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P. R. GOVERNMENT COLLEGE
(AUTONOMOUS)
KAKINADA

(Affiliated to Adikavi Nannaya University, Rajamahendravaram)

DEPARTMENT OF CHEMISTRY

B.Sc. Petrochemicals Syllabus under CBCS

BOARD OF STUDIES

2021-2022

P. R. Govt. College (A), Kakinada

Recommended Composition of the Board of Studies of Petrochemicals

And it's Functions of an Autonomous College

(AY 2021-22)

I Composition

i. **Head of the Department concerned (Chairman):**

Sri. Rambabu Vasamsetti, M.Sc.B.Ed,SET

ii. **The entire faculty of each specialization.**

1. Dr. D. Rama Rao, M.Sc., B. Ed., M.Phil. Ph.D.
2. Dr. D. Chenna Rao M.Sc., Ph.D.
3. Sri. V.Sanjeeva Kumar M.Sc, NET
4. Sri. T.V.V. Satyanarayna M.Sc.B.Ed,SET
5. Sri. P. Vijaya Kumar M.Sc., NET
6. Sri. G. Pavani, M.Sc.B.Ed,SET
7. Dr. T. Uma Maheswara Rao MSc, Ph.D.
8. Dr. N. Bujjibabu MSc., Ph. D
9. Dr. Ch. Praveen MSc., Ph.D
10. Sri. G. Sai Subrahmanyam, M.Sc.,

iii. **One expert to be nominated by the Vice-Chancellor from a panel of six recommended by the College Principal**

Dr. M. Trinadh, Lecturer in Chemistry, GDC (A), Rajahmundry

iv. **One expert in the subject from outside the college to be nominated by the Academic Council**

Dr.V. Narayana Rao, Lecturer in Chemistry, GDC Perumallapuram.

v. **One representative from industry/ Corporate Sector/ allied area relating to Placement.**

Dr. B. Ramesh Babu, Founder & M. D., BogaR Laboratories, Peddapuram.

vi. **One postgraduate meritorious alumnus to be nominated by the Principal**

The chairman, Board of Studies, may with the approval of the Principal of the College, Co-opt.

Dr. K. Raghava Chari, M.Sc., M.Phil., Ph.D

II. Term.

The term of the nominated members shall be two years.

III. Meeting

The Principal of the College shall draw the schedule for meeting of the Board of Studies for different Departments. The meeting may be scheduled as and when necessary but at least once a year.

IV. Functions

The Board of Studies of a Department in the College shall:

a) Prepare syllabus and various courses keeping in view the objectives of the College interest of the stakeholders and national requirement for consideration and approval of the Academic Council.
b) Suggest methodologies for innovative teaching and evaluation techniques.
c) Suggest panel of names to the Academic Council for appointment of examiners.
d) Coordinate research, Teaching, Extension and other academic activities in the Department/College.

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

Department of Petro chemicals

Minutes of board of studies (BOS) meeting 2021-22 on 02. 12. 2021 at 3.00 PM

Meeting of Board of Studies in Petro Chemicals is convened on 02 December 2021 through offline at P.R. Govt. College (A), Kakinada, at 3.00 PM.

Venue: Conference Hall, Dt: 02-12-2021, Thursday – 3.00 PM.

The Principal Dr. B.V. Tirupanyam, Chairman, Sri V. Rambabu, 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. Narayana Rao, 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, II & III Years for 2021-22.
- Grant of Extra credits for Online SWAYAM MOOCs etc.
- Syllabus, Model Question Papers and Model Blue Prints for I, II, III, IV, V and 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. 2021-22.
- Panel of paper setters and examiners.
- Proposals for Community Service Projects/Extension activities for the benefit of the society.
- Department action plan for 2021-22.
- 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.

1. 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.

2. It is resolved to approve the Continuation/Modifications of the syllabus for the Odd & Even Semesters of I, II & III Years for 2021-22.

