PITHAPUR RAJAH'S GOVERNMENT COLLEGE (AUTONOMOUS)
KAKINADA - 533 001, EAST GODAVARI, A.P.

Affiliated to Adikavi Nannaya University

NAAC Accredited with "A" Grade (3.17 CGPA)

BOARD OF STUDIES OF CHEMISTRY

B.Sc. Petrochemicals Under CBCS

Meeting Minutes/Resolutions

22-23

Convened on 03 November 2022

DEPARTMENT OF PETROCHEMICALS
P. R. GOVT. COLLEGE (Autonomous)

Opp. Mc Laurin High School, Raja Ram Mohan Roy Road, Kakinada

www.prgc.ac.in; e-mail: chemistry_dept@prgc.ac.in

PROCEEDINGS OF THE PRINCIPAL,
P.R. GOVERNMENT COLLEGE(A),KAKINADA-A.P

Present: Dr. B. V. Tirupanyam, M.Sc; Ph.D.

R.C.No.12A/A.C/BOS/2022-23, Dated: 24.09.2022

SUB: P.R. Government College(A), Kakinada-UG Board of Studies (BOS). Program/Course-B.Sc,/Petrochemicals, Nomination of Members- Orders issued.

REF: 1. UGC Guidelines of for Autonomous Colleges-2018.

ORDERS:

The Principal, P.R. Government College(A), Kakinada is pleased to constitute UG Boards of Studiesin Petrochemicals for framing the syllabi in Petrochemicals Subject for all Semesters duly following the norms of the UGC Autonomous guidelines.

S.No	Name of the Nominee	Designation
1	Dr. D. Chenna Rao	Chairman& Lecturer Incharge.
2	Dr. M. Trinadh	University Nominee Lecturer in Chemistry Govt. Degree College (Autonomous), Rajahmundry. Ph: 8639551783
3	Dr. V. Narayana Rao	Subject Expert Lecturer in Chemistry Govt. Degree College ,Perumallapuram.
4	Dr. B. Ramesh Babu	Representative from Industry Founder & M.D., BogaR laboratories,Peddapuram. Ph: 9701712028.
5	V. Sanjeeva Kumar	Member
6	T.V.V.Satya Narayana	Member
7	P. Vijay Kumar	Member
8	V. Rambabu	Member
9	G. Pavani	Member
10	Dr. N. Bujji Babu	Member
11	Dr. Ch. Praveen	Member
12	V. Venkateswara Rao	Member
13	G. Sai Subrahmanyam	Member
14	Ch. Siva Rama Guru Charan	Student Alumni Member
15	K. Krupalavanya II MCPC	Student Member
16	V. Vijay Babu II MCPC	Student Member

The above members are requested to attend the BoS meeting on_____2022 and share their valuable reviews, and suggestions on the following functionaries.

- Prepare syllabi for the subject keeping in view the objectives of the college, interest of the stake holders and National requirement for consideration and approval of the IQAC and Academic Council.
- Suggested methodologies for innovative teaching and evaluation techniques.
- Suggest the panel of Names to the academic council for appointment of Examiners.
- Coordinate research, teaching, extension and other activities in the Department of the college.

PRINCIPAL
P. R. Government College(A),
Kakinada

VISION AND MISSION OF THE COLLEGE

Vision

To provide the right academic environment paving way for intellectual excellence, humane feelings and social commitment. The college believes in providing quality education for the socially disadvantaged, economically weaker sections of the society and thereby help them move up the ladder of success and social order.

Mission

- To impart holistic education with special emphasis on character, culture, updated knowledge and skill-oriented learning.
- To make the students enjoy the fruits of globalization without prejudice to their local and cultural environment.
- To impart necessary life skills so as to make them face any challenge in the bigger world – Social, ethical, psychological or professional.

