PITHAPUR RAJAH'S GOVERNMENTCOLLEGE (AUTONOMOUS) KAKINADA - 533 001, AP.

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

Convened on 30 April 2024

AY 2024-25

DEPARTMENT OF CHEMISTRY

PITHAPUR RAJAH'S GOVERNMENTCOLLEGE (AUTONOMOUS)

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

Kakinada

www.prgc.edu.in; e-mail: chemistry@prgc.edu.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.2/A.C./BOS/2024-25, Dated: 23.04.2024.

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

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

ORDERS:

The Principal, P.R. Government College (A), Kakinada is pleased to constitute UG Boards of Studies in PETROCHEMICALS for framing the syllabi in respective Subject for Semester-V duly following the norms of the UGC Autonomous guidelines.

S. No	Name of the Person	Designation
1	V. Sanjeeva Kumar	Chairman & Lecturer In charge
2	Dr. M. Trinadh, Lecturer in Chemistry, Govt. College (Autonomous), Rajamahendravaram	University Nominee
3	Dr. V. Narayana Rao, Lecturer in Chemistry, Government Degree College, Perumallapuram	Subject Expert -I
4	Dr. T. Satyanarayana, Principal Ideal College of Arts and Science	Subject Expert - II
5	Dr.N. Ratnakar, AARKISH PHARMACEUTICALS INS NJ,NEW JERSEY	Subject Expert - III
6	Dr. P. KARUNA RAMAN MD, IDEAL ORGANICS HYDERABAD.	Representative from Industry
7	T. V. V. Satyanarayana	Member
8	P. Vijay Kumar	Member
9	V. Ram babu	Member
10	G. Pavani	Member
11	Dr. N. Bujji Babu	Member
12	Dr. Ch. Praveen	Member
13	V. Venkateswara Rao	Member
14	U.S.N. Prasad	Member
15	K.N.S. Swami	Member
16	S. Vijaya Lakshmi	Member
17	D. Bhavyasri	Member
18	K Sudheer	Student Alumni Member

19	V. Harshitha	Student Member
20	K. Devi	Student Member
21	K. Dinesh Varma	Student Member

The above members are requested to attend the BoS meeting on 30-04-2024 and share their valuable reviews, and suggestions on the following functionaries.

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

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

PITHAPUR RAJAH'S GOVERNMENT COLLEGE (A), KAKINADA
DEPARTMENT OF PETRO CHEMICALS
MINUTES OF BOARD OF STUDIES (BOS) MEETING

2024-25 on 30 April 2024 Meeting of Board of Studies in Petro Chemicals is convened on 30 April 2024 through online/offline at Pithapur Rajah's Government College (A), Kakinada.

Venue: JKC, Dt: 30 April 2024.

The Principal Dr. B.V. Tirupanyam, Chairman, Sri. V. Sanjeeva Kumar, Chairman and lecturer in charge, University Nominee, Dr. M. Trinadh, Lecturer in Chemistry, Govt. College (Autonomous), Rajamahendravaram, Industrialist, Dr. P. KARUNA RAMAN, MD., Ideal Organics Hyderabad, Industrialist, Subject Expert, Dr. V. Narayana Rao, Lecturer in Chemistry, Government Degree College, Perumallapuram, Subject Expert, Dr. T. Satyanarayana, Principal Ideal College of Arts and Science, All the faculty members of Chemistry Department and student alumni attended the meeting.

Agenda:

1. To discuss the Semester System and revised Choice Based Credit System (CBCS) being implemented for the Past 04 years, i.e., w.e.f. 2020-21.
2. To discuss and approve the Continuation/Modifications of the syllabus for the Semester-V for 2024-25.
3. Grant of Extra credits for Online SWAYAM MOOCs etc.
4. Syllabus, Model Question Papers and Model Blueprints, POs, PSOs & COs mappingfor V Semester.
5. Minimum of 60% integration of ICT into transaction of curriculum.
6. Minimum attendance of 75% for both I mid-term examination, and II mid-term examination under CIA component shall be the benchmark for attendance and itshall be approved in the BOS.
7. Teaching learning methodology by 50:50 (External: Internal) ratio for the present-III-Year Students. w.e.f. 2023-24.
8. Remedial coaching and assignments for slow learners, project works, research, Conferences, Industrial /academic tours & PG Entrance Coaching etc., for advanced learners.
9. Panel of paper setters and examiners.
10. Implementation of compulsory Community Service Project (CSP)/ Internships/ Apprenticeship and Extension activities for the benefit of the society.
11. Department action plan for 2024-25. To discuss and resolve the minor modifications/refinement if any.
12. Any Other Proposal with the Permission of the Chairman.