3.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)

4.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.

5. It is resolved to follow 50%-50% external and internal for first year w.e.f 2021-22 admitted batch.

6. It is resolved to allot 50 marks project work for final year students in chemistry preferably in cluster paper C - 3 practical's, w.e.f 2019-20 in accordance with APSCHE.

7. It is resolved to conduct departmental activities such as OZONE DAY, CHEM FEST, CHEMISTRY DAY and SCIENCE DAY. (Annexure-I)

8.It is resolved to implement the recommended andragogy for the first semester 2021-22

9.Resolved to conduct practical examinations semester wise.

10.It is resolved to organize guest lectures by eminent professors.

11.Resolved to implement pass minimum for internal assessment for CBSE pattern students as the pattern is learner oriented.

12.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.

Signatures of the members who attended the

Board of studies in Petrochemicals on 02.12.2021 at 3: 00 PM

S.No.	Name of the member	Designation	Signature
1	Sri. Rambabu Vasamsetti	Chairman, Board of Studies, Lecturer in charge	
2	Dr. M.Trinadh	University Nominee Lecturer in Chemistry, GDC(A),Rajahmundry	02/12/2021
3	Dr.V. Narayana Rao	Subject Expert Lecturer in Chemistry, GDC Perumallapuram	02/12/21
4	Dr. B. Ramesh Babu	Industry expert Founder & M. D., BogaR Laboratories, Peddapuram.	
5	Dr. K. Raghava Chari	Alumnus, Retd. Principal,	
6	Dr.D.RamaRao	Member Lecturer I/c- Dept. of Chemistry	
7	Dr.D. ChennaRao	Member Lecturer in Chemistry	
8	Sri. V. Sanjeeva Kumar	Member Lecturer in Chemistry	
9	Sri. T. V. V. Satyanarayna	Member Lecturer in Chemistry	
10	Sri. P. Vijaya Kumar	Member Lecturer in Chemistry	
11	Sri.G. Pavani	Member Lecturer in Chemistry	2/12/21
12	Dr.T. Uma Maheswara Rao	Member Lecturer in Chemistry	
13	Dr. N. Bujji Babu	Member Lecturer in Chemistry	
14	Dr. Ch. Praveen	Member Lecturer in Chemistry	2/12/201
15	Sri. G. Sai Subrahmanyam	Member Guest Faculty in Petrochemicals	

ACTION PLAN BOS MEETING – PETROCHEMICALS HELD ON 02 - 12 - 2021.

Department activities for 2021-22 Academic year.

Annexure I

S.No.	Month	Activity Proposed	Faculty Member of In charge
1.	**NOV-21**	Departmental staff meeting to review admissions and faculty recruitment	All Faculty members
2.	**NOV-21**	Preparation of curricular plans, time-tables etc.,	All Faculty members
3.	**DEC-21**	Bridge classes	All Faculty members
4.	**DEC-21**	Student awareness programs on ragging & eve teasing - consequences, self-discipline.	All Faculty members
5.	**DEC – 21**	World AIDS Day	All Faculty members
6.	**JAN-22**	Career guidance, higher education opportunities etc.,	All Faculty members
7.	**JAN-22**	Chemistry day & Chem. Fest	All Faculty members
8.	**FEB – 22**	Study tour / Field trips	All Faculty members
9.	**FEB – 22**	NATIONAL SCIENCE DAY	All Faculty members
10.	**MAR-22**	Guest Lecture	All Faculty members

1. Organizing National/ State level seminars/Workshops/ Conferences/ Training programs etc. With topics and other details.

i). Staff development programs
ii) Awareness on OZONE protection
iii) National Chemistry day
iv) National Science day 2020
v) Guest lectures / Invited Talks
vi) Training on Soil analysis
vii) Training on water analysis

2. Change of modules in the syllabus content.

3. Plan for utilization of funds for Autonomous /CPE / Other grants available for arranging guest lectures, faculty improvement programs, study tours, equipping laboratories, reference books & other necessary teaching-learning material with ICT enabled teaching.

