

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Diploma Programme				Branch/Spec.	Petrochemical Technology				
Semester	II				Version					
Effective from Academic Year				2018-19		Effective for the batch Admitted in				
Subject code	2BS222			Subject Name	CHEMISTRY-II					
Teaching scheme					Examination scheme (Marks)					
(per week)	Lecture(D T)		Practical(Lab.)		Total		CE	SEE		Total
	L	TU	P	TW						
Credit	4	0	2	-	6	Theory	40	60		100
Hours	4	0	4	-	8	Practical	60	40		100
<p>The course content should be taught and implemented with the aim to develop different types of skills leading to the achievement of the following competencies.....</p> <ul style="list-style-type: none"> • To Develop the habits of identifying the problems related to the engineering materials. • Ability to establish the cause and effects of Chemical phenomenon. • To help students to cope up with continues flow of Development in Engineering Chemistry. 										
Theory Syllabus										
Unit	Content					Learning outcomes				Hrs.
1	<p><u>Preparation of standard solution:</u> Define the term solute, solvent, solution Methods of expressing concentration Weight/Weight method, Weight/volume method, explain molarity, Molality, Normality, gram/lit, PPM, Density, Viscosity, Types of W/W methods, Types of W/V methods</p>					<ul style="list-style-type: none"> • Students understand Knowledge about solution. • They study how to make solution of exact concentration. 				04
2	<p><u>Ionization & Electrolysis :</u> Introduction, Arrhenius theory of ionization, Degree of ionization, Factors affecting the degree of ionization. Electrolytes and non-Electrolytes, Industrial application of Electrolysis, Faradays laws of electrolysis.</p>					<ul style="list-style-type: none"> • Students study polar substances more soluble in polar solvents and non polar substances soluble in non polar solvents. • Students are familiar with conductivity of solutions which is due to number of ions in the solution. 				06

	<p>Definition of pH, pH of acid, base and neutral solution, importance of pH in various fields, pH Calculation of acid, base and salt solution at different concentration.</p> <p>Definition and Types of Buffer solution.</p>	<ul style="list-style-type: none"> • Students get knowledge about electroplating, electrotyping and extraction of metals from its ore by application of electrolysis. • Importance of pH in various field 	
3	<p><u>Corrosion of metals & its prevention:</u></p> <p>Definition of corrosion, Types of corrosion (Pitting, Waterline, Crevice), Factors affecting the rate of corrosion (Nature of film, Nature of Environment, pH of solution, Temperature, Purity of metal)</p> <p>Method of prevention of corrosion (protective coating, Anodic and cathodic protection, Modification in design and choice of material)</p>	<ul style="list-style-type: none"> • They will study what is redox reactions and its role in corrosion. • They know how to prevent corrosion of metal. • They control corrosion of metal by proper design of materials and by selecting proper metal-metal mixture in revating. 	06
4	<p><u>Electro chemical Energy Sources:</u></p> <p>An electrochemical source of energy, Primary, Secondary and fuel batteries, Construction and working of Dry cell and Lead acid storage cell, Fuel cell (H_2/O_2, solar cell)</p>	<ul style="list-style-type: none"> • Students know different types cells. • Students get knowledge about importance of solar energy. 	06
5	<p><u>Fuels and combustion:</u></p> <p>Definition and classification of fuels, Determination of Calorific value by Bomb calorimeter, Solid Fuels (Classification of Coal, Proximate and ultimate analysis of fuels), Liquid Fuels (Petroleum), Origin of petroleum & Composition of petroleum, refining of petroleum, Octane and Cetane number of petroleum, Power alcohol, Gaseous fuels, Composition, Properties and application of natural gas, CNG, LPG and LNG – Properties and application.</p>	<ul style="list-style-type: none"> • Students can classify which fuel is from which class and also judge which fuel is best for pollution control. • Students study melting point and boiling point and by the help of it we separate petrol, diesel, kerosin, neptha, coal etc from crude oil • Students know the strength and value of fuels by the help of octane and cetane number. 	08
6	<p><u>Inert gases:</u></p> <p>Method of separation of inert gases, compound of inert gases and their application.</p>	<ul style="list-style-type: none"> • They study of isolation of noble gas from air. • They study how to separate He, Ne, Ar, Kr, Xe and Rn from mixture. • Noble gases are useful in various fields due to its unactive property 	05
7	<p><u>IUPAC system:</u></p> <p>Nomenclature 'IUPAC system of Nomenclature Organic compounds and their types, Classification of Organic compounds according to their functional Group &</p>	<ul style="list-style-type: none"> • These system of IUPAC make easy to name of organic compound • Students easily remember names of organic compounds given by IUPAC system. • There are simple rules which make 	06

