

**SARDAR PATEL UNIVERSITY  
VALLABH VIDYANAGAR**



**EFFECTIVE FROM JUNE – 2017-18**

**M.Sc (Industrial Chemistry)  
Semester: II**

**Paper Code: PS02CICH21**

**Total Credit: 4**

**Title Of Paper: Industrial Analysis - I I**

<b>Unit</b>	<b>Description in Detail</b>	<b>Weightage (%)</b>
	Details of practicals to be worked out by department	100

**Paper Code: PS02CICH22**

**Total Credit: 4**

**Title Of Paper: Chem.Engg.Practicals - II**

<b>Unit</b>	<b>Description in Detail</b>	<b>Weightage (%)</b>
	Practicals based on Heat transfer Operations and Chemical Reaction Engineering- Details of practicals to be worked out by department.	100

**Paper Code: PS02CICH23**

**Total Credit: 4**

**Title Of Paper: Unit Processes**

<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
1	Principle ,reagents,mechanism, kinetics and applications of of Halogenation, Alkylation	25
2	Principle,reagents,mechanism, kinetics and applications of, Nitration, Sulphonation	25
3	Principle,reagents, mechanism, kinetics and applications of Hydrolysis, Esterification, Hydration.	25
4	Synthesis Based On Carbon Monoxide and Hydrogen, Oxidation	25

**References:**

1. Unit processes in organic synthesis, Groggins, Tata Mgraw Hill pub. 5<sup>th</sup> edition
2. Chemistry of petrochemical processes, Sami Mater,Lewis Hatch, Gulf Professional pub. 2<sup>nd</sup> edition
3. Industrial Organic Chemistry, K.Weissermal, H.J.Arpe,Wiley VCH. 4<sup>th</sup> edition
4. Chemistry and technology of basic organic and petrochemical synthesis, N.N. Lebedev, Mir pub.

**Paper Code: PS02CICH24**

**Total Credit: 4**

**Title Of Paper:**

Heat Transfer Operations and Stoichiometry

Unit	Description in detail	Weightage (%)
1	Three Dimensional heat conduction equation in rectangular and cylindrical co-ordinates, Effect of variable thermal conductivity, Heat transfer from extended surfaces. Newtons Law of cooling, Principle and Calculations for free and forced convection Stefan Boltzman law and Kirchoffslaw, Absorption, Transmission, Reflection and Emission of radiation, Heat transfer Co-efficients, effect of scale formation, Fouling factors	25
2	Design of Heat transfer equipments- Shell& tube, double pipe and plate heat exchangers,, multipass heat exchangers, LMTD correction factors, Effectiveness and number of transfer units for heat exchangers, principle and working of multi effect evaporators- forward feed, mixed feed and backward feed evaporators	25
3	Mass balance calculation for processes with and without chemical reactions, recycle & purge operations	25
4	Energy balance calculation for processes with and without chemical reactions	25

**References :**

1. Unit Operations of Chemical Engineering, W.Mc.Cabe, J. Smith, Mc.Graw Hill Co 7<sup>th</sup> edition
2. Chemical Engineering, Vol 1 to VI, Coulson & Richardson, Pergamon Press. 4<sup>th</sup> edition
3. Engineering Heat Transfer, C.P. Gupta, R. Prakash, Nomchand & Bros., Roorkee. 7<sup>th</sup> edition.
4. Process Heat Transfer, D.Q. Kern, Mc.Graw Hill Co.
5. Fundamentals of Engg. Heat & Mass Transfer, R. C. Sachieve, Wiley Ltd.