Signatures of the members who attended the

Board of studies in Petrochemicals 03- 11 -2022 at 10.00 AM

S. No.	Name of the member	Designation	Signature
1	Dr. D. Chenna Rao	Chairman, Board of Studies, Lecturer in charge	
2	Dr. M. Trinadh	University Nominee Lecturer in Chemistry, Govt.College(A), Rajamahendravaram	
3	Dr. V. Narayana Rao	Subject Expert Lecturer in Chemistry, GDC, Perumallapuram	
4	Dr. B. Ramesh Babu	Representative from Industry Founder & M.D., BogaR laboratories, Peddapuram. Ph: 9701712028.	
5	Sri. V.Sanjeeva Kumar	Member Lecturer in Chemistry	
6	Sri. T.V.V. Satyanarayana	Member Lecturer in Chemistry	
7	Sri. P. Vijaya Kumar	Member Lecturer in Chemistry	
8	Sri. V. Rambabu	Member Lecturer in Chemistry	
9	Sri.G.Pavani	Member Lecturer in Chemistry	
10	Dr. N. Bujji Babu	Member Lecturer in Chemistry	
11	Dr. Ch. Praveen	Member Lecturer in Chemistry	
12	V. Venkateswara Rao	Member Lecturer in Chemistry	
13	G.Sai subrahmanyam	Member Lecturer in Chemistry	
14	Ch. Siva Rama Guru Charan	Student Almuni	
14	K. Krupa Lavanya II MCPC	Student Member	
15	V. Vijaya Babu II MCPC	Student Member	

P.R. GOVT.COLLEGE (A), KAKINADA

DEPARTMENT OF PETRO CHEMICALS

Minutes of board of studies (BOS) meeting

2022-23 on _____2022

Meeting of Board of Studies in Petro Chemicals is convened on _____ through offline at P.R. Govt. College (A), Kakinada.

Venue:

Conference Hall, Dt: ------.

The Principal Dr. B.V. Tirupanyam,

Chairman: Dr. D. Chenna Rao

Chairman and lecturer in charge,

Department of Chemistry

University Nominee: Dr. M. Trinadh,

Lecturer in Chemistry,

Govt. College (Autonomous), Rajamahendravaram,

Industrialist: Dr. B. Ramesh Babu,

Founder & M.D., BogaR laboratories, Peddapuram,

Subject Expert Dr.V.NarayanaRao,

Lecturer in Chemistry,

Government Degree College Perumallapuram,

All the faculty members of Chemistry Department and student alumni attended the meeting.

Agenda:

- To discuss the Semester System and Choice Based Credit System (CBCS) being implemented for the past 06 years, i.e., w.e.f. 2015-16.
- To discuss and approve the Continuation/Modifications of the syllabus for the Odd & Even Semesters of I, III & V Years for 2022-23.
- Grant of Extra credits for Online SWAYAM MOOCs etc.
- Syllabus, Model Question Papers and Model Blue Prints for I, II, III, IV, Vand VI Semesters.
- Teaching learning methodology by 60:40 (External: Internal) ratio for the present II- and III-Year Students and 50:50 (External: Internal) ratio I Year Students w.e.f. 2022-23.
- Panel of paper setters and examiners.
- Proposals for Community Service Projects/Extension activities for the benefit of the society.
- Department action plan for 2022-23.

To discuss and resolve the minor modifications/refinement if any, in the Chemistry cluster electives CI, CII & CIII as majority of the students opting this cluster as their choice. Any Other Proposal with the Permission of the Chairman.

Resolutions:

The following agenda items are discussed and resolutions are made.

- It is resolved to continue choice based credit system in the chemistry combination programmes as per the directions of the CCE, Vijayawada to the first year and second year and final year student's w.e.f. 2018-19.
- It is resolved to approve the Continuation/Modifications of the syllabus for the Odd & Even Semesters of I, II & III Years for 2021-22.
- It is resolved to encourage students to active participation in various activities and give extra credits for students after successful completion of a particular activity such as SWAYAM, MOOCS etc., (Annexure –II)
- It is Resolved to follow 60%-40% external and internal w.e.f. 2017-2018 admitted batches and it continued in present second and third year students.
- It is resolved to follow 50%-50% external and internal for first year w.e.f 2021-22 admitted batch.
- It is resolved that every student should maintain 75% attendance for both theory and practicals inorder to attend the Mid and Semester examination.
- It is resolved to conduct departmental activities such as OZONE DAY, CHEM FEST, CHEMISTRY DAY and SCIENCE DAY. (Annexure-I)

- It is resolved to implement the recommended andragogy for the first semester 2022-23 9.Resolved to conduct practical examinations semester wise.
- It is resolved to organize guest lectures by eminent professors.
  Resolved to implement pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.
- It is resolved to maintain status quo for same question paper pattern in II, III years. The following paper setters are recommended

1. Sri. U. Sai Krishna, Govt. College(A), Rajamahendravaram.
2. Dr. M. Trinadh, Govt. College(A), Rajamahendravaram
3. Dr. V. Narayana Rao, GDC, Perumallpuram.
4. Sri. M. Sudhakar, Govt. College(A), Rajamahendravaram.
5. Sri. K. Anand, GDC, Pithapuram.
6. Dr. CH. Vijay Vardhan, GDC, Perumallpuram.
7. Sri B. Surendra, GDC, Tadepaliigudem.