Resolution:

1. It is resolved to approve the syllabus as per the recommendations of the BOS for the Semester System and revised Choice Based Credit System (CBCS)being implemented for the past 04 years, i.e., i.e. 2020-21.
2. It is resolved to implement the suggestions discussed during the BOS for Continuation/Modifications of the syllabus for the Fifth Semester of III Year for 2024-25.
3. It is resolved to approve the Extra credits for Online SWAYAM MOOCs, edX, Coursera etc. which is as per the guidelines of Autonomous examination Cell.
4. It is resolved to approve Syllabus, Model Question Papers and Model Blue Prints, Cos, POs, & PSOs mapping for V Semester. With respect to the discussions held in the BOS.
5. It is resolved to approve Minimum of 50% integration of ICT in transaction of curriculum.
6. It is resolved to implement the Minimum attendance of 75% for both I mid-term examination and II mid- term examination under CIA component shall be the benchmark for attendance.
7. It is resolved to approve Teaching learning methodology by 50:50 (External: Internal) ratio III Year Students commenced w.e.f. 2021-22.
8. It is resolved to implement Remedial coaching and assignments for slow learners, project works, research works, Conferences, Industrial /academic tours & PG Entrance Coaching etc., for advanced learners.
9. It is resolved to propose Panel of paper setters and examiners for the academic year 2024-25.
10. It is resolved that the mandatory Community Service Project (CSP)/ Internships/ Apprenticeship and Extension activities are mandatory for overall growth of the student and benefit to the society.
11. It is resolved to implement the Departmental action plan for the AY 2024-25.

It is resolved to introduce the following new courses in the programme B.Sc. Petrochemicals from the AY 2024-25

S. No	Course Code	Title of the new course	Programmes in which it is introduced
1		Nil	Nil

Semester wise/ Paper wise Marks / Credits allotted.

YEAR	SEMESTER	PAPER	TITLE	MARKS	CREDITS
III	V	VIA	Petrochemicals-I	100 50:50	4
			Practicals	50	2
		VIIA	Petrochemicals-II	100 50:50	4
			Practicals	50	2

DEPARTMENT OF CHEMISTRY

ACTION PLAN

ACADEMIC YEAR 2024-2025

S.No	Month	Activity planned
1	July 2024	Enrollment of 3 months MOOCS/SWAYAM/NPTL/Edex etc by staff
2	July 2024	Placement Drive through JKC
3	August 2024	Invited talk
4	August 2024	Study tour
5	August 2024	Certificate/ Diploma course
6	September 2024	National seminar/ online/offline
7	September 2024	Sep 16 Ozone Day
8	October 2024	Certificate course/Diploma course
9	November 2024	Invited talk
10	December 2024	Enrollment of 3 months MOOCS/SWAYAM/NPTL/Edex etc by students
11	December 2024	International webinar
12	December 2024	10 December National Chemistry Day
13	January 2025	Invited talk
14	January 2025	Career Guidance
15	February 2025	Community outreach program (In connection with the National Science Day)
16	March 2025	Review of Research Publications for 24-25

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A)

KAKINADA

IMPORTNANT DAYS OF OBSERVATION FOR AY 2024-25

MONTH	DATE	NAME OF DAY	DEPARTMENT/STUDENT SUPPORTING WING
JANUARY	26th	Republic Day	All Departments and student supporting wings
FEBRUARY	28th	National Science Day	All Science departments
MARCH	22nd	World Water Day	Chemistry
JUNE	5th	World Environment Day	All Science departments
JULY	11th	World Population Day	All Arts depts.
	28th	World Nature Conservation Day	Life sciences
AUGUST	15th	Independence Day	All Departments and student supporting wings
SEPTEMBER	16th	World Ozone Day	Chemistry
	21st	International Day of Peace	History
	23rd	Mole Day	Chemistry
NOVEMBER	11th	National Education Day	

Signature of the members who attended the board of studies in Petrochemicals on 30th April 2024 at 10 a.m. mode of conduct of meeting offline / online.