I. Study visits/ Field tours to Final year students: **Rs. 20,000**

1. National Institute of Hydrology, Kakinada.

2. SAR Chandra Environ Solutions, Kakinada.

3. ONGC mini refinery, Tatipaka.

4. Soil analysis laboratory, Samalkot.

5. Venky parenteral, Yanam

6. Any other relevant field visits

II. Lab equipment's: **Rs. 2, 00,000**

Lab equipment's required to conduct Practical's and to give hands on training to the students in order to build skill and confidence in the area of Petrochemicals and petroleum products.

III. Reference books & other necessary teaching – learning material: **Rs. 10,000**

IV. Guest Lectures / Invited talks: **Rs. 15,000**

4. Plan for organizing subject oriented community outreach programs & allocation of necessary funds. (Mandatory for each Department)

i) Awareness programs on various social / Health issue Rs. 10,000

5. Introduction of new programs - Certificate courses. Rs. 10,000

6. Any other program that enhances the learning capacity of students and their employable & knowledge skills

7. Examination reforms if any,

8. Suggest panel of examiners/paper setters & other experts/nominees for BOS deliberations.
   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	04
			Practical – I	50	01
	II	II	Modern Petroleum Refining Processes	100	04
			Practical – II	50	01
II	III	III	Introduction to Chemical Engineering	100	04
			Practical – III	50	01
	IV	IV	Heat Transfer and Polymers	100	04
			Practical – IV	50	01
		V	Mass Transfer operations	100	04
			Practical – V	50	01
III	V	V	Mass Transfer operations	100	03
			Practical – V	50	02
		VI	Petrochemicals-I	100	03
			Practical – VI	50	02
		VII	Petrochemicals II (Elective)	100	03
			Practical - VII	50	02
Cluster	VIII(C)		VIII-C -1: Petrochemicals -III	100	03
			VIII-C-2 : Manufacturing Processes of Polymrs, Flow of fluids	100	03
			VIII-C-3:Testing and processing Techniques of Polymers	100	03
			Practical –VIII	50	02
			Practical –IX	50	02
			Practical –X: Project Work	50	02

GUIDELINES FOR ALLOTMENT OF EXTRA CREDITS

S.No.	Activity	Details of achievement	Credits
1	MOOC Course	**III**	Total credits achieved will be considered
2	NCC	B CERTIFICATE	2
		Participation in National Camp after 'B' certificate	3
		C certificate	4
		Adventure camp/RD parade along with 'B'	5
		Failed in B certificate Examination	1
3	Sports	Intercollegiate selection	2
		South zone selection	3
		All India participation	4
		Winning medals in all India competitions	5
4	NSS	40% attendance in regular NSS activities	1
		50% attendance with Community Service	2
		Conduct of survey/Youth exchange/RD	3
5	JKC	Enrollment and training	1
		Campus recruitment local level	2
		MNCs/reputed companies	3
6	Community service	Participation in community service by departments (outreach programmes)	2
7	Cultural activity	Winning medals at state level-2, District level-1	2 1
8	COP/Add on Course	Pass in Certificate Exam-1, Diploma-2	1 2

Course Structure:

All theory papers will have 4 hours per week and practical's will have 2 hours per week up to Semester IV (Second year). In final year all theory papers will have 3 hours per week and practical's will have 2 hours per week in Semester V and V I (Final year).

Each Theory Paper shall be of 100 marks and Practical Paper shall be of 50 marks.

Total Number of Papers: 21

Mathematics	: 7Papers
Chemistry	: 7Papers
Petrochemicals	: 7 Papers

Objectives and outcome of the course Petrochemicals

To give basic knowledge and awareness on petroleum and petrochemical products to the undergraduate level students, so that maintains linkages with Industries and research laboratories to expose the students to higher levels of knowledge and application of chemistry and then to provide job opportunities to the students in different industries.