Semester wise/ Paper wise Marks / Credits allotted.

YEAR	SEMESTER	PAPER	TITLE	MARKS	CREDITS
I	I	I	Fundamentals of Petroleum Production	100 (50:50)	04
			Practical – I	50	02
	II	II	Modern Petroleum Refining Processes	100 (50:50)	04
			Practical – II	50	02
II	III	III	Introduction to Chemical Engineering	100 (50:50)	04
			Practical – III	50	02
	IV	IV	Heat Transfer and Polymers	100 (50:50)	04
			Practical – IV	50	02
III		V	Mass Transfer operations	100 (50:50)	04
			Practical – V	50	02
	V	VI	Petrochemicals-I	100 60:40	04
			Practical – VI	50	02
		VII	Petrochemicals II	100 60:40	04
			Practical - VII	50	02

	Pithapur Rajah's Government College (Autonomous) Kakinada	Program &Semester II B.Sc. Mathematics, Chemistry, Petrochemicals & Semester-IV P-IV			
CourseCode	Heat transfer operations and Polymers-IV				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:	Heat transfer and polymers	60	10	30	4+1

Course Objectives:

To gains basic knowledge on heat transfer operations and manufacture of polymers.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Gains knowledge on basic laws
CO2	Gains knowledge on basic principle applied in indusries
CO3	Gains knowledge on basic properties of solutions
CO4	Gains knowledge on fluid flowing devices
CO5	Gains knowledge on chemical reactors

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

Syllabus:

UNIT-I:

Heat Transfer:

Conduction – Fourier's Law, conduction through plane wall and through resistances in series, Heat flow through thick walled cylinder, Heat flow through a sphere. Thermal Insulation

Radiation: Laws of Black – Body radiation, Kirchhoff's law, Stefan- Boltzmann law, Planck's law, concept of Black Body

UNIT-II: Heat Transfer :

Convection : Natural and forced convection – Heat Transfer with change in Phase – Mechanism of Condensation Heat Transfer and Boiling Heat Transfer, Over all Heat Transfer coefficients, Logarithmic Mean Temperature difference.

Flow arrangements in Heat exchangers, Variation of Fluid Temperatures in Heat exchangers, Heat Transfer Equipment. Double pipe heat exchanger andshell and tube heat exchanger.

UNIT-III: Evaporation:

Material and Enthalpy balances for single effect – Evaporator
– Types of Evaporators-Common methods of feeding multiple evaporationsystem –
Multiple effect Evaporation, Vapour Recompression, capacityand economy of evaporator

UNIT-IV:

Polymers of Olefins

Polymers of Ethylene: High Pressure Polyethylene (LDPE) – conventional and slurry processes, Low pressure Poly Ethylene (HDPE) – Zeigler process and Solvay process.

Polymers of Propylene – different forms of polypropylene – manufacture of Isotactic polypropylene.

UNIT-V:

Polymers of Olefins

Poly Vinyl Chloride: Manufacture of PVC by suspension polymerization process and emulsion polymerization process.

Polystyrene: Manufacture of Polystyrene by mass polymerization and emulsion polymerization.

Manufacture of Polybutadiene and Poly Tetrafluoro ethylene (PTFE)

P.R.GOVT. COLLEGE(A), KAKINADA.

II B.SC.- PETROLEUM & PETROCHEMICALS

MODEL QUESTIONPAPER

PAPER – IV – HEAT TRANSFER AND POLYMERS

Time: 2 Hrs. **Max. Marks 50**

PART-I

Answer any THREE questions by attempting at least ONE question from each section

Each Question carries **TEN** marks. 3X10=30M

SECTION – A

1. Question from Unit –I
2. Question from Unit –II
3. Question from Unit –III

SECTION – B

4. Question from Unit - IV
5. Question from Unit – V
6. Question from Unit– IV

PART-II

Answer any **FOUR** Questions from the following.

Each Question carries **FIVE** marks. 4 x 5 =20M

7. Question from Unit - I
8. Question from Unit – II
9. Question from Unit – III
10. Question from Unit – IV
11. Question from Unit – V
12. Question from Unit – II
13. Question from Unit – IV

Note to Paper Setter: -

In section I one essay question is to be set from each of the five units.

Similarly in Section II, one short answer question is to be set from each of the 5 units.

P.R.GOVT. COLLEGE(A), KAKINADA.