**Title Of Paper:** Petrochemical Technology

Unit	Description in detail	Weightage (%)
1	<b>Introduction:</b> Petroleum refining, Petrochemical feed stocks from petroleum refining, The basic building block processes, Petrochemical process technology, Primary raw materials for Petrochemicals like Natural gas, Crude oils, coal, oils shell, tar sand and gas hydrates.	25
2	<b>Crude Oil Processing and Production of Hydrocarbon:</b> Introduction, Physical separation Processes, Conversion Processes, Production of Olefines, Paraffinic hydrocarbon, olefins hydrocarbons, dienes, aromatic hydrocarbons, liquid petroleum fraction and residues. Reforming, Isomerization, Cracking	25
3	<b>Alkanes and higher Paraffin based Chemicals:</b> Introduction, Chemical based on synthetic gases, Chemical based on direct reaction of methane, ethane, propane and naphtha based chemicals from high molecular weight n-paraffin	25
4	<b>Chemicals based on olefin diolefin and aromatic hydrocarbon:</b> Introduction, Chemicals from n-butenes, isobutylenes, butadiene, benzene, toluene, xylene.  Test Methods for petroleum products	25

**References :**

1. Chemistry of Petrochemical Process, Sami Matar, Lewis F. Hatch, Gulf Professional Publishing. Boston.
2. Fundamental of Petroleum Chemical Technology, P. Belov, Mir Publications, Moscow.
3. Advanced Petroleum Refining, G. N. Sarkar, Khanna Publishers, Delhi
4. Petrochemicals, Peter Wisheman, John Wiley & Sons, New York
5. Fundamentals of Petroleum and petrochemical Engineering, Uttam Rai Chaudhari, CRC Press, Taylor & Francis group
6. Organic chemistry, warren, oxford university press

**Title Of Paper:****Technology of Paint Manufacturing, Printing  
Inks & Heavy Duty Protective Coatings**

<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
1	Principles of paint formulation, concept of pigment volume concentration, theory of pigment wetting & dispersion, dispersion technology	25
2	Coating manufacturing equipments-ball mill,sandmill,basket mill, attritor,High speed disperser	25
3	Different types of inks,manufacturing of inks ,different printing processes	25
4	Corrosion & Technology of heavy duty protective coatings,technology of marine coatings	25

**References :**

1. Surface coating technology,Vol 1 & 2,OCCA,Chapman & Hall, London & New York
2. Paints & surface coatings,theory&practice,secondedition,R.Lambourne&T.A.Stevens,William Andrew Publishers
3. Technology of printing inks,E.A.Apps
4. Protective Print coatings for metals,Fraun Hofer &Boxaln,ParticullisPress,England  
Basics of Paint Technolgy,firstedition,V.C.Malshe

**Title Of Paper: Air Pollution Control Technology**

Unit	Description in detail	Weightage %
1	Definition, sources of air pollution- Natural and anthropogenic. Vehicular pollution and its control. Aeroallergens- sources, biology and health effects. Effects of pollution on humans, animals, plants and materials and services, ambient air quality standards and exhaust emission standards from vehicles. Principal atmosphere pollutants – particulate matter, CO <sub>2</sub> , CO, HCs, NO <sub>x</sub> , acid rain asbestos and metals	25
2	Environmental factors and air pollution – Heat, insulation, wind, precipitation, mixing height and topography, plume – behavior, Gaussian plum model and box model, sampling and measurement of air pollution – ambient air and stack. Indoor air pollution measurement and monitoring.	25
3	Prevention and control pollution – Technology for particulate and gaseous pollution abatement. Air pollution episodes – Bhopal, Chernobyl, Los Angeles and London smog, Indonesian forest fire. Recent case studies on air pollution. Clean development mechanisms: carbon sequestration, carbon foot print, carbon trading and carbon markets	25
4	Statistics – sampling, data presentation techniques, frequency distribution, mean median, mode, standard deviation, standard error, t – test, probability, correlation and regression, analysis of variance	25

**References :**

1. Air quality management, Stern A. C.
2. Air pollution, Perkin H. G., Mc grow hill
3. Air pollution, Sharma B. K. and Kaur H
4. Air pollution, Rao M. N. and Rao H. V. N.
5. Biostatistics, K. S. Negi, AITBS publishers
6. Biostatistics, P. N. Malhan, Himalayan publication house
7. Sewage and air pollution engineering, Garg S. K.