SL.NO	NAME	SIGNATURE	CONTACT NO.
1	V. Sanjeeva Kumar	V. SL	9849324966
2	Dr. M. Trinadh, Lecturer in Chemistry, Govt. College (Autonomous), Rajamahendravaram	M.	9441388828
3	Dr. V. Narayana Rao, Lecturer in Chemistry, Government Degree College, Perumallapuram	V.	8328 [illegible]
4	Dr. T. Satyanarayana, Principal Ideal College of Arts and Science	T. Satyanarayana	9949694875
5	Dr. N. Ratnakar, AARKISH PHARMACEUTICALS INS NJ, NEW JERSEY	N.	
6	Dr. P. KARUNA RAMAN MD, IDEAL ORGANICS, HYDERABAD.	Dr.P.Karuna Raman	9398249493
7	T. V. V. Satyanarayana	T V V Sat	9490876913
8	P. Vijay Kumar	Vijay	
9	V. Ram babu		9948485537
10	G. Pavani	Pavani	9912526493
11	Dr. N. Bujji Babu		9441394792
12	Dr. Ch. Praveen		9491185518
13	V. Venkateswara Rao	V. Venkateswara Rao	9885161586
14	U.S.N. Prasad		6200882584
15	K.N.S. Swami	K.N.S.Swami	9908900962
16	S. Vijaya Lakshmi	S. Vijaya Lakshmi	9133941966
17	D. Bhavyasri	D. Bhavyasri	
18	K. SUDHEER		
19	V. HARSHITHA		
20	K. DEVI		
21	K. DINESH VARMA.		

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

Course Objectives:

To gains knowledge on production, purification, properties of natural gases.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand and explain the basic principles of feed stock for petrochemicals and natural gas.
CO2	In Depth understanding of synthesis gas and its production.
CO3	Learn and apply the production of synthetic detergents, petroleum coke and carbon black.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development			Employability			Entrepreneurship	

Syllabus:

UNIT-I

Feed stock for petrochemicals – Purification of gases – ethanolamine sweetening process - separation of gases into individual Constituents, separation of C_4 Components by extractive distillations – Low temperature fractionation–Special techniques – Absorption – Low temperature combination for Separation of Gases.

UNIT-II

Natural Gas:

Physical and thermodynamic properties of Natural gas – Low temperature processing o Natural gas for separation of ethane and heavy hydrocarbons– dehydration and sweetening of Natural Gas, Liquefaction of Natural gas and its Production of Substitute Natural Gas (SNG) from Naphtha.

Liquefied Petroleum Gas:

Sources of LPG – Composition of LPG – Chemical and physical properties of LPG - Production of LPG - Handling and safe use of LPG.

UNIT-III

Synthesis gas and its production

Steam reforming of Hydrocarbons – production of synthesis gas by steam reforming o Natural gas, steam reforming of Naphtha and partial oxidation of Fuel oil – Lurgi Coa gasification – Fischer Tropsch Syn gas technology.

After treatment of synthesis gas – Production of pure hydrogen, production of Ammonia synthesis gas, methanol synthesis gas – oxo – synthesis gas andpure carbon monoxide.

UNIT-IV

Chemicals from Synthesis gas:

Production of methanol – Oxo synthesis – production of Propionaldehyde and 2 – Ethy Hexanol – Production of Acetic Acid and Butanol from synthesis gas – Fractionation of Ai – Air separation plant, synthesis of Urea.

UNIT-V

Synthetic Detergents:

Classification of detergents – Detergents through olefins – manufacture of Linear Alky Benzenes, n-paraffin's production, and Detergents from n- paraffin's – Manufacture of Ary Benzene sulphonate (Surf) – manufacture of Alkylated Phenol detergents - Finishing o detergents – additives to detergents.

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_3	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	
V	--	--	K_3, K_6	

K_1= Remembering, K_2= Understanding, K_3= Applying,
K_4= Analysing, K_5= Evaluating, K_6=Create.

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Dr. B.K. Bhaskara Rao	A text on petrochemicals	Khanna Publishers, Delhi.
2	I.D. Mall	Petrochemical process Technology	Macmillan India Ltd.,
3	B.K. Sharma	Fuels and petrochemical processing	Goel Publishing HouseMeerut.

Weblinks

1.https://youtu.be/SmchkR7jRIE

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

Course outcome & Program outcome mapping

On Completion of the course, the students will be able to-	
CO1	Understand and explain the basic principles of feed stock for petrochemicals anc natural gas.
CO2	In Depth understanding of synthesis gas and its production.
CO3	Learn and apply the production of synthetic detergents, petroleum coke and carbon black.