II B.SC., PETROLEUM & PETROCHEMICALS

SEMESTER - IV

PAPER –IV: HEAT TRANSFER AND POLYMERS

ESSAY QUESTIONS: 10M

UNIT –I:

1. a. Derive the steady state heat transfer equation through a plane wall

b. Derive the steady state heat transfer equation through a flat wall of three layers which are I perfect thermal contact.

2. a. Derive the steady state heat transfer equation through a thick walled cylinder

b. Derive the steady state heat transfer equation through a sphere

3. a. State and explain Kirchhoff's law

b. Explain about the laws of Black body radiation

UNIT –II:

1.a. Explain the mechanism of condensation heat transfer.

b. Derive the expression for overall heat transfer coefficient based on insidearea

2.a. Explain about the variation of fluid temperature in Heat Exchanges.

b. With a neat sketch describe about the design and functioning of shelland tube heat exchanger

3. a. Explain in detail about heat transfer equipment

b. Write about the design and functioning of double pipe heat exchanger.

UNIT –III:

1.a. Write about the material and enthalpy balance calculations for single effect evaporator.

b.With a neat diagram explain he design and functioning of long tube vertical evaporator

2.a.With a neat diagram describe the Design and functioning of Forcedcirculation type Evaporator.

b. With a neat sketch, explain Thermal Vapour Recompression process.

UNIT –IV:

1.a. With a neat flow diagram describe the manufacturing of LDPE by conventional proces

b. With a neat flow diagram describe the manufacturing of LDPE byslurry process

2.a. With a neat flow diagram describe the manufacturing ofHDPE by Ziegler process

b. With a neat flow diagram describe the manufacturing of HDPE by Solvay process.

UNIT –V:

1.a. With a neat flow diagram describe the manufacturing of Poly vinylchloride by suspension process

b.With a neat flow diagram describe the manufacturing of Poly vinylchloride by emulsion polymerization process.

2.a With a neat flow diagram describe the manufacturing of poly styrene by bulk polymerization process

b. With a neat flow diagram describe the manufacturing of poly styrene by emulsionby polymerization process.

SHORT ANSWER QUESTIONS: 5 MARKS

UNIT - I:

1. Explain about Fourier's law of conduction
2. Write about thermal insulation
3. Explain the concept of black body
4. Write about Planck's law
5. Explain about Stefan Boltzmann's law

UNIT - II:

1. Write about types of convections
2. Explain about Logarithmic mean temperaturedifference

UNIT - III:

1. Write briefly about Capacity and economy of an evaporator
2. Write about the process of evaporation
3. Explain the types of evaporators

UNIT - IV:

1. Manufacturing of isotactic poly propylene
2. Ziegler Natta catalyst
3. Different types of poly propylene

UNIT - V:

1. Manufacturing of poly butadiene
2. Manufacturing of Poly tetrafluoro ethylene

IMPORTANT NOTE TO PAPER SETTER:

In section - I, one essay question is to be set from each of the five units.

Similarly in Section - II, one short answer question is to be set from each of the five units.

Questions should be given from **QUESTION BANK.**

P.R.GOVT. COLLEGE(A), KAKINADA.

II B.SC., PETROLEUM & PETROCHEMICALS

PRACTICAL SYLLABUS

SEMESTER - IV

PRACTICAL - IV (At the end of Third Semester)

1. Determination of viscosity index
2. Redwood viscometre.
3. Engler viscometre.
4. Ostwald viscometre.

SCHEME OF EVALUATION

Max. Marks: 50

5. Procedure to be written in the first 15 minutes **15 Marks**
6. Recording of data and reporting the value...

Up to 2% error	**25 Marks**
Error up to 5%	**15 Marks**
Error greater than 5%	**10 Marks**

7. Viva – Voice **5 Marks**
8. Record **5 Marks**

Referencebooks

1. Introduction to Chemical Engineering by Salil K. Ghosal andothers. Tata Mc. Graw-Hill Publishing Company.
2. Heat transfer operations – I and II by K.A. Gavhane. Nirali Prakashan – Pune.