With this impression the department of chemistry, P R Govt. College (A), introduced Mathematics, Chemistry and petrochemicals (MCPC) group in 1998-99. The objective of this course

The objective of B.Sc. Petrochemicals course is to teach students the basics about petroleum, petrochemicals and their processes. This subject gives student detailed information about petroleum and its formation.

In this three-year course spread over six semesters, there are 10 papers of Petrochemicals 7 papers of chemistry and 7 papers of Mathematics.

After graduating in Petrochemicals the students can pursue academics in Chemistry, Petroleum engineering, Petrochemicals and other disciplines of inter- disciplinary sciences. They can also use it as a stepping stone to different chemical, petrochemical and fertilizer in industries

Program Outcomes B.Sc. (Chemistry):

Undergraduate students upon graduation with a B.Sc. degree in chemistry:

PO : 1	Have firm foundations in the fundamentals and application of current chemical and scientific theories.
PO : 2	An understanding of major concepts, theoretical principles and experimental findings in chemistry.
PO : 3	Are able to design, carry out, record and analyze the results of chemical experiments
PO : 4	Are able to use modern instrumentation and classical techniques, to design experiments, and to properly record the results of their experiment.
PO : 5	Are skilled in problems solving, critical thinking and analytical reasoning.
PO : 6	Are able to identify and solve chemical problems and explore new areas of research.
PO : 7	Are able to use modern library searching and retrieval methods to obtain information about a topic, chemical, chemical technique, or an issue relating to chemistry.
PO : 8	Knows the proper procedures and regulations for safe handling and use of chemicals and can follow the proper procedures and regulations for safe handling when using chemicals
PO : 9	Are able to communicate the results of their work to chemists and non-chemists.
PO : 10	Understand the ethical, historic, philosophical, and environmental dimensions of problems and issues facing chemists.
PO : 11	Find gainful employment in industry or government, be accepted at graduate or professional schools (law, medicine, etc.), or find employment in school systems as instructors or administrators.
PO : 12	Are able to pursue Higher education in Chemistry and other disciplines of inter disciplinary

Course outcomes

Petrochemicals

CO: 1	To gains basic knowledge on Petroleum and petroleum products.
CO: 2	. To explain the market drivers for the refining industry.
CO: 3	To indicate what crude oils consist of and how crude oils are characterized based on their physical properties.
CO: 4	To express the objectives of petroleum refining and classify the processes used in petroleum.
CO: 5	To demonstrate how a petroleum refinery works and sketch a flow diagram that integrates all refining processes and the resulting refinery products
CO: 6	To examine how each refinery process works and how physical and chemical principles are applied to achieve the objectives of each refinery process
CO: 7	To assess implications of changing crude oil feed stocks on refinery configuration and propose strategies to resolve conflicts with degrading crude oil quality and increasingly stringent environmental regulations on petroleum fuels.
CO: 8	To discuss different sources of natural gas and explain how natural gas is processed at well sites and in processing plants with application of selected refinery processes and their physical operations

