-III

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	BSM	BAS-31	Advanced Mathematics & Statistics	3	1	0	4
2.	BSM	BCT-11	Chemical Engineering Fluid Mechanics	3	1	2	5
3.	EF	BCT-12	Materials in Chemical Engineering	3	1	0	4
4.	DC	BCT-13	Chemical Engineering Process Calculations	3	1	0	4
5.	DC	BCT-14	Chemical Engineering Mechanical Operations	3	1	2	5
6.	EF	BAS-20	Communication Skills	0	0	4	2
7.	AC		Audit Subject				
			Total	**18**	**6**	**10**	**24**

Sophomore Year, Semester-IV

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	M	MBA-01	Industrial Management	2	1	0	3
2.	DC	BCT-15	Transport Phenomena	3	1	0	4
3.	DC	BCT-16	Sugar Technology	3	1	0	4
4.	DC	BCT-17	Heat Transfer Operation	3	1	2	5
5.	EF	BCT-18	Chemical Engineering Thermodynamics-I	3	1	0	4
6.	EF	BEE-20	Simulation Techniques	0	0	4	2
7.	AC		Audit Subject				
			Total	**17**	**6**	**6**	**22**

Junior Year, Semester-V

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	M	MBA-02	Engineering and Managerial Economics	2	1	0	3
2.	DC	BCT-26	Chemical Technology	3	1	0	4
3.	DC	BCT-27	Mass Transfer-I	3	1	0	4
4.	DC	BCT-28A	Chemical Reaction Engg-I	3	1	2	5
5.	DC	BCT-29	Chemical Engineering Thermodynamics-II	3	1	2	5
6.	AC						
			Total	**17**	**6**	**4**	**21**

Note: The student is required to complete 10 days industrial training in Sugar Industries after V Semester.

Junior Year, Semester-VI

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	DC	BCT-31	Alcohol Technology	3	1	2	5
2.	DC	BCT-32	Mass Transfer-II	3	1	2	5
3.	DC	BCT-33	Process Dynamics, Control & Instrumentation	3	1	2	5
4.	DC	BCT-34A	Chemical Reaction Engineering – II	3	1	2	5
5.	PE1	BCT-51	Process Integration	3	1	0	4
6.	AC	BCT-30	Seminar				-
			Total	**15**	**5**	**8**	**24**

Note: The student is required to complete 50-65 days industrial training in Process Industries after VI Semester and both training will be evaluated in Semester VII.

Senior Year, Semester-VII

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	DC	BCT-41	Process Equipment Design	3	1	2	5
2.	DC	BCT-42	Energy Resources & Applications	3	1	0	4
3.	DC	BCT-43	Chemical Control in Sugar Plant	3	1	0	4
4.	PE2	BCT-**	Program Elective-2	3	1	0	4
5.	P	BCT-40	Project Part-I	0	0	10	5
6.	AC	BCT-45	Industrial/Practical Training				-
			Total	**12**	**4**	**12**	**22**

Senior Year, Semester-VIII

S.N.	Category	Paper Code	Subject	L	T	P	Credit
1.	DC	BCT-46	Chemical Engineering Design	3	1	2	5
2.	PE3	BCT-**	Program Elective-3	3	1	0	4
3.	PE4	BCT-**	Program Elective-4	3	1	0	4
4.	OE	BOE-**	Open Elective	3	1	0	4
5.	P	BCT-50	Project Part-II	0	0	10	5
			Total	**12**	**4**	**12**	**22**

Humanities & Social Science Electives

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
1.	BAS-11	Human Values & Professional Ethics	-	2	1	0	3
2.	BAS-12	Industrial Psychology	-	2	1	0	3
3.	BAS-13	Industrial Sociology	-	2	1	0	3

Engineering Fundamentals & Department Core (Chemical Engineering with Specialization in Sugar and Alcohol Technology)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
		Year-I					
1.	BCT-01	Applied Engineering Chemistry	-	3	1	0	4
		Year-II					
2.	BCT-11	Chemical Engineering Fluid Mechanics	-	3	1	2	5
3.	BCT-12	Materials in Chemical Engineering	-	3	1	0	4
4.	BCT-13	Chemical Engineering Process Calculations	-	3	1	0	4
5.	BCT-14	Chemical Engineering Mechanical Operations	-	3	1	2	5
6.	BCT-15	Transport Phenomena	-	3	1	0	4
7.	BCT-16	Sugar Technology	-	3	1	0	4
8.	BCT-17	Heat Transfer Operation	-	3	1	2	5
9.	BCT-18	Chemical Engineering Thermodynamics-I	-	3	1	0	4
		Year-III					
10.	BCT-26	Chemical Technology	-	3	1	0	4
11.	BCT-27	Mass Transfer-I	-	3	1	0	4
12.	BCT-28A	Chemical Reaction Engg-I	-	3	1	2	5
13.	BCT-29	Chemical Engineering Thermodynamics-II	-	3	1	2	5
14.	BCT-31	Alcohol Technology	-	3	1	2	5
15.	BCT-32	Mass Transfer-II	BCT-27	3	1	2	5
16.	BCT-33	Process Dynamics, Control & Instrumentation	-	3	1	2	5
17.	BCT-34A	Chemical Reaction Engineering - II	-	3	1	2	5
		Year-IV					
18.	BCT-40	Project Part-I	-	0	0	10	5
19.	BCT-41	Process Equipment Design	-	3	1	2	5
20.	BCT-42	Energy Resources & Applications	-	3	1	0	4
21.	BCT-43	Chemical Control in Sugar Plant	-	3	1	0	4
22.	BCT-45	Industrial/Practical Training	-	0	0	2	1
23.	BCT-46	Chemical Engineering Design	-	3	1	2	5
24.	BCT-50	Project Part-II	BCT-40	0	0	10	5