WebLinks:

1.https://youtu.be/P--6V7Lusoo

2.https://youtu.be/_3JVLyMv5II

3. https://youtu.be/XL2IqiImLO4

Activities & Benchmarks Proposed (Table)

1.Assignments
2.Seminars
3.Group Discussion
4. Quiz

CO-PO Mapping:

(1:Slight [Low]; 2:Moderate[Medium]; 3:Substantial[High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO 1	3	2	3	1	3	2	3	2	2	2	3	3	2
CO 2	3	3	2	3	2	2	1	2	2	2	3	3	2
CO 3	3	3	3	3	3	2	2	2	2	2	3	3	2
CO 4	3	3	3	3	3	2	2	2	2	2	3	2	3
CO 5	3	2.8	2.8	2.5	2.8	2	2	2	2	2	3	2.8	2.3

Weightage to content
Semester -IV
Paper-IV

S.No	Course Content	Long Answer	Short Answer	Total marks	As per Blooms Taxonomy
1	Heat transfer-I	1	1	15	Understanding, Application
2	Heat transfer-II	1	2	20	Remembering, Understanding
3	Evapouration	1	1	15	Application & Creation
4	Polymers of olefins-I	2	2	30	Remembering, Understanding
5	Polymers of olefins-II	1	1	15	Application & Creation
	TOTAL	**6**	**7**	**95**	

	Pithapur Rajah's Government College (Autonomous) Kakinada	Program &Semester III B.Sc. Mathematics, Chemistry, Petrochemicals & Semester-IV (P-V)			
CourseCode	MASS TRANSFER OPERATIONS				
Teaching	Hours Allocated: 60 (Theory)	L	T	P	C
Pre-requisites:		60	10	30	4+2

Course Objectives:

To gains knowledge on mass transfer operations of distillation.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Gains knowledge on separation and purification on C4 component gases
CO2	Gains knowledge on properties and separation of natural gases
CO3	Gains knowledge on production and treatment of synthesis gas
CO4	Gains knowledge on chemicals obtained from syn gas
CO5	Gains knowledge on production of synthetic detergents

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development Employability Entrepreneurship

Syllabus:

UNIT-I

Absorption (Gas Absorption) -Selection criteria for solvent in Gas absorption - material balances for a packed column – Pressure drop in packed columnsGas Absorption equipment – Tower packing's.

Adsorption: Types of Adsorption - Adsorption equipment

UNIT-II

Distillation (I):

Concept of distillation – vapour – liquid equilibrium – relative volatility – Boiling point diagram -

Various methods of distillation – differential distillation, Flash distillation, Fractionating column - Analysis of Fractionating columns – calculations of number of theoretical stages by McCabe – Thiele method.

UNIT-III

Distillation (II):

Derivation of equation of q-line, effect of feed condition on slope of q-line, calculation-of number of plates and location of feed plate, Importance of reflux ratio-concept of total reflux and minimum reflux ratio-optimum reflux ratio. – Equipment for Gas-liquid operations.

UNIT-IV

Extraction:

Liquid – liquid extraction – extraction schemes – distribution coefficient – triangular diagram – selection of solvent for extraction – single stage equilibrium extraction – multistage extraction process – Industrial liquid – liquid extraction equipment's.

UNIT-V

Crystallization & Drying -

Solubility and solubility curves, saturation and super-saturation – methods of achieving super saturation – The Mier's super saturation theory – mechanism of crystallization process – material and Heat balances in crystallization – classification and construction of crystallization equipment. Drying: Material and Heat balance equations in Continuous drying operation

- Drying equipment - Tray dryer, rotary dryer & Spray dryer.

QUESTION BANK
Essay Questions: 10 M

UNIT –I:

1.a. Define gas absorption. Give suitable examples.
b.What factors should be considered while selecting solvent for gas absorption
b. Explain about the material balances for packed columns
2.a. Draw a neat sketch of packed column and write its construction andfunctioning.
b. Write about the pressure drop in packed columns.
3.a. State and derive Longmuir's adsorption isotherm
b. Explain in detail about adsorption equipment

UNIT –II:

1.a. What is differential distillation? Derive Rayleigh equation
b. Describe the details of constructing boiling point diagrams
2.a. Explain about the Flash distillation and derive the expression for operating material balance of flash distillation.
b. Explain in detail about the method of carrying out analysis of fractionatingcolumns.

Unit-III:

1.a. Explain the flow through feed plate for various thermal conditions of feed.
b. What is q – factor? Derive the expression for q – factor and write about the effect of feed conditions on feed line.
2.a. Explain the method of calculating the total number of plates andlocation of feed plate in a fractionating column.
b. Explain the concepts of minimum and total Reflux Ratios.

UNIT –IV:

1.a. Explain the principles of Liquid – liquid extractions and Explain briefly the selection criteria for solvents to be used for liquid – liquid extraction
b. Explain about single stage equilibrium extraction

2.a. Explain about the extraction schemes used in Liquid – liquid extraction.
b. Write about multi stage extraction process.