CO-PO Mapping

1: Low=1; 2: Moderate=2; 3: High=3; 4: No Correlation=0

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	0	0	2	2	1	2	1	1	1	3	0	0
CO2	0	3	3	2	1	1	1	1	1	1	0	3	3
CO3	0	0	3	2	3	1	1	1	1	1	0	3	3

Program Outcomes

PO1: Knowledge in Petrochemicals: Apply the basic knowledge of petrochemicals to learn feed stock for petrochemicals and natural gas.

PO2: Problem analysis: Identify and analyse problems in synthesis gas production.

PO3: Design/development of solutions: Design solutions for the production of synthetic detergents, petroleum coke and carbon black.

PO4: Conduct investigations of complex problems: Use fundamental research-based knowledge and available research methods including design of experiments, analysis and interpretation of data.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for modeling and interpretation of synthesis gas and by products of petroleum.

PO6 : The Chemist & Society: Applying the contextual knowledge to assess societal, health, safety, legal and cultural issues.

PO7: Environment and sustainability: Understand the importance of petrochemicals for various solutions in societal and environmental context and demonstrate the knowledge and need for sustainable development.

PO8 : Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the science-based practice.

PO9 : Communication: Communicate effectively on complex Chemical activities with the Chemistry community and with society at large, such as, being able to comprehend and write effective reports, design documentation and make effective presentations

PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES

PSO-1: To identify and analyze the problems in feed stock for petrochemicals and natural gas using principles of Petro chemistry

PSO-2: Applying knowledge of Petro chemistry to design production for synthesis gas, synthetic detergents, petroleum coke and carbon black.

PSO-3: Use of various simulation tools for the synthesis gas, synthetic detergents, petroleum coke and carbon black.

WEIGHTAGE TO CONTENT
SEMESTER -V
PAPER-VI

S. No	Course Content	Long Answer	Short Answer	Total marks	As per Blooms Taxonomy
1	Feed stock of petrochemicals	1	2	20	Understanding, Application
2	Natural gas	2	1	25	Remembering, Understanding
3	Synthesis gas and its production	1	2	20	Application & Creation
4	Chemicals from synthesis gas	1	1	15	Remembering, Understanding
5	Synthetic detergents	1	1	15	Application & Creation
	TOTAL	**6**	**7**	**95**	

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A), KAKINADA.

B.Sc. -PETROCHEMICALS

MODEL QUESTIONPAPER

PAPER VI – PETROCHEMICALS – I

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. a. With a neat Flow diagram, explain the typical Ethanolamine sweetening process.BT 4

b. What are the different separation Techniques available industrially to Separate Gases into individual constituents? Discuss any one process briefly BT 4.

2. a. Describe how Dehydration and sweetening of Natural gas is carried out.BT2

` b. Discuss about the Low temperature processing of Natural gas for separation of Ethane BT2

3. a. With neat flow chart, describe the manufacture of synthesis gas by steam reforming of Naphtha. BT2

b. Define Fischer Tropsch syn gas Technology BT 1

SECTION – B

4. a. With a neat flow diagram describe the method of production of 2- Ethyl hexanol by Oxo – process.BT 2

b. With a neat flow diagram describe how Acetic Acid can be manufactured from Methanol and Carbon Monoxide (BASF method). BT2

5. a. Summarize how detergents can be produced from olefins.BT 5

b. Discuss the production of detergents from n - Paraffin's with a neat flow chart.BT 2

6 a. Write down the various sources of LPG. Discuss in detail about the safe handling and safe usage of LPG as a fuel keeping in view its properties. BT 4

b. Explain in detail about the production of LPG BT 4

PART-II

Answer any FOUR Questions from the following.

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

7. Explain about the purification of gases BT 4
8. Discuss a note on hypersorber BT 2
9. Evaluate the composition of natural gas BT5
10. Apply the process steam reforming of hydro carbons BT3

11. Distinguish the production of pure hydrogen BT2
12. Analyzing the process of Oxo synthesis BT4
13. classification of detergents BT 3

Note to Paper Setter: -

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

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

SEMESTER-V

PAPER-VI-Petrochemicals

PRACTICAL – VI (At the end of Fifth Semester)

1. Determination of Partition Coefficient of Benzoic acid between water and Benzene.
2. Diffusion coefficient.
3. Colorimetric estimation of KMnO4 solution.
4. Colorimetric estimation of Fe (III) – Thiocyanate Method.