Program Electives (Chemical Engineering)

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
		PE-1 (VI Semester)					
1.	BCT-51	Process Integration	-	3	1	0	4
2.	BCT-52	Piping Design	-	3	1	0	4
3.	BCT-53	Statistical Design of Experiments	-	3	1	0	4
4.	BCT-54	Process Flow Sheet Simulation	-	3	1	0	4
5.	BCT-55	Food Technology	-	3	1	0	4
		PE-2 (VII Semester)					
1.	BCT-61	Fertilizer Technology	-	3	1	0	4
2.	BCT-62	Nuclear Engineering	-	3	1	0	4

3.	BCT-63	Computational Fluid Dynamics	BCT11	3	1	0	4
4.	BME-55	Total Quality Management	-	3	1	0	4
		PE-3 & PE-4 (VIII Semester)					
1.	BCT-71	Heterogeneous Catalysis & Multiphase Reactor Design	BCT34	3	1	0	4
2.	BCT-72	Petroleum Engineering	-	3	1	0	4
3.	BCT-73	Polymer Science & Technology		3	1	0	4
4.	BCT-74	Optimization Techniques in Chemical Engineering	-	3	1	0	4
5.	BCT-75	Standardization & Quality Assurance in Chemical Industry	-	3	1	0	4
6.	BCT-76	Industrial Safety & Hazard Management	-	3	1	0	4
7.	BAS-22	Nano Technology	-	2	1	0	3
8.	BCT-77	Project Engineering & Management	-	3	1	0	4
9.	BCT-78	Bioprocess Engineering Principles	-	3	1	0	4
10.	BCT-79	Nuclear Reactor Technology	-	3	1	0	4

Audit Courses for B. Tech. (Chemical Engineering) Students

S.N.	Paper Code	Subject	Prerequisite Subject	L	T	P	Credits
		Year-I					
1.	BAS-04	Environmental Chemistry	-	3	1	0	4
2.	BAS-05	Environment & Ecology	-	2	1	0	3
3.	BME-02	Fundamentals of Mechanical Engineering	-	3	1	2	5
4.	BME-03	Manufacturing Processes		3	1	0	4
5.	BEC-01	Fundamentals of Electronics Engineering	-	3	1	2	5
6.	BAS-06	Space Sciences	-	2	1	0	3
		Year-II					
1.	BAS-32	Polymer Chemistry	-	3	1	0	4
2.	BME-56	Energy Management	-	3	1	0	4
3.	BEE-16	Electromechanical Energy Conversion	-	3	1	2	5
4.	BEE-15	Introduction to Microprocessors	-	3	1	2	5
5.	MAS-109	Foreign Language-French	-	2	1	0	3
6.	MAS-110	Foreign Language-German	-	2	1	0	3
7.	MAS-111	Foreign Language-Spanish	-	2	1	0	3
		Year-III	-				
1.	BCS-73	Neural Network & Fuzzy Systems	-	3	1	0	4
2.	BCE-21	Environmental Impact Assessment & Management	-	3	1	0	4
3.	BCS-15	Database Management System	-	3	1	2	5

BCT-28A: CHEMICAL REACTION ENGINEERING - I

Course Category	: Departmental Core (DC)
Pre-requisite Subject	: NIL
Contact hours/week	: Lecture: 3, Tutorial:1, Practical: 2
No of Credits	:5
Course Assessment Methods	: Continuous assessment through tutorials, attendance, home assignments, quizzes and one minor test and one major theory and practical test.
Course Outcome	Students expected to: ○ understand kinetics of homogeneous reactions ○ design isothermal reactors ○ understand parallel and multiple reactions ○ understand fluid-fluid reactions

Syllabus

UNIT 1: Kinetics of Homogeneous Reactions

Rate of Reaction, Molecularity and order of reaction, Mechanism of reaction, temperature dependency from thermodynamics, Integral and differential methods for analyzing kinetic data. interpretation of constant volume reactor, zero, first, second and third order reactions, half-life period, irreversible reaction in parallel and series, catalytic reaction, auto catalytic reaction, reversible reactions. **[9 Lectures]**

UNIT 2: Design of Isothermal Reactor

Design of batch, continuous stirred tank, plug flow reactors, optimization of reactor size, reactors in series/parallel, recycle reactor, reactor design for multiple reactions. **[9 Lectures]**

UNIT 3: Parallel and Multiple Reactions

Design of parallel reactions, Irreversible first order reactions in series, first order followed by zero order reaction, zero order followed by first order reaction, successive irreversible reactions of different orders, reversible reactions, irreversible series-parallel reactions, temperature and pressure effect on single and multiple reactions, choosing right kind of reactor **[9 Lectures]**

UNIT 4: Fluid-Fluid Reactions

Fluid-fluid reactions: kinetics, design, Fluid-particle reactions: kinetics and design **[9 Lectures]**

Text Books:

1. Smith J. M., 'Chemical Engineering Kinetics', 3rd Edition, McGraw-Hill (1990).
2. Levenspiel, O., 'Chemical Reaction Engineering', 3rd Edition, John Wiley (1998).