Specific Program Out comes

Petrochemicals

SEMESTER –I	SPO : 1	Gains knowledge Petroleum reservoirs, their characteristics and mechanisms
	SPO : 2	Understands the types of drillings
	SPO : 3	Gains knowledge on reservoir evaluation
	SPO : 4	Gains knowledge on composition, properties and uses of natural gas and LPG
SEMESTER –II	SPO : 1	Gains knowledge on Petroleum Processing Data and crude oil classification
	SPO : 2	Gains knowledge on crude oil distillation
	SPO : 3	Gains knowledge on different types of cracking processes
	SPO : 4	Gains knowledge on petroleum fractions
SEMESTER –III	SPO : 1	Gains basic knowledge on Unit operations and unit processes
	SPO : 2	Gains knowledge on measuring devices, flow meters and chemical reactors
SEMESTER - IV	SPO : 1	Gains knowledge on conduction, radiation and convection
	SPO : 2	Gains knowledge on evaporation and evaporation process
	SPO : 3	Gains basic knowledge on flow fluids
SEMESTER - V	SPO : 1	Gains basic knowledge about adsorption, absorption and distillation.
	SPO : 2	Gains some basic knowledge about extraction, crystallization and drying.
	SPO : 3	Gains some basic knowledge on purification of gases and natural gas.
	SPO : 4	Gains some basic knowledge about synthesis gas, its applications and synthetic detergents.
SEMESTER - VI	SPO : 1	Gains knowledge and awareness about some applied industrial products of C1, C2, C3 and C4 compounds and petroleum aromatics
	SPO : 2	Gains knowledge about chemicals produced from coal, coke, cellulose plastics and corrosion and prevention in industry.
	SPO : 3	Gains some knowledge about polymers, synthetic rubbers and plastics
	SPO : 4	Gains knowledge on moulding and different types of mouldings

Syllabus for B.Sc., - Petroleum & Petrochemicals
I B.Sc., Second semester
Paper II - Modern Petroleum Refining Processes

Unit – 1: Petroleum Processing Data:
Classification of Crude Oils, API Gravity, Characterization factors and correlation Index.
ASTM & TBP distillation of crude petroleum, Average boiling points, thermal properties of petroleum fractions.

Unit – 2: Crude oil Distillation:
Impurities in crude oils, Need for desalting of Crude oils, - electrical desalting of crude oils, Heating of crude in pipe still Heaters, Atmospheric distillation of crude oil, vacuum distillation of reduced crude oil,

Unit -3: Cracking processes:
Thermal cracking Reactions – Thermal cracking process –Dubbs two coil Cracking, Visbreaking

Catalytic cracking: mechanism of catalytic cracking – Moving Bed Air – lift thermofor catalytic cracker, Hydro Cracking – Isomax hydro cracking process

Unit – 4: Catalytic Conversions, and Finishing processes.
Catalytic Reforming: - Reforming reactions – catalytic reforming process.
Alkylation: Alkylation Reactions, Sulphuric Acid alkylation and HF alkylation. Isomerization: Aluminium chloride isomerization process,

Unit – 5: Petroleum Fractions: (Gasoline and Kerosene)
Gasoline: – ASTM distillation, Reid – vapour pressure, Octane number, Types of additives used in gasoline.
Kerosene: – Flash & Fire Points, Smoke point, Aniline point – Experimental determinations, Hydro treating process for smoke point improvement.

Suggested reading:

1) Modern Petroleum Refining processes by Dr. B.K. Bhaskara Rao. Oxford I B H.
2) Petroleum Refining Technology – by Dr. Ram Prasad, Khanna Publishers, Delhi.

I B.Sc., - Petroleum & Petrochemicals

MODEL QUESTION PAPER

Paper II (At the end of Second semester)

Modern Petroleum Refining Processes

(Time $2^1/_2$ HRS) (Max.marks 50M)

Section – I

Answer any Three questions. All questions carry **equal** marks. 3 X 10 = 30 M

1. Question from Unit-1
2. Question fromUnit -II
3. Question from Unit-II
4. Question from Unit-III
5. Question from Unit-IV
6. Question from Unit-V

Section-II

Answer any **four** questions.
All questions carry **equal** marks. 4X5=20M

1. Question from Unit - I
2. Question from Unit – II
3. Question from Unit – III
4. Question from Unit – IV
5. Question from Unit - I
6. Question from Unit – III
7. Question from Unit – V