SCHEME OFVALUATION

Procedure to be written in the first 15 minutes	**15 Marks.**
Recording of data and reporting the value	**25 Marks**
Marks upto 2% error	25 Marks
Error up to 5%	15 Marks
Error greater than 5%	10 Marks
Viva – Voice	**5 Marks**
Record	**5 Marks**
Total	**50Marks**

Co-Curricular Activities:

Mandatory:(Lab/field training of students by teacher:(lab:10+field:05):

For Teacher: Training of students by teacher in laboratory and field for not less than15 hours on the field techniques/skills of Determination of Partition of different Solutes and estimation of Concentration of solution by colorimetry.

For Student: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the techniques used for Determination of Partition of different Solutes and estimation of Concentration of solution by colorimetry. Write their observations and submit a hand written fieldwork/project work report not exceeding10 pages in the given format to the teacher.

Max marks for Fieldwork/project work Report:05.

Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

Unit tests (IE).

a) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics), collection of videos and other material.
3. Visits of facilities, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A), KAKINADA.
B.Sc. -PETROCHEMICALS
QUESTION BANK
PAPER VI – PETROCHEMICALS – I

UNIT –I:

Essay Questions

1. a. With a neat Flow diagram, explain the typical Ethanolamine sweetening process.
   b. What are the different separation Techniques available industrially to Separate Gases into individual constituents? Discuss any one process briefly.
2. a. Write in detail about the separation of C4 Components by extractive distillations.
   b. Explain briefly about the Low temperature combination for Separation of Gases.

Short Answer Questions

1. Explain about the purification of gases
2. Write about absorption technique
3. Explain about the separation of gases into individual constituents.
4. Write a note on hypersorber

UNIT-II

Essay Questions

1. a. Explain how Dehydration and sweetening of Natural gas is carried out.
` b. Explain about the Low temperature processing of Natural gas for separation of Ethane
2. a. Write down the various sources of LPG. Discuss in detail about the safe handling and safe usage of LPG as a fuel keeping in view its properties.
   b. Explain in detail about the production of LPG
3. a. Explain in detail about the Production of Substitute Natural Gas (SNG) from Naphtha.
   b. Write about the Liquefaction of Natural gas

Short Answer Questions

1. Write about composition of natural gas
2. Write about the properties of natural gas
3. What is LPG? Write the composition of LPG
4. Write briefly about the properties of LPG

UNIT-III

Essay Questions

1. a. With neat flow chart, describe the manufacture of synthesis gas by steam reforming of Naphtha.
   b. Write briefly about Fischer Tropsch syn gas Technology
2. a. Explain in detail about the production of Ammonia synthesis gas

b. Explain in detail about the production of Methanol by Oxo – synthesis

Short Answer Questions

1. Write briefly about Lurgi coal gasification
2. Write about the steam reforming of hydro carbons
3. Write about the production of pure hydrogen

UNIT-IV

Essay Questions

1. a. With a neat flow diagram describe the method of production of 2- Ethyl hexanol by Oxo – process.
   b. With a neat flow diagram describe how Acetic Acid can be manufactured from Methanol and Carbon Monoxide (BASF method).
2. a. Explain about the design and working of Air separation plant.
   b. Explain in detail about the synthesis of Urea.

Short Answer Questions

1. Write about Oxo synthesis
2. Explain about the production of Butanol

UNIT-V

Essay Questions

1. a. With a neat flow chart describe how detergents can be produced from olefins.
   b. Discuss the production of detergents from n - Paraffin's with a neat flow chart.
2. a. Explain in detail about the manufacture of Alkylated Phenol detergents
   b. Explain in detail about the Manufacture of Aryl Benzene sulphonate (Surf)

Short Answer Questions

1. Explain briefly about additives to detergents
2. Write about the classification of detergents
3. Write about the finishing of detergents

	Pithapur Rajah's Government College(Autonomous) Kakinada	Program &Semester III B.Sc. Mathematics, Chemistry, Petrochemicals & Semester-V (P-VII)			
CourseCode	**PETROCHEMICALS- II**				
Teaching	**Hours Allocated: 60** **(Theory)**	**L**	**T**	**P**	**C**
Pre-requisites:	Hydrocarbons and their properties, Catalysis, Crude oils, etc.	60	10	30	4+2

Course Objectives

To gains knowledge on production, properties of C1-C4 components.