Reference Book:

1. Keith J. Laidler, 'Chemical Kinetics', 3rd Edition, Pearson (2013)
2. Coulson and Richardson's, 'Chemical Engineering Volume III', 3rdElsevier (2006)

CHEMICAL REACTION ENGINEERING -I LAB (0:0:2)

1. Second order reaction
2. Pseudo First order reaction
3. Batch reactor: Second order reaction
4. Batch reactor: Pseudo first order reaction
5. Study of second order reaction for unequal concentration of reactants
6. Arrhenius Law
7. Continuous stirred tank reactor
8. Plug flow reactor
9. To study operation of an adiabatic batch reactor
10. To study combined Flow Reactor
11. To study cascade Continuous Stirred Tank Reactor

BCT-34A CHEMICAL REACTION ENGINEERING - II

Course Category	: Department Core (DC)
Pre-requisite Subject	: NIL
Contact hours/week	: Lecture: 3, Tutorial:1, Practical: 1
No of Credits	: 5
Course Assessment Methods	: Continuous assessment through presentation and interaction with supervisors
Course Outcome	Students are expected to understand concept of: o heterogeneous processes o diffusion control reactions o gas-solid and gas-liquid reactions o fluidized bed reactors

Unit - I: Heterogeneous Processes

Global rates of reaction. Catalysis. General characteristics of catalysis. Physical adsorption and chemisorption. Adsorption isotherms, Determination of surface area of a catalyst. Classification of catalyst, catalyst preparation. Catalyst deactivation. Langmuir Himshelwood and Eley – Rideal model. Rate equation when surface reaction, adsorption and desorption control. External Diffusion effects on heterogeneous catalytic reaction. Modeling diffusion without reaction **[9 Lectures]**

Unit - II: Diffusion control reactions

External resistance to mass transfer. Mass transfer limited reaction in packed beds. Diffusion and reaction in porous catalyst pellets. Effective diffusivity and effective thermal conductivity. Internal effectiveness factor. Thiele modules. Mass transfer and reaction in a packed bed reactor. Gas- solid non-catalytic reactions. **[9 Lectures]**

Unit - III: Gas – Solid/Gas-liquid reactions

Limitation of shrinking core model. Determination of the rate controlling step. Design of gas solid particle reaction. Gas – liquid reaction. Absorption combined with chemical reaction. Mass transfer coefficients and kinetic constants. Application of film penetration and surface renewal theories. Hatta number and enhancement factor for first order reaction. Tower reactor design. **[9 Lectures]**

Unit IV: Fluidized bed reactors

Phenomena of Fluidization, liquid like behaviour of fluidized beds, advantages and disadvantages of fluidized beds, different types of fluidized beds and its applications. Heat and Mass Transfer in Fluidized Beds: Variables affecting heat transfer rate, heat transfer at the wall of containing vessel, heat transfer to immersed tubes. **[9 Lectures]**

References:

1. J. M. Smith, "Chemical Engineering Kinetics", McGraw Hill College, 3rd Edition (1981)
2. H. S. Fogler, "Elements of Chemical Reaction Engineering", Prentice Hall of India Pvt Ltd, 4th Edition (2008)

3. O. Levenspiel, "Chemical Reaction Engineering", John Wiley, 3rd Edition (2006)
4. C. G. Hill, "An Introduction to Chemical Engineering Kinetics & Reactor Design", John Wiley, 2nd Edition (1994)
5. B. Viswanathan, S. Sivasanker, A. V. Ramaswamy, "Catalysis: Principles and Applications", Alpha Science International, Ltd (2002)
6. R. A. Van Santen, Piet W. N. M. Van Leeuwen, Jacob A. Moulijn, Bruce A. Averill, "Catalysis: An Integrated Approach", Elsevier Science, 2nd Edition (1994)
7. D. Kunii, O. Levenspiel, "Fluidization Engineering", Butterworth-Heinemann, 2nd Edition (1991)

CHEMICAL REACTION ENGINEERING -II LAB (0:0:2)

1. Expanded Course description:
2. To study performance of CSTR connected in series
3. To study performance of PFR & CSTR in Series
4. R.T.D. Studies in Plug Flow Reactor
5. R.T.D. Studies in CSTR
6. R.T.D. Studies in Packed Bed Reactor
7. Semi Bath Reactor
8. Condensation Polymerization Reactor
9. Fluidized Bed Reactor
10. Modeling and simulation of CSTR
11. Modeling and simulation of PFR
12. Modeling of kinetic reactions