I B.Sc., - Petroleum & Petrochemicals

BLUE PRINT

Paper – II: SEMESSTER - II

Modern Petroleum Refining Processes

BLUE PRINT

S. No.	Course Content	Essay Questions (10M)	Short Answer Questions (5M)	Total No. Of Questions from each Unit
1	**Unit –I**	**1**	**2**	**3**
2	**Unit –II**	2	1	3
3	**Unit –III**	1	2	3
4	**Unit –IV**	1	1	2
5	**Unit –V**	**1**	**1**	**2**
	TOTAL	**6**	**7**	**13**

NOTE: Questions should be given from Question Bank

I B.Sc., - Petroleum & Petrochemicals
Paper –II: SEMESTER -II

Modern Petroleum Refining Processes

QUESTION BANK

Essay Questions: 10 Marks

UNIT –I:

1. Explain about the experimental details of ASTM distillation of crude oil
2. Write the experimental details of TBP Analysis
3. Explain about thermal properties of petroleum and petroleum fractions
4. Write about various average boiling points.
5. Explain about the Characterization factor and correlation Index.
6. Write about the Classification of Crude Oils and API Gravity

UNIT –II:

1. Explain about the heating of crude oils in pipe still heaters
2. Write about the atmospheric distillation of crude oil
3. Write about the vacuum distillation of reduced crude oil
4. Explain about the electrical desalting of crude oils.
5. Write about the atmospheric distillation of crude oil

UNIT –III:

1. Write about different types of cracking processes and thermal cracking reactions.
2. Explain about the process of Dubbs two coil cracking.
3. Write about Visbreaking operation
4. Explain about the moving bed air lift thermofor catalytic cracking
5. With a neat flow diagram, describe the process of fluid catalytic cracking
6. With a neat flow diagram describe Isomax - Hydrocracking process

UNIT –IV:

1. With a neat flow diagram describe the process of catalytic reforming
2. With a neat flow diagram describe the process of cascade sulphuric acid alkylation.
3. With a neat flow diagram describe the process of hydro fluoric acid alkylation
4. With a neat flow diagram describe the process of Aluminum chloride isomerization.

UNIT –V:

1. Explain about the experimental details of ASTM distillation of Gasoline
2. Write about the experimental details of determination of Reid vapour pressure of the Gasoline
3. Write about the experimental details of the determination of Flash point and Fire point by Pensky marten apparatus.
4. Explain about the experimental determination of smoke point of kerosene oil.

Short answer questions: 05 Marks

UNIT - I:

1. Write about the classification of crude oils
2. Explain about API Gravity
3. Write about Characterization factor
4. Write about Correlation index
5. Write about thermal properties of petroleum fractions

UNIT - II:

1. Write about the impurities in crude oils
2. Write a short note on desalting of crude oils
3. Explain briefly about crude oil distillation
4. Write a note on pipe still heaters.
5. Explain briefly about Vacuum distillation

UNIT - III:

1. Write a short note on thermal cracking
2. Explain about thermal cracking reactions
3. Explain briefly the process of hydro cracking
4. Write a note on catalytic cracking

UNIT - IV:

1. Write briefly about the reactions during catalytic reforming
2. Write about the catalysts used for alkylation process
3. Explain briefly about isomerization process.

UNIT - V:

1. Write a short note on Octane number
2. Write briefly about the additives used in gasoline
3. Write briefly about the Aniline point determination

Practical Syllabus for I B.Sc.,
Petroleum and Petrochemicals

Practical II (At the end of Second Semester)

1) Cloud point determination.
2) Pour point determination
3) Determination of specific gravity of Petroleum fractions by Hydrometers.
4) ASTM Distillation of Gasoline
5) Determination of Specific gravity by Specific gravity bottle.
6) Determination of Specific gravity by Pyknometer.

SCHEME OF VALUATION

Max. Marks: 50

1)	Procedure to be written in the first 15 minutes	10 Marks
2)	Recording of data and reporting the value up to 2% error	20 Marks
	Error up to 5%	10 Marks
	Error greater than 5%	5 Marks
3)	Viva – Voice	10 Marks
4)	Record	10 Marks