Course Outcomes:

On Completion of the course, the students will be able to-	
CO1	Understand the concepts of production of chemicals from methane
CO2	In Depth understanding and production of chemicals from alkenes
CO3	Learn and apply the principles production of chemicals from aromatic petrochemicals.

Course with focus on employability / entrepreneurship / Skill Development modules

Skill Development		Employability		Entrepreneurship	

SYLLABUS

UNIT-I

Chemicals from Methane (C_1 Compounds).

Production of Methanol, Fluro chloromethanes, Hydrogen Cyanide andMethylamine from Methane.

Production of Formaldehyde, Tertiary Amyl Methyl Ether (TAME), Dimethylformamide from Methanol.

Production of Hexamethylene Tetramine and Ethylene Glycol fromformaldehyde.

UNIT-II

Chemicals from Ethylene (C_2 compounds)

Production of Ethylene by Naphtha cracking – manufacture of vinyl chloride, vinyl Acetate, Ethanol, Acetaldehyde, Ethylene oxide, Ethylene glycols from Ethylene –

UNIT-III

Chemicals from propylene (C_3 compounds)

Production of Propylene by catalytic cracking of Petroleum distillate - Production of Isopropyl Alcohol, Propylene oxide, Acrylonitrile, Acrolein, Acrylic Acid and Epichlorohydrin from Propylene.

UNIT-IV

Chemicals from Butylene, Butadiene and pentanes. (C_4 and C_5 compounds)

Dehydrogenation of Butanes for the Production of Butene's and Butadiene – catalytic dehydrogenation of butanes for the production of Butadiene – Production of methacrylic acid, MTBE from Butenes.

Production of Adipic acid from Butadiene – production of Isoprene frommethyl butenes (C_5 feed).

UNIT-V

Petroleum Aromatics and its chemicals:

Production of BTX through catalytic reforming, Reformate separation into Aromatics (Undex process), BTX separation from crude BTX Disproportionation of Toluene into Benzene and Xylenes, Isomerization of Xylenes to p-Xylene.

Chemicals from BTX Aromatics - Styrene from Benzene, Caprolactam and Toluene Diisocyanate from Toluene, Dimethyl Terephthalate from p-xylene.

Unit No	Additions	Deletions	Expected levels of learning as per Blooms taxonomy assessment of CO	Percentage added/deleted
I	--	--	K_2, K_3	
II	--	--	K_1, K_3	
III	--	--	K_3, K_6	
IV	--	--	K_1, K_2	
V	--	--	K_3, K_6	

K_1= Remembering, K_2= Understanding, K_3= Applying,
K_4= Analysing, K_5= Evaluating, K_6=Create.

Text Books & Reference Books

S. No	Author	Title	Publisher
1	Dr. B.K. Bhaskara Rao	A text on petrochemicals	Khanna Publishers, Delhi.
2	I.D. Mall	Petrochemical process Technology	Macmillan India Ltd.,
3	B.K. Sharma	Fuels and petrochemical processing	Goel Publishing HouseMeerut.

Web Links:

1.https://youtu.be/SmchkR7jRIE

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

CO-PO Mapping:

1: Low=1; 2: Moderate=2; 3: High=3; 4: No Correlation=0

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
CO1	3	3	3	2	1	1	2	1	1	1	3	3	2
CO2	3	3	3	2	2	1	2	1	1	1	3	3	3
CO3	3	3	3	2	1	1	1	1	1	1	3	3	3

Program Outcomes

PO1 : Knowledge in production of chemicals: Apply the knowledge of petrochemicals in the production of chemicals from alkanes, alkenes and aromatic petroleum substances.

PO2: Problem analysis: Identify and analyze the problems in the production of chemicals from alkanes, alkenes and aromatic petroleum substances.

PO3: Design/development of solutions: Design solutions for simple to complex problems in the production of chemicals from alkanes, alkenes and aromatic petroleum substances.

PO4: Conduct investigations of complex problems: Use fundamental research-based knowledge and available research methods including design of experiments, analysis and interpretation of data.

PO5 : Modern tool usage: Create, select, and apply appropriate techniques, resources, and IT tools for modeling and interpretation of simple to complex reactions

PO6 : The Chemist & Society: Applying the contextual knowledge to assess societal, health, safety, legal and cultural issues.