UNIT –V:

1. a. Define solubility and write in detail about solubility curves
b. Write in detail about the Miers super saturation theory
2. a. Explain in detail about the mechanism of crystallization
b. Carry out the material balance calculations for crystallization process.

3. a. With a neat sketch explain the construction and working of continuous vacuumcrystallizer.
b. With a neat sketch explain the construction and working of agitated tankcrystallizer.

Short answer questions: 03 M

UNIT - I:

1.Write about types of adsorption
2.Explain about Freundlisch adsorption isotherm
3. What factors should be considered while selecting solvent for gasabsorption
4. What is gas absorption? Give example

UNIT - II:

1. Explain briefly the concept of Distillation
2. Write a short note on Vapour – Liquid equilibria
3. Write a short note on relative volality

UNIT - III:

1.Explain the terms Reflux and Reflux ratios
2.Write about Optimum reflex ratio
3.Write about q – line

UNIT - IV:

1. Write about triangular diagrams
2. Write about distribution coefficient
3. Explain briefly about Solvent extraction.

UNIT - V:

1.Explain the terms saturation and super saturation
2.Write briefly about the methods of super saturation
3. Write a short note on drying process

IMPORTANT NOTE TO PAPER SETTER:

In section - I, one essay question is to be set from each of the five units. Similarly in Section - II, one short answer question is to be set from each of the five units. Questions should be given from QUESTION BANK.

PRACTICAL – V (At the end of Fourth Semester)

1) Determination of Specific gravity by Specific gravity bottle.
2) Determination of Specific gravity by Pyknometer.
3) Simple Distillation
4) Steam distillation

SCHEME OFVALUATION

Max. Marks: 50

1) Procedure to be written in the first 15 minutes 10 Marks
2) Recording of data and reporting the value 15
   Marks upto 2% error
   Error up to 5% 10 Marks
   Error greater than 5% 5 Marks
3) Viva – Voice 5 Marks
4) Record 5 Marks

Referencebooks

1. Introduction to Chemical Engineering by Salil K Ghosal and others Tata Mc.Graw – Hill Publishing Company.
2. Unit operations – I and II by K.A. Gavhane. Nirali Prakashan – Pune

WebLinks:

1. https://youtu.be/SmchkR7jRIE
2. https://youtu.be/5nTkArHe4bY

Activities & Benchmarks Proposed (Table)

1. Assignments
2. Seminars
3. Group Discussion
4. Quiz

CO-PO Mapping:

(1:Slight [Low]; 2:Moderate[Medium]; 3:Substantial[High], '-':No Correlation)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO 1	3	2	3	1	3	2	3	2	2	2	3	3	2
CO 2	3	3	2	3	2	2	1	2	2	2	3	3	2
CO 3	3	3	3	3	3	2	2	2	2	2	3	3	2
CO 4	3	3	3	3	3	2	2	2	2	2	3	2	3
Avg	3	2.8	2.8	2.5	2.8	2	2	2	2	2	3	2.8	2.3

Weightage to content
Semester -V
Paper-VI

S.No	Course Content	Long Answer	Short Answer	Total marks	As per Blooms Taxonomy
1	Absorption	2	1	25	Understanding, Application
2	Distillation-I	1	2	20	Remembering, Understanding
3	Distillation-II	1	1	15	Application & Creation
4	Extraction	1	2	20	Remembering, Understanding
5	Crystallisation & drying	1	1	15	Application & Creation
	TOTAL	**6**	**7**	**95**	

II B.Sc., Petroleum & Petrochemicals

MODEL QUESTION PAPER

Paper V- Mass transfer operations

Time: 2 Hrs **Semester -IV** **Max. Marks 50**

Section – I

Answer any Three questions from the following choosing atleast one from any part
All questions carry equal marks **3 x 10 =30 marks**

Part-A

1. Question from unit-I
2. Question from Unit-II
3. Question from Unit-III

Part-B

4. Question from unit-IV
5. Question from Unit-V
6. Question from Unit-I

Section II

Write short notes on any FOUR of the following 4x5=20Marks

7. Question from unit-I
8. Question from Unit-II
9. Question from Unit-III
10. Question from Unit-IV
11. Question from Unit-V
12. Question from Unit-II
13. Question from Unit-IV

Note to paper setter:

In section I, one essay question is to be set from each of the 5 units. Similarly, in section II one short answer question is to be set from each of the 5 units.