	structure, IUPAC, naming rules ,Application of IUPAC system in naming of the Organic Compound	nomenclature of compound.	
8	<p><u>Lubricants</u></p> <p>Introduction and definition of lubricants and lubrication, Function of lubricants, Classification of lubricants (solid, semi-solid, liquid, synthetic oil), Physical Properties (viscosity and viscosity index, flash and fire point, pour and cloud point, oiliness)</p> <p>Chemical Properties (Saponification value, Neutralization number, Emulsification number)</p> <p>Selection of lubricants for Gears, Cutting tools, Steam turbine.</p>	<ul style="list-style-type: none"> • We improve our machine, vehicle life and decrease maintenance of it by selecting proper lubricants • Students study various important properties of lubricants. 	04
			45

SUGGESTED LIST OF EXPERIMENTS

The experiments should be properly designed and implemented with an attempt to develop different types of skills leading to the achievement of the competency -

Sr.No.	Unit no.	Experiment
1	1	Inorganic qualitative Analysis . (Student should perform minimum 20 experiments)
2	2	To determine pH-Values of given samples of Solution by using Universal Indicator and pH-meter.
3	3	Study of corrosion of metals in medium of different pH.
4	3	Study of Corrosion of Metals in the different mediums.
5	5	To determine the Moisture content of coal.
6	5	To determine the ash content in a given sample of coal.
7	2	Study of electrochemical cell and electrolyte cell.
8	4	Study of Electrochemical series.
9	8	To determine the viscosity of given liquid.
10	8	To determine Flash & Fire point of given lubricating oil.

	Note	Minimum 20 Experiments should be performed by the students from the above given list or experiment related to above topics
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SUGGESTED LEARNING RESOURCES

List of Books

Sr.No	Title of Books	Author	Publication
1	Engineering Chemistry	JAIN & JAIN	Dhanpat Rai and Sons
2	A Text Book of Polytechnic Chemistry	V.P. Mehta	Jain Brothers
3	A Text Book of Applied Chemistry	J. Rajaram	Tata McGraw Hill Co. New Delhi
4	Engineering Chemistry	S.S.Dara	S.Chand Publication
5.	A text book of Engineering chemistry	M.M.Uppal	
6.	Inorganic chemistry	P.L.SONI	

<https://www.emedicalprep.com/study-material/chemistry/colligative-properties/methods-expressing-concentration-solution/>
<https://xapps.xyleminc.com/Crest.Grindex/help/grindex/contents/Metals.htm>
<https://www.online-sciences.com/the-matter/the-properties-of-the-noble-inert-gases/>

List of Major Equipment/ Instrument

- PH- Meter
- Electric oven (0° to 150°)
- Glass wares
- Chemical balance
- Desiccator
- Redwood Viscometer
- Pesky Martin Apparatus / Abel's Apparatus
- Cleveland open cup apparatus.

SUGGESTED LIST OF PROPOSED STUDENT ACTIVITIES

Following is the list of proposed student activities like:

- Teacher guided self learning activities.
- Course/topic based internet based assignments.
- Library survey regarding Engineering Material used in different industries.
- Industrial Visits of one or Two Industries.

- Quiz & Brain storming session related to Fuel properties & Utilization of fuel for different purposes.
- Sampling & Testing of water collected from different places.
- These could be individual or group-based.