PO7: Environment and sustainability: Understand the importance of production of chemicals from petroleum industry for various solutions in societal and environmental context and demonstrate the knowledge and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the science-based practice.

PO9: Communication: Communicate effectively on complex Chemical activities with the Chemistry community and with society at large, such as, being able to comprehend and write effective reports, design documentation and make effective presentations

PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

PROGRAMME SPECIFIC OUTCOMES

PSO-1: To identify and analyse the problems in production of chemicals from alkanes, alkenes and aromatic petroleum substances.

PSO-2: Applying knowledge of petrochemicals to increase the production of chemicals from alkanes, alkenes and aromatic petroleum substances.

PSO-3: Use of various Simulation tools to improve the production of chemicals.

WEIGHTAGE TO CONTENT
SEMESTER -V
PAPER-VII

S. No	Course Content	Long Answer	Short Answer	Total marks	As per Blooms Taxonomy
1	Chemicals from C1 components	1	2	20	Understanding, Application
2	Chemicals from C2 components	1	1	15	Remembering, Understanding
3	Chemicals from C3 components	1	1	15	Application & Creation
4	Chemicals from C4 components	1	2	20	Remembering, Understanding
5	Chemicals from BTX aromatics	2	1	25	Application & Creation
	TOTAL	**6**	**7**	**95**	

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A), KAKINADA.

B.SC.-PETROCHEMICALS

MODEL QUESTIONPAPER

PAPER –VII: PETROCHEMICALS – II

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. a. Describe the process of manufacturing of methanol from Methane with neat flow diagram. **BT-1**

   b. Describe the process of manufacturing HCN from Methane With a neat flow chart. **BT-1**

2. a. Describe the production of Ethylene by steam cracking of Naphtha. **BT-1**

   b. Describe the manufacture of vinyl chloride from ethylene with a neat flow diagram. **BT-1**

3. a. Illustrate the process of production of Propylene with a neat flow chart by catalytic cracking of petroleum Distillate. **BT-2**

   b. Explain the process of production of Isopropyl alcohol from propylene with a neat flow chart. **BT-2**

SECTION – B

4. a. Describe the process of catalytic dehydrogenation of Butenes for the production of Butadiene with a neat flow diagram. **BT-1**

   b. Describe the process of production of methacrylic acid from Isobutylene With a neat flow diagram. **BT-1**

5. a. Illustrate the Udex process for Aromatics Separation from Reformate With a neat flow chart. **BT-2**

   b. Prepare BTX aromatics by catalytic reforming of Naphtha and Draw its neat flow diagram. **BT-4**

6. a. Illustrate the process of disproportionation of toluene into Benzene and Xylenes with a neat flow diagram. **BT-2**

   b. Demonstrate the process of isomerization of xylene to p- xylene with a neat flow diagram. **BT-2**

PART-II

Answer any FOUR Questions from the following.

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

7. Illustrate the production of ethyl amine from methane. **BT-2**
8. Discuss about the Production of Ethylene glycol from Ethylene. **BT-1**
9. Explain the Production of Epichlorohydrin from propylene. **BT-4**
10. Discuss the Production of Adipic acid from Butadiene. **BT-1**
11. Show the Reformate separation into aromatics Toluene di isocyanate from toluene. **BT-2**
12. Discuss about the production of Fluoro – choro methane's from methane.
13. Define Conversion of Butanes to Butenes. **BT-1**

PAPER-VII: Petrochemicals-II
Semester - V
PRACTICAL – VII : (At the end of Fifth Semester)

1. Preparation of Fluorescein Dye.
2. Preparation of Azo Dye.
3. Preparation of Novolac resin.
4. Preparation of Resol Resin.

SCHEME OF EVALUATION

Procedure to be written in the first 15 minutes.	
Chemical Reaction-	10 Marks
Procedure-	10Marks
Yield	10Marks
Viva – Voice	10 Marks
Record	10 Marks
Total	**50 Marks**

Co-Curricular Activities:

Mandatory:(Lab/field training of students by teacher:(lab:10+field:05):

For Teacher: Training of students by teacher in laboratory and field for not less than15 hours on the field techniques/skills of Preparation of Dyes and their applications.

For Student: Student shall visit a related industry/chemistry laboratory in universities/research organizations/private sector facility and observe the techniques used for Preparation of Dyes and their applications. Write their observations and submit a handwritten fieldwork/project work report not exceeding10 pages in the given format to the teacher.

Max marks for Fieldwork/project work Report:05.

Suggested Format for Fieldwork/project work: Title page, student details, index page, details of place visited, observations, findings, and acknowledgements.

Unit tests (IE).

a) Suggested Co-Curricular Activities

1. Training of students by related industrial experts.
2. Assignments, Seminars and Quiz (on related topics), collection of videos and other material.
3. Visits of facilities, firms, research organizations etc.
4. Invited lectures and presentations on related topics by field/industrial experts.

PITHAPUR RAJAH'S GOVERNMENT COLLEGE(A), KAKINADA.

B.SC.-PETROCHEMICALS

QUESTION BANK

PAPER –VII: PETROCHEMICALS – II

UNIT-I

Essay Questions

1. a. Describe the process of manufacturing of methanol from Methane with neat flow diagram. **BT-1**
   b. Describe the process of manufacturing HCN from Methane With a neat flow chart. **BT-1**
2. a. Illustrate the process of manufacturing Tertiary Amyl Methyl Ether (TAME) from methanol with a neat flow chart. **BT-2**
   b. Demonstrate the process of manufacturing of Ethylene Glycol from formaldehyde with a neat flow chart. **BT-2**

Short Answer Questions

1. Illustrate the production of ethyl amine from methane. **BT-2**
2. Discuss about the production of Fluoro – choro methane's from methane. **BT-1**
3. Describe the production of hexa methylene tetra amine. **BT-1**
4. Explain the production of Dimethyl formamide from Methanol. **BT-2**

UNIT-II

Essay Questions

1. a. Describe the production of Ethylene by steam cracking of Naphtha. **BT-1**
   b. Describe the manufacture of vinyl chloride from ethylene with a neat flow diagram. **BT-1**
2. a. Describe the manufacture of vinyl acetate from Ethylene with a neat flow diagram. **BT**
   b. Describe the manufacture of Ethyl alcohol from Ethylene with a neat flow diagram. **BT-1**

Short Answer Questions

1. Discuss about the Production of Ethylene glycol from Ethylene. **BT-1**
2. Discuss about the Production of acetaldehyde from Ethylene. **BT-1**

UNIT-III

Essay Questions

1. a. Illustrate the process of production of Propylene with a neat flow chart by catalytic cracking of petroleum Distillate. **BT-2**
   b. Explain the process of production of Isopropyl alcohol from propylene with a neat flow chart. **BT-2**
2. a. Summarize the process of production of Propylene oxide from propylene with a neat flow chart. **BT-4**
   b. Explain the Diagram describe the process of production of Acrylonitrile from Propylene with a neat flow – **BT-4**

Short Answer Questions

1. Explain the Production of Epichlorohydrin from propylene. BT-4
2. Explain Production of Acrolein from propylene. BT-4

UNIT-IV

Essay Questions

1. a. Describe the process of catalytic dehydrogenation of Butenes for the production of Butadiene with a neat flow diagram. **BT-1**
   b. Describe the process of production of methacrylic acid from Isobutylene With a neat flow diagram. **BT-1**
2. a. Explain the production of MTBE with a neat flow chart from Isobutene
   b. Describe the process of production of Maleic anhydride from C4 unsaturates with a neat flow diagram. **BT-1**

Short Answer Questions

1. Discuss the Production of Adipic acid from Butadiene. **BT-1**
2. Define Conversion of Butanes to Butenes. **BT-1**
3. Describe the Manufacture of Butadiene from Butanes. **BT-1**

UNIT-V

Essay Questions

1. a. Illustrate the Udex process for Aromatics Separation from Reformate With a neat flow chart. **BT-2**
   b. Prepare BTX aromatics by catalytic reforming of Naphtha and Draw its neat flow diagram. **BT-4**
2. a. Illustrate the process of disproportionation of toluene into Benzene and Xylenes with a neat flow diagram. **BT-2**
   b. Demonstrate the process of isomerization of xylene to p- xylene with a neat flow diagram. **BT-2**
3. a. Explain the process of production of styrene from benzene with a neat flow diagram. **BT-4**
   b. Explain the process of production of Caprolactam With a neat flow diagram. **BT-4**

Short Answer Questions

1. Illustrate the Production of DMT from Para xylene. **BT-2**
2. Show the Reformate separation into aromatics Toluene di isocyanate from toluene. **BT-2**